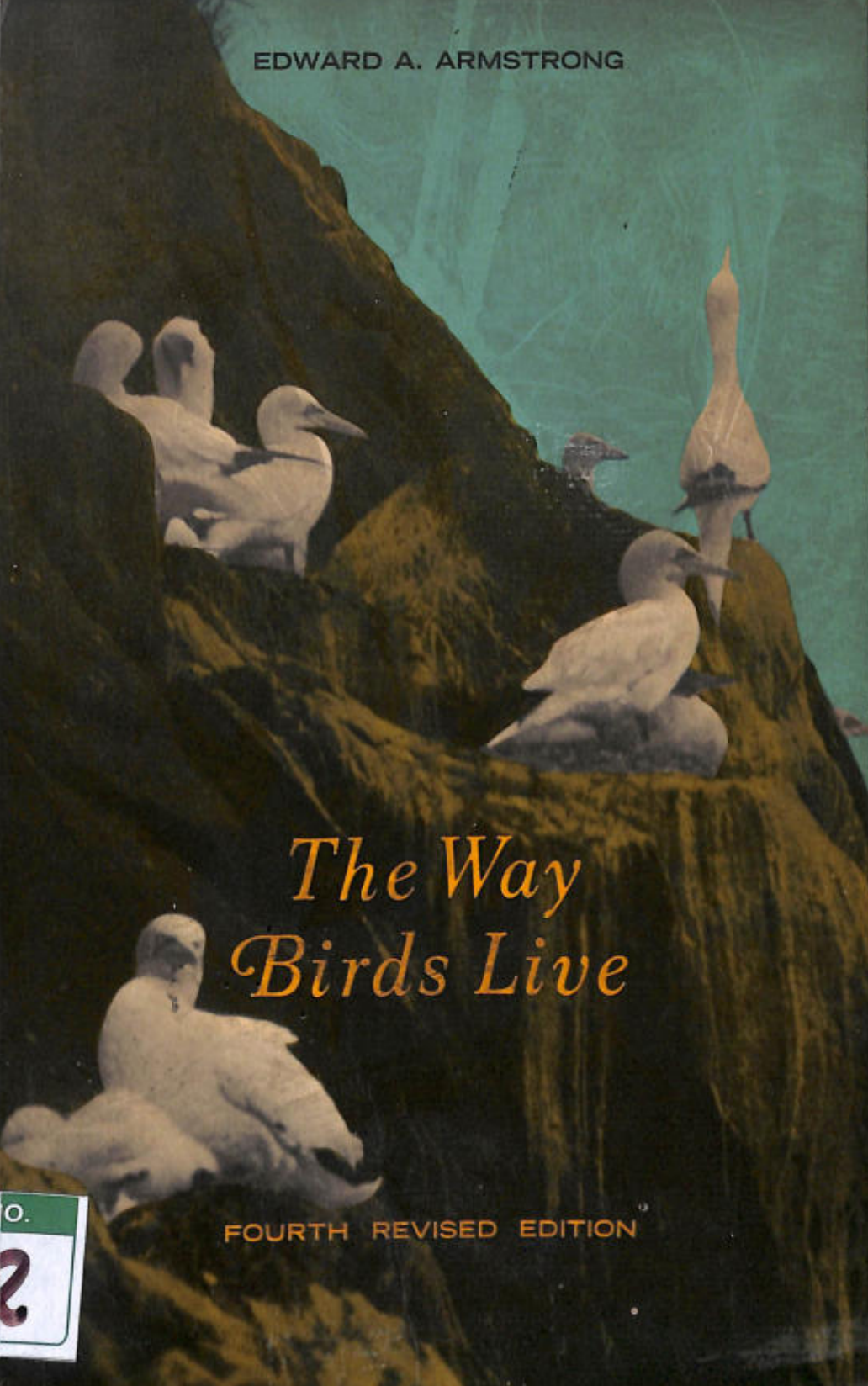


The background of the book cover is a detailed illustration of several albatrosses on a dark, craggy cliff. The birds are white with dark wingtips and long, hooked beaks. One bird is perched high on the right, looking towards the left. Another is in the center, facing right. A third is in the lower left, looking down. The sky is a pale, hazy blue. The overall style is that of a classic natural history book illustration.

EDWARD A. ARMSTRONG

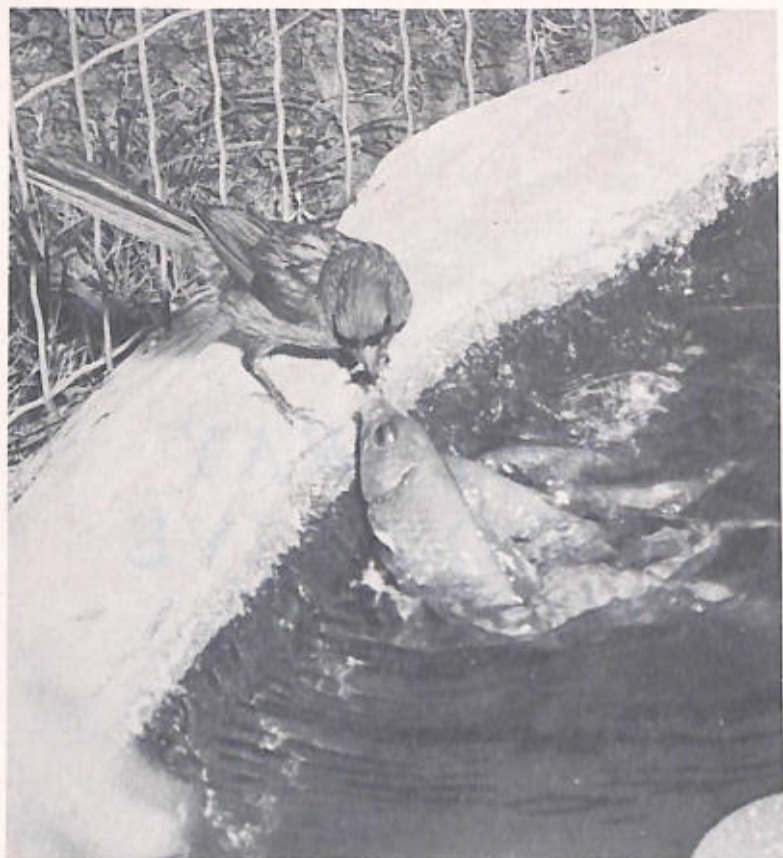
*The Way
Birds Live*

FOURTH REVISED EDITION

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THE WAY
BIRDS LIVE



CARDINAL FEEDING GOLDFISH (p. 37).



THE WAY BIRDS LIVE

BY

EDWARD A. ARMSTRONG

Illustrated with drawings by the author and with photographs

Fourth Revised Edition



DOVER PUBLICATIONS, INC., NEW YORK

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Published in Canada by General Publishing Com-
pany, Ltd., 30 Lesmill Road, Don Mills, Toronto,
Ontario.

Published in the United Kingdom by Constable
and Company, Ltd., 10 Orange Street, London
WC 2.

This Dover edition, first published in 1967, is a
revised version of the work originally published by
Lindsay Drummond, Ltd., in 1943. It contains a
new Preface by the author.

Library of Congress Catalog Card Number: 67-19612

Manufactured in the United States of America
Dover Publications, Inc.
180 Varick Street
New York, N. Y. 10014

PREFACE TO THE SECOND EDITION

THE SECOND EDITION of this book was prepared by the author in 1921, and it is a pleasure to be able to say that it has been well received. The book has been used in many schools and colleges, and it is gratifying to find that it has been found useful. The author has received many suggestions from teachers and students, and he has endeavored to incorporate them into this second edition. The book is now in its second edition, and it is hoped that it will be found useful to a larger number of teachers and students than the first edition.

FOR PATRICK



PREFACE TO THE DOVER EDITION

Since this little book was first published interest in birds and understanding of why they behave as they do has been increasing, but it is sad that in most parts of the world the birds themselves have been decreasing. As population expands, the quiet places which birds like are destroyed; houses are built, more land is cultivated, and poisonous sprays kill birds as well as the harmful insects. Many societies are striving to preserve wild life and I urge my readers to do all they can to prevent birds and their haunts from being thoughtlessly destroyed. Why not join one of the conservation organisations so that you can feel you are doing something to preserve the world's beauties for those who will follow you? You will thus meet other people who can help you to enjoy birding.

Much of this book has been rewritten to bring it up to date and all of it has been revised. Its scope is world-wide, for it aims to tell of the interesting activities of birds wherever they may be, but as this edition is appearing in the United States mention is made of many American species and several photographs of American birds are included.

Without some explanation there could be misunderstanding in regard to the names of birds, for the same bird may have a different name across the Atlantic and different birds may even have the same name! Merely because it has a rosy breast early settlers from England named a thrush "robin" although it is unlike the European robin in appearance and behaviour. The American red-winged blackbird is not related to either the European blackbird or redwing. In America "sparrowhawk" denotes a bird much more like the European kestrel than the European sparrowhawk. Some species occur on both sides of the Atlantic—the house sparrow and starling which were introduced to America, and others such as the raven and the herring gull which occur naturally. Long ago one of the many wren species of America, the winter wren, colonised much of Asia and Europe. In Britain it is just "the wren." The house sparrow belongs to a different family from the "sparrows" of the United States for it is related to the weaverbirds and they are buntings. Chickadees are similar to tits but European warblers, which are brownish birds most easily

identified by their songs, are not closely related to the American warblers, most of which are conspicuously coloured. If in doubt about a bird look it up in one of the excellent books with coloured pictures. Some of these give the American, English, and scientific names. Here are a few birds mentioned later with their alternative names: Common loon (great northern diver), duck hawk (peregrine falcon), marsh hawk (hen harrier), gallinule (waterhen or moorhen), red-backed sandpiper (dunlin), bank swallow (sand martin), brown creeper (tree-creeper). The American woodcock resembles the European woodcock in some respects but is not the same species. The great blue heron is very similar to the only species of heron which nests in the British Isles.

I wish to thank Dr. Ralph S. Palmer of the New York State Museum for his critical reading of the manuscript for the revised edition, and the National Audubon Society for their cooperation in helping to choose new illustrations.

If you would like to know more of the interesting activities of birds, further details can be found in my *Bird Display and Behaviour* (Dover, 1965) and *An Introduction to Bird Song* (Oxford University Press, 1963). Both of these contain lists of books and papers enabling readers to follow up aspects of bird behaviour in which they happen to be particularly interested.

EDWARD A. ARMSTRONG.

CAMBRIDGE, 1966.



PREFACE TO THE FIRST EDITION

"WE'LL a-birding together," says Master Page in Shakespeare's play, *The Merry Wives of Windsor*. Let that be our motto, too. Watching birds has given me a great deal of pleasure and I should like to add the joy of sharing some of it with other folk. Birds are always interesting and delightful to watch but their fascination increases the more we understand their ways. When I was a boy I never could find a book to tell me—not merely what the birds looked like—but about their singing and dancing, love-making and fighting, and why they do just what they do. This book deals with these things. I hope that after reading it you will go out and have plenty of fun looking at birds for yourself. Those of you who are young in years or heart, sharp-eyed, energetic, and know what to look for, should be able to find out new things about birds' activities—and that is the greatest fun of all. Here and there I have mentioned observations which nimble eyes, aided by some patience, might make. You will, no doubt, think of many more as you read.

The life history of very few birds has been closely studied so there is plenty of opportunity for you. The more you watch and record birds' ways the easier it is to understand what they are up to, and the more you understand what they do and how they live the easier it is to notice activities which are worth recording. In this little book you will find something about the unusual things that birds do as well as notes of what they commonly do. I think that if you know some of the strange doings as well as have an idea of the ordinary ways of birds you will be able to tell whether what you observe from time to time is ordinary or not. In speaking of birds we can hardly ever say, "All birds do this," or use "always" or "never," because, first of all, as you will presently see, different kinds of birds may do the same thing in many different ways, or even do it differently at different times, and secondly, we need lots more observations and life histories of birds to fill the gaps in our incomplete information. So combine sport and science, mingle fun and facts, in your bird watching. As you sit with your notebook in a hide before a bird's nest or lie concealed amidst the rocks of some bird-thronged island with your camera you are a hunter, hunting for

more facts about the way birds live—a scientist adding to our knowledge of what is true and our enjoyment of what is beautiful.

What makes the activities of wild birds so interesting to watch and so puzzling to understand is that birds' ways are both like and unlike ours. They sing, imitate one another, and do many things that we do—as we shall presently see—and so it seems as if their feelings were sometimes at least a bit like ours. But their minds work differently. For example, when a young cuckoo throws a meadow pipit chick out of the nest its mother does not try to carry it back although it may lie dying only an inch or two away from her as she sits brooding the changeling. She does not seem to know that it is her chick any longer. On the other hand, a swallow is able to find its way back from South Africa to the same barn in which it nested last year. Are we to say that the one bird is very stupid and the other very clever? No! Birds are birds, not human beings, and they are adapted to live a bird's life, not a human life. So when watching birds we must try to become birds to some extent ourselves and not judge them by human standards. We may speak of birds "courting," "getting engaged," "playing," "learning," and so on, but of course we don't imagine that these terms mean just the same as when we use them about people. It is difficult, but very interesting, to try to think ourselves into the mind of a bird. The more we learn to do it the better our birding will be.

Quite a number of people have helped to make this book more interesting and accurate, particularly my wife, Dr. W. H. Thorpe, and Mr. D. Lack, who each read the proofs and made suggestions. Miss M. G. S. Best, Mr. G. Bird, Dr. W. S. Bullough, Mr. Lee Crandall and the New York Zoological Society, Lord William Percy and Dr. M. N. Rankin very kindly allowed me to use their photographs and I am very grateful to them. Two friends who provided pictures I am no longer able to thank personally, the pioneer bird photographer Mr. Riley Fortune who was generous in his help to me, and Pilot Officer Denis Henderson Rankin, killed on active service, a promising young naturalist. Four of my sketches appeared originally in *Birds of the Grey Wind* (2nd. edn. Lindsay Drummond, 1944). A list of books which would enable readers to follow up some of the matters dealt with here appears in *Bird Display* (C.U.P., 1942).

EDWARD A. ARMSTRONG.

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Photographs not otherwise acknowledged are by the author



CHAPTER I

FINDING A PARTNER

Why Birds Sing.—In some countries, such as France and Germany, a young man or girl will put an advertisement in the papers giving particulars about himself or herself and stating what kind of a partner would be suitable. Birds do much the same thing. They advertise who they are and where they are by singing. When a migrant arrives in Europe or the United States from the south, he claims a piece of ground as his own and starts to sing; and his song means the same thing whether he chants "*teacher, teacher*" like the oven-bird or pipes as sweetly as the blackcap or hermit thrush. It means, "Here I am! I would make a very fine partner. You other fellows keep off! This is my stronghold, and I'll go for anyone who dares set foot in it." The various bird-songs are just these things being shouted in what we might call different languages. The scheme works very well, for the cock birds of many species arrive ten days or a fortnight before



Thrush singing.

the hens and have their claims staked before these arrive. A bird can drive another away by singing without having to fight—which is all to the good as, instead of killing or wounding each other, they may both live to bring up families. He who doesn't fight but runs away may live to mate another day! A European robin, for example, will sometimes make off on hearing a rival sing, without even waiting to catch a glimpse of him. On the other hand, unmated females are attracted by a cock bird's song. Bird fanciers tell us that a female canary may "fall in love" with a male because he sings in a way which appeals to her. This is

difficult to prove but it has been noticed that some birds which sing feebly or unnaturally may not attract a mate.

Attracting Mates.—Birds which live in very thick cover, such as cat-tail swamps, where they are not easily seen, often have particularly loud, continuous, or strange songs so that everyone may know that they are there. The corncrake's call is so like the noise made by a saw-edged piece of bone rubbed over another piece that with two such bones it is easy to call the bird right up to you ; the bittern utters a queer bellow ending with a booming thud. I once spent a couple of hours hidden in a reed-bed with a bittern booming close at hand. Each time he gave two or three gasps as he took breath and then came the boom—which did not sound particularly loud although it can be heard at a distance of three miles. When I listened to the bird calling at dusk over the misty marsh it seemed to me as if away out there was a tired sad giant giving a sigh and groan as he turned over in bed ! The American bittern's "thunder-pumping" sounds like a stake being driven into the ground. The grasshopper warbler makes a continuous ticking wheeze like a fisherman's reel unwinding as he "plays" a trout. The song of the American grasshopper sparrow is somewhat similar. Species which live in less thickly grown places have other ways of attracting attention. One of the most popular is to fly up into the air. Skylarks are the experts at this game ; pipits also have fine flight-songs or song-flights ; grouse, not being good singers, just flop up a few feet from a hillock. In spring on Scottish moors the curlew flutes his lovely bubbling notes as if he had his mouth full of water ; and the snipe dashes around high up, every now and then diving head first while the wind in his tail-feathers makes a bleating noise, so that a town-bred boy or girl might think a goat was cruising about in the sky ! It all means the same thing, just as the meaning of an advertisement for somebody's soap is the same whether it is in English or Chinese, on a sign carried round by a sandwich man, or rushed about painted on a delivery truck.

The European heron has his own way of finding a mate. He stands on a branch near the spot which he has chosen as suitable for the nest, points his beak to the sky with his head thrown back and calls *hoo*, then lowers his head towards his legs, making a snapping sound and adding a long-drawn *ooooo*. He goes on doing this until at last a female becomes interested ; then things warm up

and after some further preliminaries housekeeping begins. It is as if eligible bachelors instead of going to dances to meet nice girls rented an empty house and stood at the open window taking off their hats to them.

The red-necked or northern phalarope, an arctic species which looks a little like a dainty waterhen or gallinule, has very different customs. The female does the courting. She flies towards any male appearing in her neighbourhood and shows him that he is welcome by making a rattling noise with the quills of her wing feathers. After they have mated she lays her eggs and then leaves to him the business of looking after them.



Snipe drumming.

When birds live in flocks they sometimes find partners amongst their companions, just as sensible young men don't usually wait for rich heiresses to turn up from across the seas but choose a suitable girl in their own town. Gulls and terns often adopt this plan. It has the advantage that no time need be wasted looking around for a mate at the nesting-ground. Housekeeping can start without delay.

Pairing-up.—Sometimes a youth and a girl fall in love at first sight, sometimes they take some time to get to know each other; they may have a long engagement or, perhaps, get married very soon. Amongst birds there is just as much variety. A few moments ago we pictured the bachelor heron on the tree-top calling for a partner hour after hour and sometimes week after week. At last an unattached female arrives. Now he makes clicks with his bill to invite her to enter his domain amongst the branches. But he has got into such a habit of defending it and keeping out trespassers that unless she approaches very slowly and cautiously he may offend or frighten her by suddenly striking at her with his bill—and so the process of getting acquainted has to start over again. When at length she joins him there may be quite a few little tiffs and misunderstandings, but at last he gracefully presents a stick to her, raising his crest at the same time;



Heron's invitation ceremony.

she erects her crest and accepts it from him, and the pact is sealed. Thereafter he will bring her many a stick to build into the nest, for he takes his full share in everything to do with their home.

There is a pretty black-and-white bird which may be seen along coasts when flocks come south from the arctic in winter—the snow bunting. The cock takes possession of a stretch of rocky, turfy ground, and whenever he sees another snow bunting approaching flies towards it to drive it away. He does not seem to know whether he is dealing with a male or a female until he is quite close. If the stranger turns out to be a male and shows fight, he attacks him and drives him off or fights him; but when the male flies up to a female she just potters around unfrightened. Then he issues his pretty invitation. Standing upright he opens his black-and-white wings, spreads his similarly coloured tail, and trots away from her, making a striking chequerboard display of his plumage as he does so. He runs back each time and performs his little dance again and again until she joins him. Their “engagement” period is very

brief. In the north the nesting-season is short and birds cannot afford to waste time if they are to raise a brood.

European robins defend their kingdom or "territory" almost all the year round. This is why they may be heard singing in winter, for they warn off intruders then as well as in spring. Quite early in the year—long before it is time to nest—they form pairs. A hen flies towards a cock and alights nearly on top of him.



Snow Bunting's invitation display.

Usually the cock sings loudly and he sometimes strikes attitudes at the hen; perhaps she will do a certain amount of singing and posturing herself. They may carry on excitedly like this for two days, or have things settled between themselves in twenty minutes. Thus robins pair-up in January or even late December, although they do not begin building the nest until towards the end of March. British starlings, too—not the visiting starlings, which arrive late in the year from Germany and Denmark—become "engaged" in the autumn and nest in spring.

Do Birds ever Pair for Life?—Which birds settle down together for life? This is one of the many problems that you may help to solve, for the behaviour of some species is not yet sufficiently understood. Some, such as the blackcock, prairie chicken, and ruff, which have "dancing grounds"—about which I shall have something to say later—never really pair off at all, others only remain together for a few days; red-winged blackbirds and some house wrens may have several wives and there are some species in which the females have several husbands. When birds nest twice in the same year they may change mates for the

second brood ; sometimes we find the same pair faithful to each other for one or more years. In order to be sure that certain species pair for life we would need to have records over a long period of time, and it is seldom that anyone is able to keep an eye on the doings of a pair of wild birds year after year. If more people would put coloured bands on nesting birds and look out for them each year we would learn more than we know now about these matters. These bands are quite light and slip round a bird's shank. They cause it no inconvenience and make it easy to recognize. A pair of carrion crows nested together for ten years in succession, and it seems very probable that swans and geese pair for life. Waterhens keep together faithfully for years. Herring gulls have been found nesting together in four successive years, but they may have separated after breeding and met again each year when they returned to their old haunts in spring. One pair of swallows used the same nest for three successive years, but other pairs have been known to change partners for second broods in the same year. A pair of European swifts has also been known to occupy the same nesting-place for three seasons.

Considering how easy it is for birds to become separated from each other, it is rather remarkable that pairs manage to stick together for years as they do. Geese come in flocks over vast wastes of sea from the arctic to spend the winter in the south, flying through darkness and storms on their way, and when they arrive they are often disturbed by gunners. It must be difficult for gander and goose always to keep in touch. Although we must be careful not to think of birds having feelings exactly like those of human beings, who can doubt that such birds are, in their own way, fond of one another ? In South America a naturalist saw a pair of upland geese migrating northwards together. One was crippled and unable to fly." Its mate kept with it, making short flights and then waiting for the other, plodding along on foot, to catch up. So they went on mile after mile together although there was not the least chance that the injured bird could ever reach its goal, hundreds of miles away.

CHAPTER II

SHOWING OFF

WE shall make a great mistake if we think that when birds have found mates all the showing off is over. Far from it. Many species "display," as it is called, after they have paired off as well as before. Presently we shall see why they do so. But before we come to that let us think of the three most important ways in which one bird can impress another—by its calls, its adornments, and its antics. Watch some house sparrows for a short time and you will notice that although they are no songsters yet they have quite a number of calls with different meanings. For instance, the squealing *me, me* by which the hen calls the cock could never be mistaken for the sharp alarm note. When the cock sparrow is angry he shows his black bib and perks up his tail in a very definite way. Thus sparrows show their feelings with colours and calls, speaking both sign and sound languages.

Bird Displays.—When a Union Jack is flown it is, as we all know, a national emblem, but when it is hoisted upside down it is a signal of distress. Thus the same thing may



have different purposes and meanings at different times and for different people. Some bird displays also mean different things at different times. A peacock will raise his plumes, clatter his quills together, stamp and scream to impress the peahen; but once when a bantam had strayed into a peacock's pen I saw him frighten it away by these very actions. And how the bantam skedaddled! Thus when the peacock shows off to the peahen his display is designed to attract her, but to an enemy or rival it means "Get out!" Similarly the spoon-bill raises his lovely silver-white

crest when he is courting and also when he confronts an enemy. What really happens is that the display has the effect of exciting other birds one way or the other. In the case of the peahen this leads her on to accept the peacock as her mate, but in other birds the feeling of excitement caused by the peacock's abrupt display becomes alarm. After all we show the same "display" when we have feelings as different as shame and anger. We blush when ashamed but also go red in the face when in a temper! The combs and wattles of a turkey-cock become a brighter red when he is courting or angry, too!

Most birds perform in a different way when courting from what they do when trying to scare away another bird of their own species, but many displays have arisen as a compromise between attacking and fleeing or are appeasement attitudes indicating that the bird wants to be friendly. The chaffinch shows off his pink waistcoat when courting but when a rival appears he half-opens his wings and holds them sideways to exhibit the white patch—which is just the opposite of a flag of truce.

Ways of Signalling.—All this makes it quite plain that birds' bright colours and wonderful decorations are not there

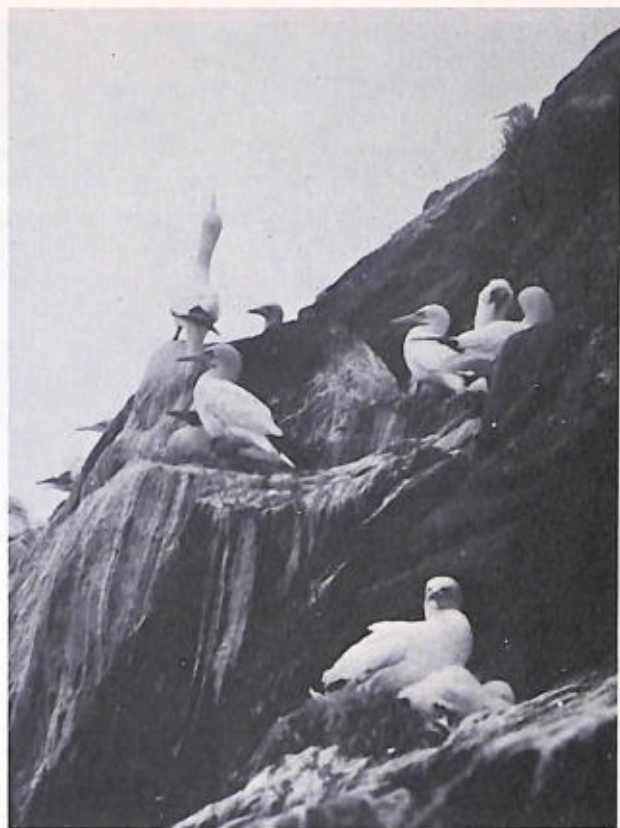


Upside-down display of Prince Rudolph's Bird of Paradise.

just to look beautiful. They are used for signalling in much the same way as ships' flags are used. A landlubber might suppose a set of flags strung up to the mast was merely meant to

THE GANNET POINTS
HIS BILL TO THE SKY
WHEN ABOUT TO
TAKE FLIGHT
(p. 21).

GANNET
NEST-BUILDING
(p. 67).





COMMON TERN FEEDING MATE. THE FEMALE IS SWALLOWING
ONE OF THE FISH BROUGHT TO HER (p. 32).

BLACK GUILLEMOT IN A HURRY (p. 66).



be pleasing to the eye when it was actually spelling out an important message. Nelson's famous signal was just such a set of flags. Birds use their adornments like coloured signalling-flags, and when they strike peculiar attitudes or perform odd antics—even turning somersaults or hanging upside down as some birds of paradise do—it is their way of hoisting their signals as conspicuously as possible. This is what we mean when we talk of bird "displaying". Incidentally, birds see colours much as we do. They certainly can see red and yellow distinctly but the eyes of some are less sensitive to blue. Night-flying birds, such as most owls, are exceptional. Like cats and dogs they are practically colour-blind. They have no vivid plumage to display as it would be ineffective in poor light and their prey is dull coloured. In contrast cabbage-white butterflies perceive most of the colours we can see but hive bees see red as black or grey and can distinguish colour beyond violet.

Strange Adornments.—Some birds, especially tropical species, grow astonishing adornments in order to make a great show



Lesser Bird of Paradise displaying.

while displaying. A farmyard rooster with his comb, wattles, and arched tail is a sight that we would think very remarkable

if we had never seen anything like it before. The wonderful plumes of paradise birds are erected or agitated when they display. The bird called the "ruff" fluffs out the huge tippet round his neck from which he gets his name. Only the males have this adornment. The frigate bird has a large red bladder under his neck which he blows out like a balloon, and there is a bell-bird in Costa Rica which is able to inflate three long, fleshy spikes, which rise up around his beak.

Sudden Signals.—A bird may grow signalling apparatus anywhere from the tip of his bill to his tail or his toes.



Many of our sea-birds have a kind of signalling-lamp concealed in their mouths! We open ours for the dentist or the doctor, they open theirs to lure on a mate. When a cormorant is courting he (or she) gives what looks like a terrific yawn, flashing a vivid yellow mouth at the other. As the cormorant's plumage is dark the yellow lining of his mouth shows up very clearly. It is a funny sight, especially when, as sometimes happens, the other bird responds by cocking up its tail and twisting its head until the crown is nearly

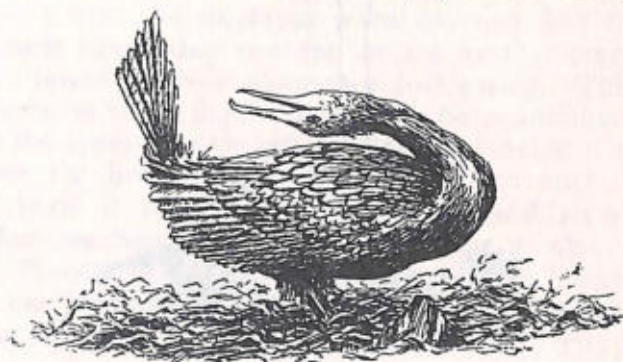
touching its back. It seems as if the birds were trying to express the sentiment of Gilbert and Sullivan's song:

"You hold yourself like this,
You hold yourself like that,
By hook and crook you try to look both angular and flat."

Red-breasted merganser drakes cruise about in mixed parties, tremendously excited, and every now and then one or another opens his bill as widely as possible showing a gleam of brilliant red. The mouths of some birds of paradise are bright green,

those of fulmar petrels are pinkish mauve, gannets' are black, and rifle birds' are white—so you may find almost any colour inside some bird's beak.

Birds have these signalling-lamps in their mouths so that the bright colour concealed there can be suddenly revealed when the bird opens its mouth, and thereby it can inspire feelings which attract or frighten other birds. Sudden displays are quite common amongst birds. We were thinking of the peacock's display a little while ago, but there was one thing I did not mention then. When he wants to make an impression on a peahen he does not walk straight up to her. Not at all. He raises his panoply of feathers when he is a little way off, walks backwards towards her and then abruptly turns round, rattling

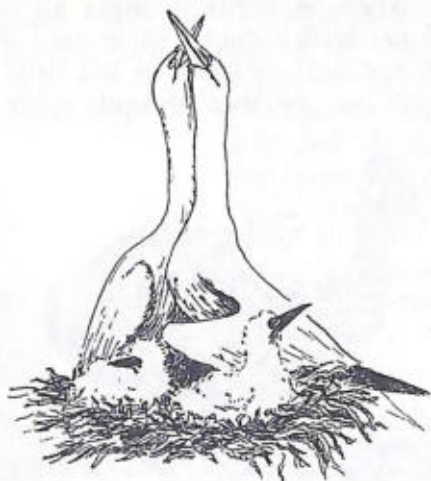


Cormorant displaying.

his quills and giving his piercing scream. It is all designed to be as startling as possible. Similarly, Leadbeater's cockatoo has upon his crown what looks like a single white feather, but he can give a jerk of his head and raise the concealed crest just as suddenly as a Chinese flicks open his fan, and, hey presto! there appear plumes coloured in bands, first scarlet, then yellow, then more red, and finally a fringe of white.

Why all this suddenness? Does it really matter whether the coloured signals are quickly flashed out? Yes, it does matter. The object of displaying is, as we have seen, to work up excitement and strong feelings in the other bird; and just as a boy wanting to give a fright to another lies in wait and jumps out suddenly upon him, so birds, whether they wish to attract or frighten, usually succeed best if their colours or plumes are brandished abruptly.

Displaying together.—Some birds such as gannets and whooper swans go on displaying even when they have won mates and are busy looking after the young. It seems to become an enjoyable habit. But it is more than this. Doing things together increases friendliness, and most of our friendships grow up through doing the same things in company with others. So with birds. Such antics as those of gannets—bowing to one another and clashing their beaks—may increase their harmony and fellow-feeling, and as it is a very good thing for the chick that his parents should



be on good terms and stick loyally together, these performances have become a regular feature in the life of nesting gannets.

The Purpose of Display.—Thus although we know only a little about the meaning of birds' signals we can be quite sure that their code of signalling is their way of raising, or maintaining, the pitch of each other's feelings. Without that there could be no eggs or young and the race would die out. So the birds with the best ways of showing their feelings leave most descendants. That is why, in spite of the fact that bright coloration and long plumes make it easier for their enemies to spy and catch birds which have them, yet they are more advantage than disadvantage.

CHAPTER III

SIGN LANGUAGE

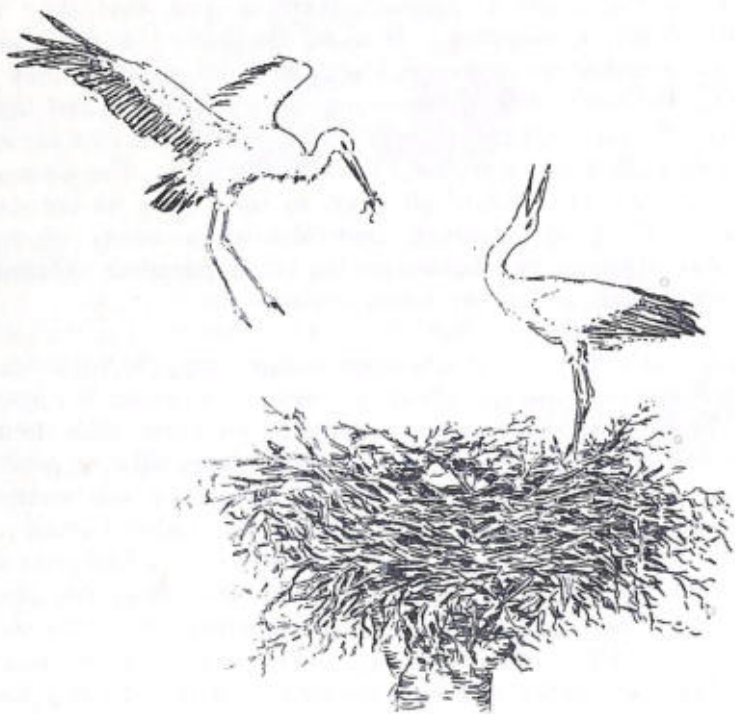
As Frenchmen and Italians use more gestures than we do, waving their arms and shrugging their shoulders, people sometimes say that they talk with their whole bodies. This is what birds do. Most of them have a larger variety of calls than we realize, but they also use sign language to make their meaning clear.

The Signals for "Up and Away."—Many of the colour signals which birds wear are displayed when courting, but there are others which serve other purposes or are used at other times. There is a bright patch of colour on a duck's wing. This flashes out when the bird takes flight. It seems to be an automatic signal meaning the opposite of the red light which shines at the back of cars when the brake is applied, warning you that they are slowing down or stopping. It says, "Up and away," and when other members of the flock see the flash of colour they go off too. Probably it is a life-saving device, like the red light, as when one bird suspects danger and flies away its companions don't wait to find out more about it but follow suit. The plumage of whooper swans is white all over, so they have no coloured "flying-up" signal. Instead, they bob their heads up and down several times, and this serves the same purpose. Gannets point their beaks to the sky when about to fly.

Salutations.—Flocks of whooper swans migrate from their breeding quarters in the arctic to winter in warmer regions. They fly to a musical accompaniment, and their calls, *whoop, whoop*, come floating down to the frosty lakes like a peal of bells jangled together. I was lucky enough to see some of these swans in Iceland on a great lake surrounded by mauve-coloured mountains. One bird was sitting quietly on the water near the nest. In the distance I saw a white speck approaching. Flap, flap, flap, he came speeding up to his mate and alighted with a great splashing on the water. Then, facing each other, they performed a ceremony of greeting, raising their heads high, arching their wings, and uttering together a series

of loud, trumpet-like calls. Gradually the excitement died down, but they went on calling, replying to one another. Swimming side by side, they bent their necks and dipped their heads together several times in succession, so that they appeared to be, not two separate birds, but a single swan reflected in a mirror. I wish I could give you an idea of how beautiful this scene was and how pleased the birds seemed at meeting again.

This is the swans' way of greeting each other. Human beings have an elaborate sign language—which we call politeness or etiquette—for the same purpose. When we meet each other we bow, take off our hats, and shake hands. When an old-fashioned Chinese gentleman meets you he shakes hands, not with you, but with himself. The two forms of greeting have the same meaning. So different kinds of birds have different ceremonies when they meet. When South American oven-birds return to the nest they sing a duet together. One stands opposite the other and while the first pipes slowly and regularly its mate replies in a rapid rhythm



Stork's greeting ceremony.

—a joyous little concert. The young birds may be heard in the nest practising their notes and trills. Herons have their own way of saying "Welcome home!" When one of them arrives back at the nest to take a turn on the eggs the sitting bird rises and they stand with crests raised giving loud shouts. The male bird may also bend down, snapping his bill in much the same way as when he and his mate first met. Storks have a more striking ceremony. The bird at the nest welcomes its mate by "klappering"—putting its bill right over its back and bringing it down to its feet whilst making a loud rattling noise with its mandibles. I was once entertained in a house in Yugoslavia which had a stork's nest on the roof. It sounded as if someone up there was wielding a boating rattle!

Changing the Guard.—When a brown pelican arrives at the nest to take duty on the eggs he waves his great beak vertically like a banner. The sitting bird accepts the signal by half opening her wings, poking her bill into the nest and giving a grunt. Coots bring bits of weed to their mates when they come to take their turn of brooding, and stone curlews have been known to pass a pebble back and forth when exchanging places. These ceremonies, which take place when birds change over on the nest, are their way of "Changing the Guard."

Politeness pays amongst birds as amongst human beings. If an Adélie penguin comes along to the nest without bothering to bow he may get a sharp peck. It seems that the sitting bird does not recognize her partner unless he bows in the correct way. Black-headed gulls do not always act politely when they wish to relieve one another on the nest. One may put a foot on the other's back or sit down and try to squeeze his or her partner off the eggs.

* King penguins have a very odd bowing ceremony. One of these birds will stand bolt upright with his beak high in the air, bring his flippers forward smartly and utter a loud trumpet note. Having done so, he quickly brings his head down until his bill almost touches his feet, and then takes up his normal attitude. Sometimes two will trumpet in turn, one always waiting until the other has completed his bow before beginning. At other times, as shown in my photographs, the bird's companion merely looks bored.

Deceiving Enemies.—The performances which we have been thinking about are ways by which birds show their feelings or what is in their minds to each other, but they have also a way of luring their enemies into useless attempts to catch them. One day when I was walking along a stream I came suddenly upon a duck with her family. Instead of flying away she flapped and sprawled about on the water as if she had been badly hurt, looking as if she could be caught very easily. Meanwhile the ducklings scuttled into hiding. I was not taken in for I had seen birds do this sort of thing many a time before, but most animals on the hunt for prey would have been deceived. Naturalists have watched ducks luring otters and hawks away from their ducklings by seeming to be wounded. It would be a mistake to imagine that a bird thinks out this plan to delude enemies. She is really torn between two desires—to fly away and to stay with her young—so she does something between the two. The result is that the youngsters escape and thus birds which have this habit of sprawling about give their chicks a better chance of life than those which don't. They leave more descendants, who behave in the same way. It has become a sign language which says to the enemy, "Come and pick me up?" But when the fox, dog, weasel, or whatever other animal it is, has been led away the old bird flies back to her chicks safe and sound.

CHAPTER IV

BATTLES AND BLUFF

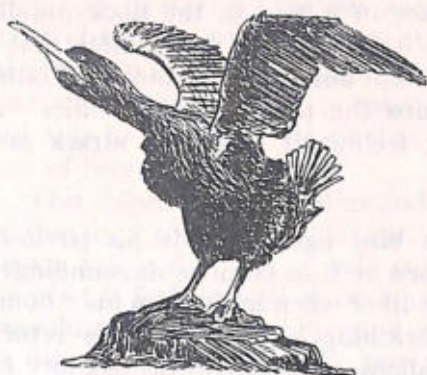
Threat Displays.—There is one important kind of sign language about which I did not say much in the previous chapter. It is used by birds and boys and consists in doing things to frighten somebody else. When small boys quarrel they clench their fists, square up to each other, and each tries to look as brave as possible ; in the same way birds use signs as well as songs to strike fear into the hearts of their rivals and enemies. European robins are rather quarrelsome in spite of being friendly towards gardeners and appearing on Christmas cards with messages of goodwill. They will not tolerate intruders on their territories, summer or winter. When a robin sees another robin trespassing he flies up to him or her, pokes out his chest (just like the small boy) and sways his body to and fro so that his rival sees as much red as possible. He waves the red flag of danger for all he is worth. Fight or flee is his ultimatum. For years many people thought that robins were making love when they did this—which shows how important it is to watch birds long and carefully if we are not to make mistakes.

We now know that the robin's red breast, the white shoulder-bars of the chaffinch, the bright colouring of some birds' mouths, and various other vivid adornments which different species of birds carry are warning signals, used when one bird wants to frighten a rival ; but some birds have means of frightening other kinds of enemies. Bitterns crouch and fluff out their neck-feathers, nightjars open wide their great, gaping, pink mouths, young cormorants take up the queer attitude which I have sketched, and young owls of some species ruffle their feathers and open out their wings to make themselves look as big as possible. They stand swaying to and fro, glaring at you and snapping their bills. They sometimes hiss, too, just as snakes, wrynecks, and tits do. Perhaps these small hole-nesting birds are less attacked by small beasts such as rats and weasels than would be the case if they did not hiss, because no one likes to risk meeting a snake down a hole.



Frogmouth. Threat attitude.

Display-fighting.—All is not love and pleasantness with birds, but as a rule they are sociable and get on well with each other. When they fight they usually have some good reason for doing so. Most fighting, as you will have gathered, is due to competition for nesting-space and for mates. There is such a strong urge to carry on the race that birds are driven by it to strive for territories and partners. Species which live happily together in flocks during the winter claim their estates and pair off in spring, and will not allow other birds of the same kind to come nearer than a certain distance. But fights to the death amongst birds are not common. It is as if birds had discovered that there are better ways of settling differences than by killing each other. Their way is to have a competition in frightfulness. By singing, showing certain special feathers, by taking up a fierce attitude, or doing a war-dance a bird does his best to scare rivals. When two birds compete in brandishing their danger signals one is liable to show that he is a little less brave than the other. "He who hesitates is lost" and is soon driven away. Thus there is a good deal of bluff as well as bravery in bird battles. Quarrelling which never gets further than hoisting threatening signals is so common amongst birds that there is a special name for it—"display-fighting." There are primitive peoples who fight in much the same way. Brandishing spears and leaping about with war-paint and feathers gleaming, they perform wild dances, do a little scrapping, and then those



Cormorant in threat attitude.

whose hearts quail give in. Even when pugnacious birds, such as prairie chickens and ruffs, gather together at tournament grounds there is much more display-fighting than real fighting and they do each other comparatively little damage.

It is just as well that birds do not often fight "tooth and nail," for some of them are heavily armed.

If gannets, for example, were to charge about trying to spear each other with their powerful bills there would soon be few gannets left. When they fight they usually clasp each others' bills and wrestle but do not stab. It is as if soldiers agreed to use guns for poking each other, not shooting. We have a good deal still to learn from birds! But when nations try to frighten other nations into giving them what they want by boasting of their power they are using a trick which the birds have practised for ages.

Bullying.—Perhaps you may have noticed that when a number of fowl are kept together in a hen-run one of them sometimes is badly bullied by the others. She may become quite bedraggled and eventually die. Scientists have tried to understand this. They have discovered that amongst a flock of hens there will be one which "rules the roost" and pecks all the others, another which is pecked by the bully but bullies all the rest, and so on down to a wretched creature which has to put up with being pecked by all the others and doesn't dare peck back. In a hen-run the birds soon arrange themselves into a "pecking-order" according to how many companions each bird feels entitled to peck. I have heard of schools in which the state of affairs was almost as unpleasant as this.

What happens amongst hens is that usually the first meeting decides which of two birds is to be boss. Either they fight and one is conquered or one bird becomes frightened and allows the other to bully her, or if both are frightened the first to overcome her fear becomes "top dog." Pigeons do not decide who is to

be bullied so easily. The place of a bird in the flock usually depends on many "settling-in" quarrels. It is not often that a bullied hen revolts successfully, but amongst penguins and other birds individuals sometimes turn the tables on the bullies. A bird, beaten when it was not feeling fit, will later attack and defeat its rival.

Fighting for Territory.—If a bird fights outside his territory he is much more timid than when he is in familiar surroundings; thus an individual beaten by another when away from his "home ground" may give him a thrashing when there is a return match. When a bold bird challenges another in his territory he may, if he is strong, force the owner away from the boundaries, but the farther he is driven towards the centre the more confidence and pluck he shows and the greater the qualms felt by the intruder. So it is not very often that the bird in possession is driven out, though sometimes, when a young bird has occupied the territory of a bird which nested there the previous year, the rightful owner, when he arrives, is so determined to have his own back that the newcomer has to give ground. When two birds are deciding where the boundary of their respective kingdoms is to be you may occasionally see them chasing each other back and forth, pendulum fashion, for a long time, until at last the frontier is agreed upon.

"An Englishman's home is his castle"; so, too, a bird's territory is his castle and he is full of valour in its defence. It means almost everything to him, as we can see from the fact that there are birds which will not nest unless they have a territory. Two pairs of swans will not breed on a small lake, and if several pairs of territory-holding birds are kept in a cage only one pair will nest and that pair will be found to bully the others. We must remember, however, that in captivity birds are more cruel to each other than is natural. Birds which have their freedom can escape from bullies, and even a timid bird feels brave when he is defending a stronghold of his own.

What Hormones do.—Why is it that one bird becomes a bully and another submits to being bullied? That is a difficult question to answer, but we know that success depends a great deal on the activity of certain glands in the bird's body—little factories producing what are called "hormones," which have

the power to start up various ways of behaving. Scientists can make chemicals which act as hormones do. When these are injected into a bird it changes its ways. It may begin to sing or seize a territory or want to migrate, and often becomes bolder and able to beat its rivals, so that bullied birds may thus have a turn of being bosses.

This shows that to understand exactly why a bird does this or that is a complicated matter. It depends on what is happening inside the bird as well as on what is happening outside, on what it feels as well as on what it sees. Now that we know something of how a bird's mind and body work we have to try to discover more definitely how the two are connected. You can be certain that there is so much still to be discovered that those of us who are interested in birds will be kept busy for untold years to come.

COURTSHIP GIFTS

WE all know that it is the usual thing for a young man who is courting to give his girl presents of flowers or boxes of chocolates. Birds do much the same thing.

What a Present signifies.—European robins, as I pointed out earlier, pair-up months before they start nesting, but there comes a day towards the end of March when cock robin will hop up to his mate and give her a small grub. Then we know that the whole business of nest-building and rearing young is about to begin. One grub is of very little use as food, but it is not presented because of its food value any more than the young man gives his girl chocolates because he thinks she is sickly and needs vitamins. In both cases the gift is symbolical, an indication of the feelings which cause it to be given. Even if a young lady has plenty of money to buy all the chocolates she wants she appreciates a present from the youth who is in love with her ; so, too, a robin will gladly accept a small worm from her mate although she may be standing on a dish full of them ! Moreover, when a robin is feeding youngsters he will come along with his bill crammed with food, but when it is a case of giving a hint to the hen that it is time they were setting up house together then he presents only one tiny morsel.

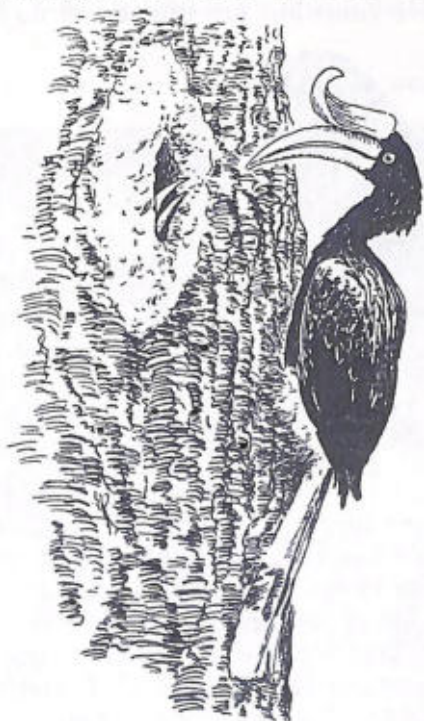
In the British Isles, rooks, which belong to the crow family, nest in "rookeries" in tall trees. Early in the season anyone who watches long enough is sure to see a male rook fly in with the pouch below his beak bulging with food. His mate may go out to meet him on a branch or he may go to her on the nest. Then he thrusts the food into her throat, just as he does when he feeds the youngsters. All the time she makes a squalling noise and begs with her wings drooped, quivering, looking just as young rooks do when they are hungry and see the old bird coming in with food.

Birds that Feed their Mates.—When the young man brings chocolates to his girl he means to show that he is the sort of chap

who will look after her and bring her things when they are married. Later, his gifts are apt to be much more useful and practical. Rooks not only feed their partners before they start nesting but keep it up when there are eggs and while the chicks are young. The great advantage of this is that the females are able to brood the eggs and cuddle the chicks more carefully and continuously than if they were having to go off and find grubs or worms every now and then. It can be very cold in the treetops, as naturalists know who have spent hours on end up there photographing rooks, and the naked youngsters would soon catch cold if left bare to every wind that blows. Also, the hungry crows which sometimes haunt rookeries are delighted when they can carry off a young rook. Rooks will themselves eat young birds when they get the chance.

I once kept watch for a few days at a goldfinch's nest when the youngsters had just hatched. The cock bird brought food every now and then, but he never gave it to the chicks. His mate pleaded for it with her beak upturned and her wings fluttering. He pumped the yellow stuff down her throat and then, after a little interval, she fed the youngsters.

Although terns differ so greatly in appearance and habits from rooks they, too, go in for courtship-feeding. I have gone from watching the dark birds in the tree-tops to where the white terns were nesting on the shingle and seen the same presentation of gifts taking place. Sometimes a bird with a fish in its bill is chased by another, and it seems at first glance as if the pursuer must be a pirate intending to rob the timid one. But it is all part of their ceremony. When the terns at last alight on the shore

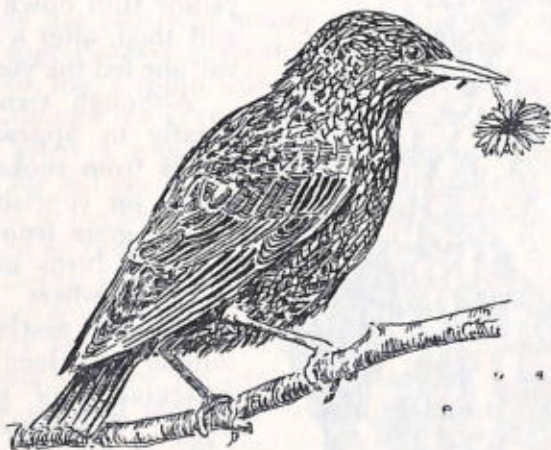


Hornbill at nest

the bird with the fish will give it to the other. Often he does not do it gracefully but in a most undignified way, as if he hated giving it up. He may hold on to one end or seize it again, so that the fish is sometimes torn in two. I say "he," but it might be "she," for terns are amongst the few birds in which the female may give a courtship gift to the male. Later, the male brings fish to feed his mate as she sits on the eggs.

A male hornbill has to feed his mate, for she is walled up in the nesting-hole, sometimes for as long as 175 days. In one species this is what happens: The male brings mud and other materials to the female, who sits in the hole and plasters up the exit until there is room only for her beak to poke out. There she stays brooding the eggs and tending the young until they are able to fly. Then she breaks out. The male, as you may imagine, is kept busy during his mate's voluntary imprisonment and has to bring food 3000 times or more.

Courtship Gifts of Spiders and Flies.—Isn't it a strange and interesting thing that birds give courtship presents as we do?



It is still more strange that some flies and spiders do likewise. Male *Empid* flies wrap up a small insect or some other prey in a web of fine silk spun from glands in their front feet and present it to the female. Some species put flower petals in the web and others put nothing at all, so the food value of the present is not important any more than it is in the case of robins. Female spiders are sometimes very ferocious, and may eat a suitor if



THE FEMALE ARCTIC TERN SCOOPS THE NEST-HOLLOW
WHILE FACING THE CIRCLING MALE (p. 34).

AN ARCTIC TERN LINES THE NEST-HOLLOW AS SHE BROODS (p. 35).





HERON AT NEST WITH YOUNG (p. 11). ,



GOLDEN EAGLE (p. 36).



PRAIRIE CHICKEN DISPLAY-FIGHTING (p. 27).

MUTE SWAN TURNING HER EGGS (p. 41).



he does not approach cautiously—they probably don't notice that he is not a fly. A certain species of spider keeps on the safe side by bringing along an insect to distract his "lady-love's" attention.

The gifts given by birds are not always things to eat. Starlings carry flowers into their nesting-hole when the female is sitting and a herring gull will pick up a shell or pluck a sea-pink and lay it before his brooding mate so courteously that we can almost hear him saying: "My dear, you can never realize how devoted I am to you." Adélie penguins offer pebbles or even some snow, and quite a number of different species of birds present sticks or straws.

Why do birds give presents while courting? We have seen that the meaning of the gift and not its usefulness is important; thus although birds can't understand the meanings of things as we do, yet it seems that when a gift is presented the experience of receiving it switches on the impulse to get on with housekeeping. Birds thus get a kind of mental push which awakens them to new activities and leads on to raising families.



PRAIRIE CHICKEN DISPLAY-FIGHTING (p. 27).

MUTE SWAN TURNING HER EGGS (p. 41).



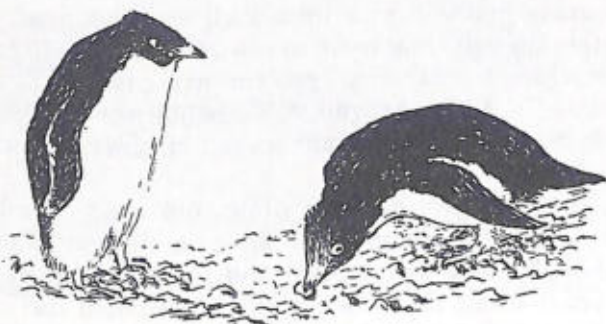
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CHAPTER VI

SETTING UP HOUSE



Adélie Penguin "proposing."

Useful Gifts.—When a penguin toddles up and places an offering of a stone at the feet of a female, or a heron gives a stick to his mate, each is presenting something which is useful besides being an indication of the bird's feelings, for penguins make nests of pebbles and herons of sticks. Sometimes the male bird goes so far as to build or half-build a nest. Waterhens and winter wrens do this, and you may come across platforms or unlined nests which will never contain eggs.

Nest-making while Courting.—Fidgeting during courtship with stuff such as may later be used for nesting material is quite a usual thing for various species to do, and some actually make the nest at the same time as they are performing their courting antics. Some wading birds perform a "scrape" ceremony as part of their courtship. A cock lapwing alights and flops forward with his breast to the ground; then he begins to shuffle up and down and from side to side, keeping his tail in the air with the chestnut-coloured feathers showing. By and by his mate will lay her eggs in a hollow made in this way. A female tern will squat in the sand or on shingle; the male comes along and moves around her, displaying with drooping wings. As she always turns to keep facing him the result is a saucer-like depression. Thus a hollow for the eggs is

made, and it is usually only after the tern has begun to sit that she lines it with pebbles and perhaps a few bits of dry grass and weed as the bird in my photograph is doing.

Lessons unnecessary.—A bird does not have to learn how to build its nest. Canaries are often reared in captivity for many generations without ever having the chance even to see a normal nest, yet when they are given suitable material they build typical nests. If you find an untidy nest you must not suppose that it is the work of a young bird which has not yet learnt its job. When such nests are built the explanation is that the bird has not yet quite reached the right stage in its development for that year. A bird can't build a nest when it likes, as a man can build a house; it must wait until the glands in its body are ripe for the work. These glands play a part somewhat like the spring of a clockwork engine. They make the bird do all sorts of things by affecting the rest of its body; but a bird's body is also affected by what happens outside it, and particularly by the state of the weather. Thus if there comes a very cold and stormy time when a bird has partly built its nest it may go on with it quite slowly. If house-builders' health was so bad that they always felt very lazy during cold weather it would be a little like the state of affairs amongst birds; and if they always knew without being taught or told how the house should be designed, and exactly what materials to use at each stage, the comparison would be still more apt.

Types of Nest.—The nighthawk makes no nest but lays her two eggs on the ground, whereas the long-tailed tit makes a lovely domed compartment of lichen, moss, and cobwebs, and cushions it with a great many feathers—sometimes as many as 2600. Barn swallows may make about 1200 trips with mud when constructing their nest. Some humming-birds build very dainty nests, slinging their little hammocks under broad leaves, which shelter them from the rain; other kinds make tiny cups of vegetable down. My sketch, which was made on a wooded hillside in Trinidad, shows a nest of this kind on a branch of a bread-fruit tree. I found one which easily fitted into the mouth of a big snail's shell! You are sure to have heard of the birds'-nest soup which is considered such a dainty by the Chinese. The nests are made of a sticky juice which certain kinds of cave-nesting swifts found in Borneo secrete from

their mouths. In a Chinese city you can walk into the open shops and watch men picking over these nests and getting rid of odd feathers and bits of shell, so making the jelly-like stuff fit for cooking. The soup is very good—rather like chicken broth.

There is variety even in the way birds gather sticks for their nests. Woodpigeons pick them up from the ground, but rooks usually break twigs from the trees with their beaks. Male hawks of some species will plunge down on a branch, and if the impact



Humming-bird's nest in bread-fruit tree.

does not break it, hang on upside-down flapping until it cracks. Golden eagles also drop on branches to snap them off. Ospreys bring material in their talons. Some parakeets which line their nests with strips of bark carry them in improvised pockets; the grey-headed love-bird tucks the strips under her back feathers as you might carry a pencil behind your ear, whereas the blue-crowned hanging parakeet places them amongst her neck and breast feathers. The feathers have little hooks which serve to hold the load in place.

Sharing the Work.—Sometimes both birds take equal shares in building the nest, or it may be that the female, or occasionally the male, does all the work. The cocks of some European warblers, such as the whitethroat and garden warbler, make nest platforms. When a female chooses one she completes it. Some male American robins bring material for the female to build into the nest, others do not help at all. Cock song thrushes do not build but help to feed the chicks. In these matters exceptions to the rule

occur and we have still a great deal to learn. Customs vary according to the species, and individual birds have their own peculiar ways. Several pairs or a party of birds may even club together for house-building. The monk parakeet forms what we might call a cooperative building society, and so does the black ani which breeds in Florida.

I was canoeing down a river in the West Indies one day when I saw several of these dusky birds perched on branches beside a big, clumsy nest. I climbed up, put in my hand, and found that there was a pile of eggs in it. Unlike the parakeets, which have their separate flats in the main buildings, the anis all lay together. They are perfectly friendly and take turns on the eggs. No British birds nest together in this way, though there is a record of the members of a colony of house martins joining forces to feed a single brood. I have seen young water-hens feeding their brothers and sisters of a later brood. The same thing happens amongst swallows. Quite frequently a volunteer of the same species comes along to help certain Central and South American wrens to feed their young. Occasionally a young European cuckoo is given food by other birds besides its foster parents. Blue tits have been known to feed a robin's brood and a robin to give food to young song thrushes. A cardinal has even been observed feeding goldfish!



Oropendola at nest.

Safety Devices.—As you can see for yourself, the safety devices connected with nests are very varied.

Many ground-nesting birds find security on islands. Other species nest in trees—like the natives who construct their huts in trees and

draw up their ladders after them in order to foil their head-hunting neighbours. In the tropics many birds make long woven nests which hang down like stockings from the tips of branches. Thus their contents are protected from monkeys and other tree-climbing beasts. At Panama I stayed in a hut beside which stood a tree whose upper branches were hung with the nests of oropendolas. It was interesting to see how agile the big yellow birds were in nipping into their dangling, beautifully woven nests. Grebes make their nests in the water. Our primitive lake-dwelling ancestors did much the same. In the Colorado desert I have seen the cactus wren's nest set in the midst of ferocious spikes, and there are several species of tropical birds which chum up with wasps or bees. The birds are not troubled by the insects but profit by the protection they give, for not many animals will brave a nest of hornets for the sake of a few eggs.

Ducks cover their eggs with down from their own breasts :

“ Warm beneath
Are eggs of cloudy green
Whence hungry rats and lean
Would stealthily suck
New life.”

F. W. HARVEY.

Besides keeping the eggs warm when the bird is away feeding, this quilt prevents the eggs from being discovered by egg-thieves such as crows and jays. Our own eiderdown quilts—when they are genuine!—are packed with the down of eider ducks collected from their nests. Partridges sometimes cover their eggs with leaves and some tropical birds kick sand or earth over the eggs when they leave them. Some birds, such as nighthawks, have plumage which blends with their surroundings so completely that as they sit they provide the best possible concealment for their eggs.

Labour-saving.—The brush turkeys of Australia do not bother to sit on their eggs. They just bury them in a great mound of rubbish and let the heat of the decaying vegetable matter do their work for them. Their nests are sometimes to be seen in the Zoo. None of our birds has such a complete labour-saving device ; but if you put a thermometer into a grebe's nest you will find that it is warmer than the surrounding air, so it seems that by covering

up the eggs on leaving them the bird manages to keep them warm as well as safe from thieves.

The Cuckoo.—The European cuckoo's way of saving herself trouble is to palm off her eggs on other birds. She usually watches the birds building and flies to the nest when the appropriate time has come, picks up an egg, sits on the nest and lays her own in its place. It hatches in twelve and a half days, and sometimes before the young cuckoo is twenty-four hours old it starts throwing out the eggs or chicks beside it. Its sides and back are so sensitive that pressure from another object annoys it greatly. Then it squats lower, and the result is that the egg or chick falls into a peculiar hollow in its back. That irritates it more than ever and with amazing strength it struggles backwards up the side of the nest and tips its burden overboard. My photographs show how this is done. Thus it gets the nest and the food intended for four or five birds all to itself and soon grows into a greedy monster.

Host Parasites.—The European cuckoo is by no means the only bird which burdens other species with the rearing of its young. The North American brown-headed cowbird uses its bill to spear an egg in the victim's nest. The young cowbird does not evict its companions but devours food intended for them. Probably the young African greater honeyguide kills its nest-mates using hooks on its beak which drop off later. Among weaverbirds there are some parasitic species and the redhead, a North American species of duck, often casually lays her eggs in the nests of other ducks and leaves them to be brooded by the foster parent.

draw up their ladders after them in order to foil their head-hunting neighbours. In the tropics many birds make long woven nests which hang down like stockings from the tips of branches. Thus their contents are protected from monkeys and other tree-climbing beasts. At Panama I stayed in a hut beside which stood a tree whose upper branches were hung with the nests of oropendolas. It was interesting to see how agile the big yellow birds were in nipping into their dangling, beautifully woven nests. Grebes make their nests in the water. Our primitive lake-dwelling ancestors did much the same. In the Colorado desert I have seen the cactus wren's nest set in the midst of ferocious spikes, and there are several species of tropical birds which chum up with wasps or bees. The birds are not troubled by the insects but profit by the protection they give, for not many animals will brave a nest of hornets for the sake of a few eggs.

Ducks cover their eggs with down from their own breasts :

“ Warm beneath
Are eggs of cloudy green
Whence hungry rats and lean
Would stealthily suck
New life.”

F. W. HARVEY.

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CHAPTER VII

ABOUT EGGS

The Shapes of Eggs.—The shape of eggs varies a lot. Owls' eggs are nearly spherical, while those of guillemots are rather pear-shaped with one end fat and the other somewhat pointed. If these birds exchanged the shapes of their eggs it would not do at all, for the spheres of the owl would roll off the bare rock on which the guillemot "nests" and an owl nesting in a hole would find it very difficult to turn over the big pointed egg of the guillemot; thus there is a connexion between the shapes of eggs and the places in which they are laid. If we set a guillemot's egg on a table and give the small end a flick it spins round and does not fall off. This peculiarity must save many eggs from crashing, though when brooding guillemots are suddenly frightened and fly off they sometimes carry the egg a little way embedded in their feathers—and it is soon a sploody mess on the rocks below. The eggs of wading birds, such as plovers and sandpipers, which usually lay four eggs in a nest on the ground, also tend to be pear-shaped. The bird arranges them with the points inwards so that they fit together neatly into the smallest possible space; thus they can be brooded most comfortably and efficiently, for they are rather large for the size of the bird.

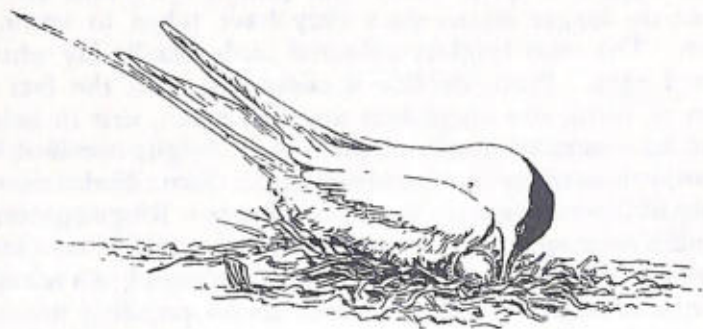
Texture and Colour.—Perhaps another safety-device is the oily or greasy texture of ducks' eggs. It may help to prevent damp from soaking in, but of this we are not sure. Cormorants' eggs are covered with a chalky layer, whereas tinamous' eggs look and feel like burnished metal and emus' eggs have a granulated surface. We really don't know why there are these differences, just as we don't know why there should be so much variation in the colour of eggs. Eggs laid on the ground are usually protectively coloured so that they are difficult to see, whereas white eggs are often laid in holes where there is no danger of their appearance attracting the attention of robbers. Probably also their paleness helps to prevent the owner breaking them by mistake in the dimly lighted cavity. Puffins' eggs are white

but sometimes show a faint pattern ; as these birds are related to guillemots and razor-billed auks, which nest in the open and lay coloured eggs, it is quite likely that puffins once laid blotched eggs but no longer do so since they have taken to nesting in burrows. The most brightly coloured birds usually lay white or unspotted eggs. Probably this is connected with the fact that so many of them, like kingfishers and bee-eaters, nest in holes in order to be concealed from enemies. Also, bright coloured birds and conspicuous eggs are often distasteful. Some birds are much better than others at recognizing their own eggs. Ringed plovers do not mind if their eggs are coloured red or blue, and I have known a black-headed gull brood an empty cartridge case, but a naturalist who experimented with garden warblers by painting their eggs found that they often got rid of those he had decorated. Cuckoos usually lay their eggs amongst others which match them fairly closely in colour and there is thus less likelihood of their victims rejecting them.

Starting to Brood.—If you have ever found the nest of an owl you may have been surprised to find that the owlets were not all the same size. The reason is that owls begin to sit when they lay their first egg and by the time the last is laid the first has a good start. There may be some advantage in this. Perhaps if the young are at different stages it is more likely that at least one of them will be able to tackle whatever prey the owls bring in. Hawks also usually start incubating before all the eggs have been laid and the hatch spreads over some days. Geese and partridges sit when all the eggs have been laid. So the chicks hatch and are led away together. As a general rule small eggs hatch sooner than large ones, but the cuckoo's egg is a very interesting exception, for although it is slightly larger than the eggs of hedge-sparrows and meadow pipits with which it is laid, it often hatches sooner, thereby giving the young cuckoo a start which enables him or her to throw out the unhatched eggs or the new-born chicks. Cowbirds' eggs also develop rather quickly.

Turning the Eggs.—Birds turn over their eggs regularly in order to make sure that they are evenly warmed. A short-eared owl has a small curved beak and an oystercatcher a long pointed one ; yet when sitting in hides within a few feet of these birds I have watched each of them turn its eggs neatly and

carefully. A pheasant turns her egg about once an hour but the American redstart does so about every eight minutes. You



Roseate Tern turning eggs.

would be doing useful work if you were to find out more about egg-turning.

Habits and Instincts.—A useful hint to know if you are going in for watching or photographing birds at their nests is that they usually return by the same path ; thus there is often a runway up to the nests of fairly large birds which nest in grass or reeds. I have noticed when in the tree-tops watching rooks that the birds hop on to the same branches every time they approach. When taking photographs of such birds you can focus on a definite spot and be almost certain that the bird will perch there. Birds form habits even more than we do and often do things again and again in the same way. Sometimes these habits are formed very quickly. Thus some birds building in bushes, soon get into the way of going and returning by a certain route. What we call instincts are very like habits which have been so built into birds' bodies that they are passed on from parent birds to their descendants.

Taking Turns on the Eggs.—A little earlier, when we were thinking of how birds greet one another, we noticed that in many species both members of a pair take turns on the eggs. The length of time various birds spend in brooding before exchanging with their mates or going off to feed varies a great deal. Some species stay on the eggs for less than half an hour before sallying forth to seek for food, others sit for days on end.

Certain petrels brood for spells of about forty-eight hours and always change places at night, but eider ducks only leave their nests for short intervals, if at all, unless frightened away, and sometimes sit continuously until the eggs hatch. Albatrosses may remain on their single egg for a month at a stretch without any food. They can fast for so long because when they come to their nesting-ground their bodies are covered with a reserve of fat which they use up as they sit. Pigeons exchange places very regularly, the cocks doing duty by day, the hens taking the night watch. But so much are they ruled by habit that if his mate happens to get killed the male keeps to his routine, brooding only by day although the eggs become chilled and lifeless through being neglected at night. There is a great deal still to be discovered about these matters, so you will have a fascinating time if you try to find out some of the many things we want to know.

CHAPTER VIII

YOUNGSTERS

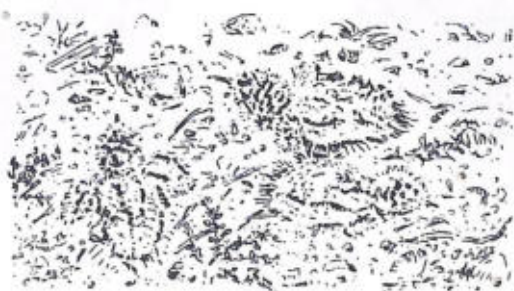
Hatching.—When the chick within the egg is fully developed it pushes its bill against a kind of skin at the broad end of the egg and gets its first breath from the air in this compartment. Then with the energy thus received it pecks at the shell. At the tip of its beak there is what is called the “egg-tooth”—a little horny projection which helps it to break the shell and soon falls off afterwards. Unhatched crocodiles have a similar structure on their snouts. Hatching may take some hours, or even days. I found a great black-backed gull’s nest when the eggs were chipping and put up a hide tent beside it so that I could return the next day and watch how the chicks got out. It took them just half an hour to get clear of the cracked egg-shells. In the case of a black-headed gull’s chick it goes on tapping in an automatic way, due to the throbs of its body, for thirty or forty hours until it has drilled a hole ; then it makes a second hole or sometimes enlarges the first. It takes about forty-eight hours from the appearance of tiny cracks until the chick hatches. But the chicks of some birds of the plover family are able to push the two halves of the shell apart suddenly after they have made some cracks. They immediately start to run about. Usually the youngsters can escape from the shell by their own efforts but frequently, as with birds as various as marsh hawks, cranes, and partridges, the mother-bird may help them out. There is a great deal still to be discovered about such matters. When a young herring gull has made a small hole in the shell it will call quite loudly. It is rather queer to hear cheeping coming from inside the egg. Naturalists have recorded how unhatched chicks become still and quiet when they hear the warning notes of their parents. Before they are born they know the meaning of the alarm call !

Helpless and Lively Youngsters.—Young birds may be divided roughly into two groups : those which are able to leave the nest soon after hatching and those which are helpless and have to be fed and tended in the nest for days or weeks. There is a connexion between the length of time which birds spend in the

nest and what they eat. Species which pick up morsels of food from the ground or the water often have chicks which are soon able to look after themselves to some extent—partridges and ducks, for example. It is not surprising that the young of birds of prey and species which live on the nectar of flowers are helpless for a considerable time.

Escaping Danger.—In some of those species which depart from the customs of most of their relations and take to nesting on the ground we find that the young are not content to stay in the same place but tend to move about. The short-eared owl lays her eggs beneath a tussock of vegetation. I was very puzzled when I returned to a nest where there were young to find that they had disappeared. Where had they gone? Had some creature eaten them? I thought this could not be the explanation as the old birds kept flapping anxiously about, making cracking sounds by clapping their wings together. So I looked all around in the marshy field and found the owlets one by one under various tufts of grass. Possibly the old birds entice them away by dangling food a little distance ahead of them as soon as they are able to shuffle about, and so induce them to leave home. If some prowling beastie comes along he is not likely to discover and eat them all if they are in different hiding-places. In the same way young nightjars and nighthawks may move away from the place where they were hatched, although swifts, swallows, and nearly all other birds which feed on flying insects have young which stay helplessly in the nest until their wings are strong enough for them to fly.

The chicks of many ground-nesting birds crouch absolutely



Protective coloration. Young oystercatchers crouching on shingle.

still when they are disturbed so that they are very hard to see. They are model children, for they at once obey their parents' warning note meaning "Be still." One day when I was sitting on a tiny island having lunch I was amazed to see a young oystercatcher, very wet and bedraggled, come walking up out of the sea. I then remembered some time before noticing a black object in the water with the waves partly washing over it. What had happened was that the youngster had been feeding near the water's edge when I came along about two hours earlier and on hearing the warning call it squatted down and didn't move until it was on the point of being drowned by the incoming tide.

Signalling for Food.—You will find that the mouths of young birds which stay some time in the nest are often brightly coloured—it may be yellow or red; but sometimes they are decorated with spots or tiny tooth-like objects. The nestling waxwing's mouth is a combination of violet blue and cherry red. We might say that the chick carries a little bull's-eye lamp and flashes it every time its mother comes along with food! The signal shows her exactly where to put the provisions, so that there is no waste of time nor danger of the succulent morsels being dropped by mistake to the bottom of the nest. The glowing mouth is like a beacon in the twilight of the shaded nest. Sometimes it works



out the other way round. Young cormorants and gannets put **their** beaks right into their parent's gullet to fetch up food, and **in** such cases it is the old birds which carry a beacon light. The

yellow mouth of the cormorant shows up vividly against the dark plumage, and nothing could be more conspicuous than the gannet's black mouth contrasting with its snowy feathers.

Big Appetites.—It is astonishing how much young birds will eat. Crow chicks eat at least half their own weight in a day, and sometimes their own weight of food, and a young American robin eats fourteen feet of earthworms a day! A song thrush chick could eat as much. Some birds which feed on insects may bring food to the nest about a thousand times in one day. Owlets



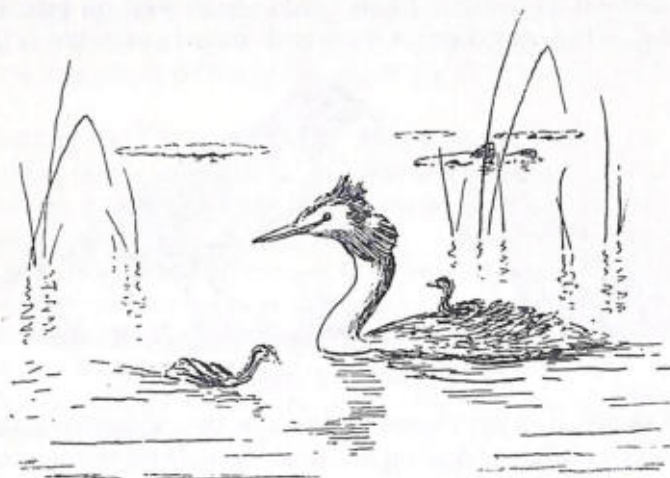
Thrush feeding chick.

will stuff themselves with mice or voles so that sometimes the tail of the last one remains hanging out until there is more room inside.

Living Sunshades.—If small chicks are left exposed to the sun for some hours they will die, so the old birds are careful to shade them with their bodies and wings. During heavy rain, birds also shelter their chicks. It is unusual for birds to bring water to their nestlings, but storks sometimes do so. Cormorants have also been seen to dribble fluid into the gapes of their young.

Careful and Careless Parents.—Not many birds ever carry their chicks about, but some species of duck, waterhens, and grebes may be seen cruising along with one or two of the youngsters riding on their backs. Woodcock, too, take their chicks for rides, holding them between their thighs and keeping their tails lowered. Some folk say that guillemots and other birds which rear their young on high cliffs carry them in their beaks down to the sea, but this is not true. We know that they tumble overboard when the time comes, and they are so

light and fluffy that they do not come to any harm even when they bump on the way down. Albatrosses leave their offspring and go out to sea, and while the youngsters are slimming they practise running and flapping until at last they are able to fly.



Great Crested Grebe carrying young.



EIDER DUCK FLUTTERING OFF HER NEST AS IF WOUNDED (p. 24).

EIDER DUCK SETTLING ON HER EGGS BEDDED IN EIDER-DOWN (p. 38).

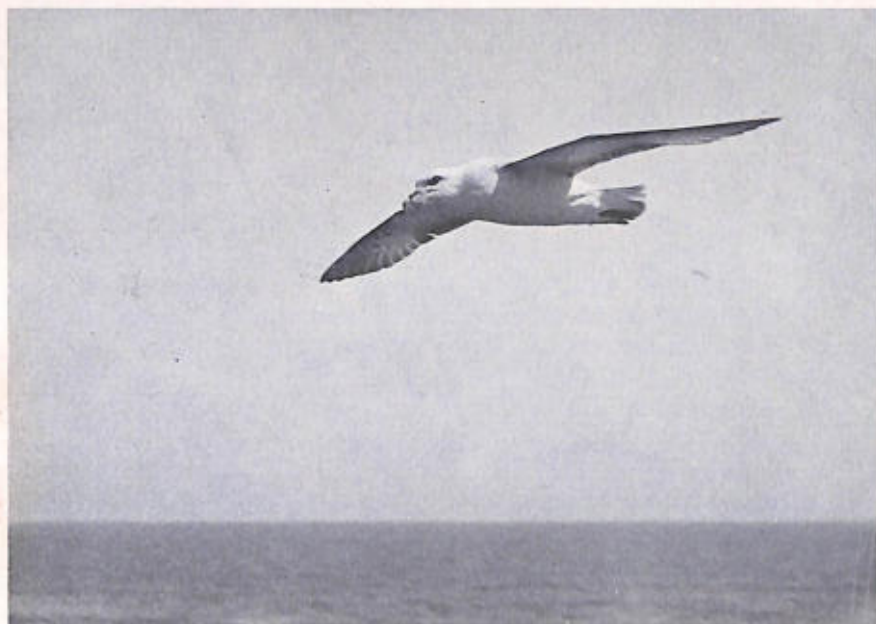




A ROCK PIPIT ATTENDS TO THE SANITATION OF THE NEST (p. 49).

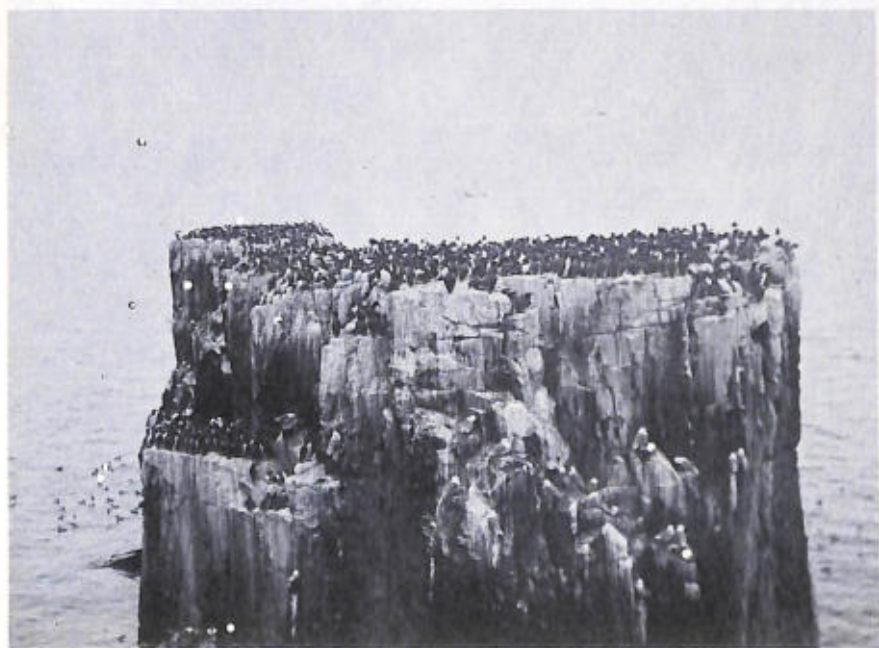
NIGHTHAWK WITH HER TWO EGGS ON THE GROUND (p. 35).

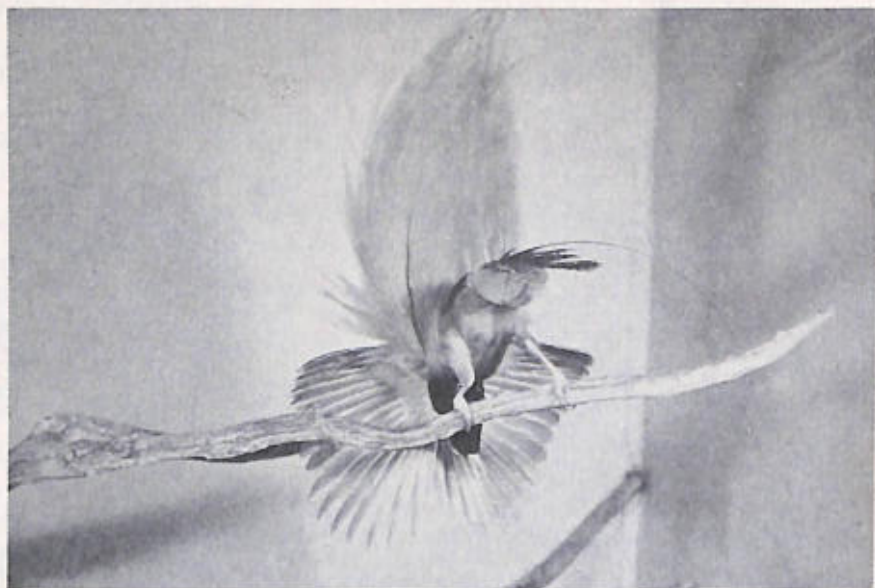




FULMAR PETREL IN FLIGHT OFF THE FAEROE ISLANDS (p. 19).

GUILLEMOTS AND KITTIWAKES NESTING ON THE FARNE ISLANDS (p. 74).





COUNT SALVADORI'S BIRD OF PARADISE DISPLAYING (p. 18).

YOUNG BITTERN IN THREATENING ATTITUDE (p. 25).



TOILET AND TIDINESS

Dirt and Danger.—"Where there's dirt there's danger!" In housekeeping affairs most birds behave as if this were their slogan. Probably what has happened is that in the past the tidy birds managed to rear more chicks than the slovenly fellows. In a dirty nest it is the parasites which thrive, sucking the life out of the helpless youngsters, making weaklings of them—ready victims for prowling germs. If you put your hand into a swallow's nest you will probably find some of these little beasties on it. But they can't thrive on you! Dirty nests may also bring destruction upon their occupants by attracting the attention of various bloodthirsty creatures. To leave a conspicuous mass of white droppings on the doorstep is asking for trouble.

Keeping the Nest Tidy.—Thus small perching birds, such as warblers, are usually very particular about carrying away droppings from the nest. Dippers go in for water sanitation. They put the pellets into the stream beside which the nest is situated. Woodpeckers have their own way of keeping the nest-hole sweet, for they hammer the sides so that wood dust falls down and serves as a sanitary powder.

Another matter about which birds often are rather particular is in dealing with the egg-shells after the young hatch. In spring you may often find empty half-shells of various species of small birds. This is not a sign that a nest has been plundered. The birds carry the shells away so that they won't make a mess, or perhaps cut the tender skin of the tiny chicks. Quite a few birds get rid of the shells by eating them! If you have kept caterpillars you may have noticed that some species make their first meal of the egg-shells from which they have just crept out. Golden plover carry off the shells although the young are soon able to run about, and these birds have been known to dislike litter so much that they tidied away any paper dropped near their nests. They treat such scraps as if they were egg-shells. I found when I was photographing a kinglet that this tiny bird slipped on to the nest too quickly for me to get a photograph,



Oystercatcher removing egg-shell from the nest.

so I put bits of paper into it to make her pause when she saw them and thus give me a better chance. But she always seized them immediately and flew off to drop them well away from her dainty hammock beneath the cedar branch. Perhaps she mistook these scraps for the droppings of the young, but it was important that she should remove them; if leaves, for example, were allowed to remain in a nest they might prevent the eggs or young from being thoroughly warmed.

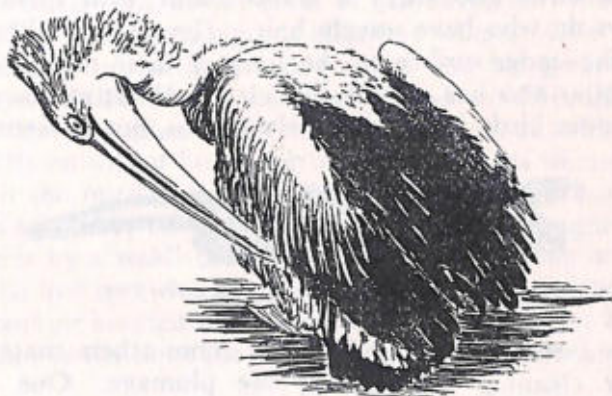
Many birds are extremely particular about making neat nests and keeping them so. There is a reason for this. Untidy strands of hair, for example, might entangle the youngsters or even lasso their parents. I have seen birds which were thus trapped hanging dead from their nests. So it pays to be tidy as well as to be clean.

Preening.—When hiding by the nests of birds of prey I have noticed that the chicks spend a good deal of time preening and cleaning themselves. The first garment of hawks and eagles is composed of down, and if it got clotted with blood from their prey it would be very bad for the youngsters. A golden eagle will preen the down on her small eaglet ever so tenderly with the great hooked bill which is powerful enough to tear a fawn to pieces. Some smaller birds, such as the dainty bearded tit of European marshes, comb the sprouting head-feathers of the chicks through their bills with the utmost gentleness.

Dry Cleaning.—In winter as well as in summer you may see sparrows having a dust-bath. They also have water-baths in

very chilly weather. We do not know of many other birds which go in for dust-baths as well as water-baths. Dry cleaning is popular amongst game birds—partridges, pheasants, and so on—and we all know how hens enjoy dusting themselves, but they don't bathe in water. Larks have dust-baths and lie in the rain with outspread wings enjoying themselves, but do they ever have a dip? Naturalists have not recorded much about these matters, so there is plenty left for you to discover.

The Toilet.—Many water-birds devote a good deal of their time to washing and preening. Waterhens usually have a bath and brush-up before going to roost for the night. If you



Pelican preening.

keep watch where a stream flows into the sea you will notice that herring gulls and other gulls love to bathe in water that is not salty. Most birds have an oil-gland at the base of the tail. Some make use of it when performing their toilet. A goose will rub its chin feathers on the gland, smear its plumage and then draw the feathers through its bill to remove surplus oil. The whole job may take more than an hour. But birds without this gland are able to keep their feathers in good condition. However, if a grebe is kept away from water its lovely glistening coat loses its waterproof quality. This may be due to water being necessary if the bird is to smooth its feathers and keep them in place. I have seen a red-breasted merganser—a fish-eating duck which nests in Europe and North America—preening herself for nearly two hours on end; first as she swam slowly

along and later while she rested on a stone. She would have gone on longer if I had not disturbed her.

Toilet Outfits.—Some birds carry their own dry-cleaning outfit with them. They have powder-down in their plumage, sometimes in slightly oily patches, as in herons and bitterns, sometimes in the form of powder-plumes scattered here and there amongst the plumage, as in cockatoos. Birds which have much of this powder seem to avoid water-baths. You are not likely to see a heron having a bath! When preening themselves young herons run their bills through their powder-patches and then pass their feathers through their mandibles, thus cleaning and oiling them.

Some birds also carry a comb about with them as girls and boys do who have unruly hair. Herons and bitterns have a saw-like under-surface to the nails of their middle toes and the nightjar also has a comb-like claw. What use these combs are to some birds is not definitely known, but it seems certain



Comb on Heron's claw.

in a few instances and probable in some others that they are used for cleaning and tidying the plumage. One observer some centuries ago, and another recently, claimed that the heron holds eels on the ground by placing this claw on them. He also uses it for scratching his head and cleaning his bill.

The Bittern's Toilet.—The European bittern spends his life in muddy, marshy places and gets his feathers soiled with slime, especially when he has to deal with a very wriggly eel. Here is how he makes his toilet. First he rubs his head and neck over the powder-down patches on his breast and the upper surface of his thighs, and this breaks up the slime; next he combs off the mess with the middle toe of each foot. It has thirty-six teeth, so it is quite a useful implement. Then he finishes up by preening himself fastidiously and anointing the feathers with oil from the oil-gland. Some birds are known to remove parasites with their serrated claws, and possibly the nightjar uses his comb for cleaning the scales of moths from the bristles round his wide

mouth, but we are not at all sure what use combs are to barn owls, black-tailed godwits, and some other species which have them. Try to find out.

Sun-bathing.—Many birds enjoy a sun-bath. Some species sprawl with back to the sun, others face it, some do both. While sunning themselves birds often spread their tails. Partridges are among the birds which sun-bathe frequently. I have seen a king vulture with his wings spread out to the sun while perched at the top of a tree by a lake in the Panamanian jungle. It looked indeed a kingly bird. Cormorants also stand with outspread wings on rocks by the seashore when they come in from fishing.

Short-eared owls simply revel in sun-baths, and they will lie in a sandy place spreading out alternate wings. One will even stand on a stump with drooping wings and his great flat face turned upwards like a sun-worshipper. Owls would probably sun-bathe much more often in the wild if they were not so liable to be mobbed by crowds of fussy, chattering small birds whenever they appear in the open during daylight. Hawks like to have a long sun-bath after they bathe. I once found a kestrel caught on a line set for eels by a small lake. Possibly while washing or sunning himself he had sprawled on top of the line and so twisted himself that it became knotted over some of his quills. When I released him he flew away none the worse for his strange adventure.

* *Snow-bathing and Ant-bathing.*—As a contrast to sun-bathing some birds, like some dogs, go in for snow-bathing. A naturalist who saw a downy woodpecker bathing in some loose snow says that she seemed to be enjoying herself immensely. It is rather odd that some birds, such as starlings, crows, and jays "bathe" in ants! They sprawl on ant-hills or pick up the insects and deliberately place them amongst their feathers. Even young birds which have never seen ants before will do this. No one knows why. Some naturalists think that the ants rid the birds of parasites, but "anting" is sometimes indulged in by birds on which there are so few of these that this can hardly be the explanation.

A few species give themselves special beauty treatment. Cranes smear their backs with peat-water and mud. When motmots are young they have ordinary-looking tails, but later there

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Comb on Heron's claw.

in a few instances and probable in some others that they are used for cleaning and tidying the plumage. One observer some centuries ago, and another recently, claimed that the heron holds eels on the ground by placing this claw on them. He also uses it for scratching his head and cleaning his bill.

The Bittern's Toilet.—The European bittern spends his life in muddy, marshy places and gets his feathers soiled with slime, especially when he has to deal with a very wriggly eel. Here is how he makes his toilet. First he rubs his head and neck over the powder-down patches on his breast and the upper surface of his thighs, and this breaks up the slime; next he combs off the mess with the middle toe of each foot. It has thirty-six teeth, so it is quite a useful implement. Then he finishes up by preening himself fastidiously and anointing the feathers with oil from the oil-gland. Some birds are known to remove parasites with their serrated claws, and possibly the nightjar uses his comb for cleaning the scales of moths from the bristles round his wide

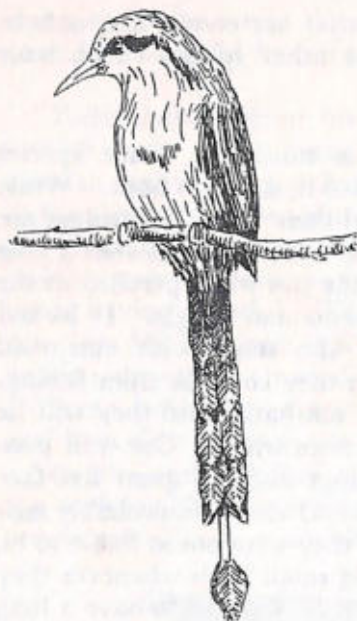
mouth, but we are not at all sure what use combs are to barn owls, black-tailed godwits, and some other species which have them. Try to find out.

Sun-bathing.—Many birds enjoy a sun-bath. Some species sprawl with back to the sun, others face it, some do both. While sunning themselves birds often spread their tails. Partridges are among the birds which sun-bathe frequently. I have seen a king vulture with his wings spread out to the sun while perched at the top of a tree by a lake in the Panamanian jungle. It looked indeed a kingly bird. Cormorants also stand with outspread wings on rocks by the seashore when they come in from fishing.

Short-eared owls simply revel in sun-baths, and they will lie in a sandy place spreading out alternate wings. One will even stand on a stump with drooping wings and his great flat face turned upwards like a sun-worshipper. Owls would probably sun-bathe much more often in the wild if they were not so liable to be mobbed by crowds of fussy, chattering small birds whenever they appear in the open during daylight. Hawks like to have a long sun-bath after they bathe. I once found a kestrel caught on a line set for eels by a small lake. Possibly while washing or sunning himself he had sprawled on top of the line and so twisted himself that it became knotted over some of his quills. When I released him he flew away none the worse for his strange adventure.

* *Snow-bathing and Ant-bathing.*—As a contrast to sun-bathing some birds, like some dogs, go in for snow-bathing. A naturalist who saw a downy woodpecker bathing in some loose snow says that she seemed to be enjoying herself immensely. It is rather odd that some birds, such as starlings, crows, and jays "bathe" in ants! They sprawl on ant-hills or pick up the insects and deliberately place them amongst their feathers. Even young birds which have never seen ants before will do this. No one knows why. Some naturalists think that the ants rid the birds of parasites, but "anting" is sometimes indulged in by birds on which there are so few of these that this can hardly be the explanation.

A few species give themselves special beauty treatment. Cranes smear their backs with peat-water and mud. When mot-mots are young they have ordinary-looking tails, but later there

*Mot-mot.*

are bare spaces on the quills so that the tips of the two middle feathers are racket shaped. Some naturalists say that the birds preen off the barbs, but it seems more probable that they fall off. As if to emphasize the remarkable appearance of their tails they flick them from side to side. In Tobago — Robinson Crusoe's Island—I found them so tame that I could walk warily up and photograph them.

Have you ever thought how much like a bird you become when you spend a holiday at the seaside? When you wake up you wash, comb your hair and put some hair-oil on it, have breakfast, go for a swim, dry yourself, have a sun-bath and a run on the sands—very much as the sea-gulls do.

It is all great fun because we enjoy doing natural things. Living like a bird is very pleasant.

CHAPTER X

DO BIRDS GO TO SCHOOL?

The Art of Nest-building.—Some nests are works of art. Any of us who have tried basket-making cannot help but feel a lot of respect for the craftsmanship that an oriole, a weaver-bird, or a wren puts into making a nest.

"No tool had he that wrought, no knife to cut,
No nail to fix, no bodkin to insert,
No glue to join; his little beak was all.
And yet how neatly finished. What nice hand
With ev'ry implement and means of art,
Could make me such another?"

THOMAS HURDIS.

The poet, however, did not realize that it is much more often "she" than "he" who is the expert builder. When we think of how long it would take us to make a nest so neatly as some birds do, we are apt to be puzzled by questions such as, "How did they learn to do it?" and "How can we explain the fact that birds build like their parents, not only making the nest the same size and shape but using the same materials in the same order?" Similarly, anyone learning to swim and finding it a tedious business might well wonder, "How is it that young birds are able to swim or fly so quickly and easily?"

Knowledge without Teaching.—The truth is that birds have within themselves the power of doing what it is natural for them to do very much more than we have. They have many more fixed ways of acting, and the ability to act in those fixed ways without being taught, though if we go far enough back it is clear their ancestors acquired these activities and have somehow thus made life easier for their descendants. But we have the great advantage of being able to learn to do the same thing in different ways, whereas a bird has often one way and one way only of doing anything and is quite at a loss if it cannot act in the customary way. All the birds of any particular species make their nests according to the typical design—with very few exceptions. King penguins in the Zoo thrive on fish but the fish has to be placed in the bird's mouth or even

pushed down its throat by the keeper. They never learn to pick up food from the ground as they normally find their food while swimming in the water. A naturalist who has studied the East African white-rumped swift says that although the nest is so cramped that the youngsters cannot exercise their wings properly, when they first fly they go right out of sight. Sometimes they go on their own and sometimes they follow a parent out. A native who saw a swift make its first flight wrote in his notebook: "The child has a lot of strength; you would not be able to tell it was a child except that it follows the other." A friend of mine kept watch at a bank swallow's nesting-hole to see how the youngsters learned to fly. At last his patience was rewarded and he saw the birds fly boldly away. They could fly quite well although they had never been in the air before. When young gannets make their first flight their parents leave them to do so quite unaided. They soon are able to plunge after fish, dropping like great white arrow-heads from the sky. A young waterhen can swim, dive, and hide under water without ever having seen another bird do any of these things. I have seen one walk out of the nest

and go for its first swim in the most matter-of-fact way. A little earlier we noticed that birds could make nests exactly like those of all their tribe without ever having seen a nest of any kind, and, as we shall see later, youngsters find their way overseas when the time comes to migrate without any help or guidance from their elders.

Learning by Experience.—All the same, birds can alter their way of doing things up to a point when necessary, and certainly there are a good many things which they learn by experience and by making mistakes and trying



over again, just as we do. For example, chicks will pick up poisonous or nasty-tasting insects or caterpillars, but they quickly learn to avoid them. Birds also sometimes learn to give up nesting near the ground if their nests are robbed. Since European animals, such as the fox, were turned loose in Australia the lyre birds have begun to build in trees, and, what is still more interesting, South American monk parakeets (rather like budgerigars) have also learned by experience that their nests are liable to be robbed by people if they build them, as they have always been accustomed to do, low down in bushes near the ground, so they are getting into the habit of building higher. The special interest of this is that, as I mentioned earlier, several pairs of monk parakeets combine to build a big nest in which the different pairs have separate apartments. It seems that somehow or other the gangs of builders manage to agree to adopt the new and safer custom. On the other hand, where there are no trees birds adapt themselves to building on the ground. I have seen a heron's nest in reeds and on a thorn bush only three feet high. In Australia sparrows have learned to nest in tunnels which they make in banks. In England the tree-creeper has discovered a new kind of roosting-place about which I shall have more to say later. Some birds find new sorts of food; sometimes great spotted woodpeckers get into the habit of eating nestlings, and in Holland oystercatchers have been known to suck the eggs of other birds.

Imitation.—Some pages back I spoke of how two swans do exactly the same thing together. They imitate each other, and this gives us a clue as to how ceremonies and antics arose in which two or more birds take part. A pair of great crested grebes will stand up in the water waving their heads or dangling



weed in their beaks at each other. Western grebes perform in a similar way and race side by side together over the water. Pairs of red-throated loons also race like this and may even throw themselves on their backs one after the other and swim upside down. One bird acts like the mirror image of the other. Grebes will chase their young, trying to make them dive, but we can hardly call that teaching them any more than a schoolmaster could be considered a good teacher if he spent all his time walking round brandishing a cane. The idea which many people have that birds teach their young is due to the fact that they see them apparently imitating their parents and they assume they are being taught. The nearest a bird gets to teaching its young is when a marsh harrier drops prey for the youngster to catch in flight.

We learn, too, a great deal—if we are wise—by copying others. If you were to go to a Chinese meal you could manage well enough by doing what you saw other people doing—picking juicy morsels with chopsticks from the central bowl to put in your bowl, smacking your lips and wiping your hands on the hot, wet towel which is handed round. Some boys and girls learn to swim by watching others and then trying to do the same thing. But there are few things which we are born knowing how to do and readily do them if someone sets us the example. Babies will smile of their own accord, but when I smile at our baby he smiles back at me. A little encouragement starts him off. Birds often perform certain actions just because one of their companions starts the ball rolling. Doing things is infectious amongst children as well as birds. In the streets of some towns when a few boys start some game or activity, such as roller skating or spinning tops, soon it is taken up in other streets.

If you keep watch where a great colony of herring gulls are nesting you will find that sometimes when one bird starts to preen soon dozens or scores are doing the same; if one starts to call, lots of others may follow suit until there is a terrific din. When an African bishop bird goes off to drink others all round remember they are thirsty too. On many occasions I have hidden up in the midst of a colony of nesting terns. It is a wonderful thing to be amongst such a host of birds, some sitting on their nests, others flying around, and most of them screeching. Suddenly there is a strange silence and nearly all the birds take flight. It is very odd that they should all act together in this way. The same thing happened when I was watching a colony of bank swallows around their nesting-holes. Every now and

then they all whisked away like leaves in the wind. There are many other species of birds which suddenly fly around in a flock for no reason that we can detect. It seems that when one flies all the others feel they simply must fly too, whether they are on good terms with the other birds or not.

When one person in a party yawns others often do the same. Sometimes they don't realize that the first person's yawn started them yawning. This kind of thing may become a disease which affects people in the Arctic. In Siberia a whole company of soldiers, without meaning to be rude, may begin imitating their officer. It is not recorded what the officer says on such occasions! I suppose it looks rather like one of those camp-fire games in which everybody in turn does what the leader does. It seems as if it is in somewhat the same way as we copy each other in yawning that birds imitate one another. Cranes, which perform a prancing dance in spring, sometimes need very little encouragement to start doing it. If someone cuts a few capers in front of them off they go. I used to amuse myself when I went to the Zoo by walking about and turning round before a crane. He always did as I did. Birds will sometimes imitate birds of closely related species when they see them displaying.

It is because apes are capable of imitating people that it is possible to teach them to do such things as drink out of cups and ride tricycles.

Imitating Sounds.—We learn to speak by imitating sounds, so in a sense civilization depends on our powers of imitation. Without speech mankind would not have made much progress. Birds, as everyone knows, are very good at imitating sounds. You can teach a young budgerigar to talk, but you must take care to keep him by himself, for he picks up his own language much quicker than yours and won't bother about learning English if he can talk as much parakeet language as he wants to. People who rear canaries keep the young birds where they can hear and copy a really good songster. If young canaries are kept in a room where they constantly hear the nightingale's song played to them on the gramophone they learn to mingle its notes with their own.

Inborn Songs and Learned Songs.—It is very strange that some birds are born knowing their songs and able to sing them without ever hearing a bird of their own kind singing, whereas other species have to learn their songs to some extent. Thus when

individuals of three British species of bunting were reared where they could not hear any other bird, the corn buntings and reed buntings sang normally but the yellow bunting's song was imperfect. Like the chaffinch this bird has to learn the ending to its song. Not a great deal is known about these peculiarities, so here is another opportunity for you to discover something new. Naturally, it is those species which do not grow up note-perfect in their own songs which most readily learn to sing the notes of other birds. Bullfinches can be taught to whistle tunes by playing to them on the recorder, and a young budgerigar kept with a thrush learned this bird's song perfectly, but sang it quite softly. Even a sparrow can learn to sing a bit if he is reared with canaries. Birds which perfect their songs by hearing others around them do so at certain stages of their development. Meadowlarks improve their songs from when they are about five weeks old through their first winter whereas the chaffinch has two periods of learning—during early youth and in its first spring. The starling is one of a number of birds which include calls of other birds in their songs:

“ After the starlings had flown
Over the plain and were gone,
There was one of them stayed on alone
In the trees ; it chattered on high
Lifting its bill to the sky . . .
And after a hush
It gurgled as gurgles a well,
Warbled as warbles a thrush,
Had a try at the sound of a bell
And mimicked a jay. . . .”

FORD MADOX HUEFFER.

But poets are not the only people who have imagined birds to be better mimics than they actually are.

Mocking-birds are famous for their powers of mimicry and there are some Australian birds, such as the lyre bird and bower birds, which imitate all kinds of sounds from the notes of other birds to the noise of a saw. But although many birds learn their songs, or parts of them, they do so by “picking them up.” You will never see a blackbird or nightingale teaching a youngster to sing.

The truth is that birds are gifted with the power to do most essential things correctly, but they also learn by experience and imitation. Of teaching they get little or none, and they go to school no more than pygmy boys in the Congo, but, like them, they learn by keeping a sharp eye and ear on what their elders do.

CHAPTER XI

COME OUT AND PLAY !

When is a Game not a Game?—Do birds play games? Yes, some of them do, though play is much more usual amongst mammals than birds. But as we know so little about what goes on in a bird's mind it is often difficult to be sure when we see a bird performing some antic that it is doing it "just for fun." Even when we see other people doing things we are sometimes in doubt as to whether they have a serious purpose or are just amusing themselves. In Colorado I once saw some Hopi Indians dancing wildly around with eagles' wings fastened to their backs. It looked as if they were enjoying a playful frolic. But one of them told me the dance was their way of praying for rain ! It was really a ceremony, partly magical and partly religious. Some folk-dances which nowadays are danced just for fun, such as English sword dances, were originally performances of this kind. So if it is not easy to say whether the doings of human beings are serious or not it is still more difficult to tell whether birds are playing or doing something with a deeper meaning when we see them performing strange antics. We have to watch them extremely carefully if we are not to make mistakes. Birds do all sorts of strange things when they are courting—so do human beings for that matter !—and it would be just as great an error to think that at such times they are playing games as to imagine when we see a man up a telephone pole that he has gone there just for the pleasure of doing some climbing.

Games of "Catch."—Some games we play alone. There are not many children who have not tried to keep a ball in the air as long as possible without letting it touch the ground. And who has not played "Catch" either alone or with a friend? Just now and then birds have been seen playing games rather like these. While I was watching a peregrine falcon flying high up with a bird held in its talons it dropped the carcase, but soon caught it again by making a swift swoop. A naturalist in South Africa has described how he saw a crow dropping and catching shells again and again. One of Gilbert White's friends told him that

he had seen a jackdaw doing the same thing with what appeared to be a walnut. An Australian claims to have seen a more wonderful game—two bower birds flying about playing with a bone, one catching it when the other dropped it and thus keeping it in the air for minutes at a time.

Cat-and-Mouse Games.—A variation of this game occurs when a bird plays with its prey as a cat plays with a mouse. Cormorants and grebes occasionally play in this way with a fish—letting it go and catching it again. An American bird-lover watched a marsh hawk pounce with talons spread on a meadowlark. After looking at it this way and that with many turnings of its head it flew up a few feet and dropped it seven or eight times, each time



seizing the poor bird as it tried to flutter away. In New Zealand a hawk was seen carrying two mice up into the air, one in each foot, and dropping them again. At last it lost one and decided to eat the other. Such practices are not common amongst either birds or mammals and perhaps we should not call them "play" at all. We have no reason to suppose that the creatures concerned have any intention to be cruel. Also, the captured mouse, bird, or fish probably does not feel fear or pain nearly as much as we might think it does. David Livingstone, who was carried off by a lion, and a tiger hunter with whom a tigress "played" recorded afterwards that, although they were conscious all the time, their minds were numbed to the sensations of pain and fear.

Chasing Games.—We may often see one bird chasing another of the same species, but usually this happens when a trespasser is

being chivvied away from the piece of ground claimed by someone else, or a bird chases his mate or mate-to-be. So it can't be called a game any more than it is a game when those robber gulls, the jaegers, chase other birds in the air, make them cough up the fish they are carrying and catch these as they fall. But when we see flocks of birds, such as dunlin (red-backed sandpiper) manoeuvring in unison they seem to be enjoying themselves. In spring, pairs of partridges chase each other back and forth keeping the same distance apart. After they have sprinted in one direction they both turn round and the bird which was being chased runs after the other; so they go on alternately. Sometimes three birds in line trot up and down. Racing of this kind is probably connected with courtship. Crows will hop together down a field and all turn at the same time. Follow-my-leader is popular with Adélie penguins. They flop along the surface of the sea in jumps at a great rate and a number of them sometimes career about in a file after a leader who takes them in one direction, then doubles back and off again on another tack, tobogganing over ice-floes or diving underneath. After a while they all crowd on to a raft of ice to preen and bask in the sun; then off they go for another game.

At the other end of the world the eider ducks enjoy a thrill in their own way. In Iceland they gather where they can launch out into the swift current which sweeps out of a bay when the tide is ebbing and "shoot the rapids." Each bird, when he has had the fun of being borne swiftly along by the stream, lands and runs briskly back again to the starting-point in a great hurry to have some more excitement. They are like a lot of boys enjoying a slide and "keeping the pot boiling." A party of more than a dozen coots will scramble up a steep bank two or three at a time, dive in one after the other, and go on doing this until each bird has had about three dives. Such frolics, however, are rarely observed. We may now and then see wild duck playing what looks like a diving game of "who can stay under the longest." Half a dozen begin by flying around and making a glancing dive into the water so that they are completely submerged for two or three yards. Soon others join in until the whole paddling of as many as forty birds is taking part. This frolic occurs in winter and may be a development from that odd outbreak of chasing, splashing, and diving which often occurs amongst flocks of ducks.

Turkey-trots.—Although turkeys do not look very playful birds they are not always as dignified as they look when you see them in the farmyard. I once stayed in a tiny hut in California near enough to the desert and mountains to hear, as I lay in bed, the coyotes howling at the moon and the great horned owl calling "*hoo, hoo.*" Perhaps these creatures were interested in a big flock of turkeys close by. The next morning I saw the birds playing what looked just like a game of "*Tag.*" It happened to be Christmas Eve, but I don't think the turkeys were celebrating the fact that they were not taking part in other Christmas festivities! Turkeys' games have probably grown out of courtship antics. They sometimes run in follow-my-leader file around a tree and have such elaborate dances that the Mexican Indians—who think they dance to bring rain to the dried-up countryside—have a turkey-dance of their own which they perform when they want rain.

Tricks.—Owls may look solemn but they are really playful and wily. A friend of mine had a tame short-eared owl and a kestrel (a small falcon) in a cage together. When the owl noticed that the kestrel had fallen asleep after sun-bathing he alighted noiselessly alongside and gave the kestrel's wing a tweak. It awoke with a scream; but the owl was gazing placidly upwards, looking the picture of innocence.

Ravens seem to approach our kind of intelligence more than most birds—though we must always remember that birds' minds work very differently from our own. People who have kept them as pets will tell you all kinds of stories about their tricks. One bird enjoyed slyly stealing up below where another was perching and upsetting him by knocking his feet from under him with a swift stroke of his big bill. A pair learned how to tease a cat—one hopped about in front of her to attract her attention while the other crept up behind and pinched her tail. At such times they have an artful look in their eyes, so that they seem to enjoy the joke—and that makes them seem very human, for we are the only creatures on earth who can enjoy a laugh. Every time we laugh we do something that no ape or monkey or bird can do; not even the laughing jackass or hyena—for they only sound as if they were laughing. A chimpanzee can look a bit like you or me, but, poor chap, we are one up on him because we can laugh at him and at ourselves.



WITH SLIME-COVERED HEAD AND NECK THE BITTERN BEGINS HER TOILET

—AND FINISHING IT $1\frac{1}{2}$ HOURS LATER RUBS THE BACK OF HER
HEAD ON THE OIL GLAND (p. 52).





THE YOUNG CUCKOO WRIGGLES UNTIL THE HEDGESPARROW'S EGG FALLS
INTO THE HOLLOW OF ITS BACK

—THEN THROWS IT OVERBOARD (p. 39).

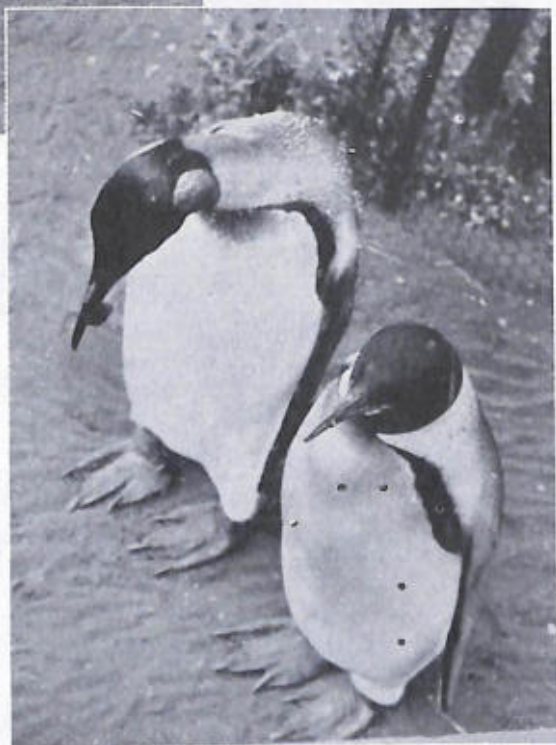




A RUBY TOPAZ HUMMING-BIRD IN TRINIDAD PANTS IN THE HEAT AS SHE PERCHES ON THE RIM OF THE NEST SHADING THE CHICKS (p. 47).



THE KING PENGUIN HOLDS
HIMSELF STIFFLY ERECT



—THEN MAKES A DIGNIFIED
BOW (p. 23).

Mammals' Games.—Many mammals play games. Red deer play "Tag" and chase each other round hillocks. When out of sight at the other side one of them will reverse direction so as to surprise his playmate just as we might do. Lambs, as well as deer, play "King-o'-the-Castle." Otters make slides on slippery banks and badgers are very playful. At a "sett" where I used to watch at dusk the first thing I would see would be a striped nose at the opening. After spending quite a long time looking about and sniffing the air the badger would come out a little way. Then he would run in again. Soon one or two more appeared—one night I counted nine. Then the fun would start—and it was terrific. In their chasings and mock fights the cubs rolled madly about and over each other, snapping and snorting like puppies. This happened every evening and the games lasted about half an hour. Then the badgers slipped off through the woods to feed. The extraordinary thing was that except for an occasional grunt or snuffle they made no sound as they played. I thought this very odd as badgers have rather clumsily shaped bodies and feet. The youngsters seemed so glad to have a romp that it was easy to imagine mother and father having a tough time trying to keep them still before they came out. Towards dusk they must have needed many a poke and smack to keep them from creeping out of the dark, cramped den too soon.

Why We Play.—Mammals and birds, boys and girls, play because they have energy to work off. But play is useful in two ways. It is health-giving and a training for the rough and tumble of life. Our young son Patrick, who is three months old, likes to be laid on a big chair in the evening so that he can kick while he gurgles happily. His "daily dozen" does him good. When he is older his games will be more complicated and less like exercises. Animals' and children's games develop from simple, natural movements into various more or less elaborate performances. Thus living things learn quickness of eye and limb—and find out how to take care of themselves when in tight places later on. If a badger has to fight for his life against another badger or a dog the lessons he learned while rolling about, twisting and wriggling with his brothers and sisters, no doubt come in very useful.

How Play Arose.—At the beginning of this chapter I mentioned how difficult it is sometimes to be sure when we see birds acting

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in queer ways that they are really playing and not courting or fighting. Birds, as we have seen, perform various movements to stimulate one another, but sometimes it seems as if they do them for their own sake, and so a performance that originally served to excite the birds so that mating might take place becomes a romp or frolic.

Guillemots' Water-dances.—I wish I could take you with me to a little Irish bay to see my funny friends the black guillemots holding their water-dances. When on land these black-and-white birds stand and run clumsily on their large red feet, like comic little pierrots, but in the sea they are expert swimmers and divers. They like to gather into groups of about four birds. Suddenly one dives—and immediately down they all go to chase each other in the green depths. Often just before this they do a kind of waltz on the water, one swimming round the other, who keeps turning to face his partner. All the time they continually cheep at one another, and as they open their mouths you see that these, like their feet, are a bright red colour. Sometimes they string out on the water in a line at almost equal distances apart. You would think they were trying to dance the Lancers or some other old-fashioned dance.

I believe that the performance was once entirely a mating-dance, and probably still is to some extent, but now it has become something of a party. Like a football game in which the two teams enjoy their rivalry the birds express rivalry and sociability rather as song-birds do when they sing.

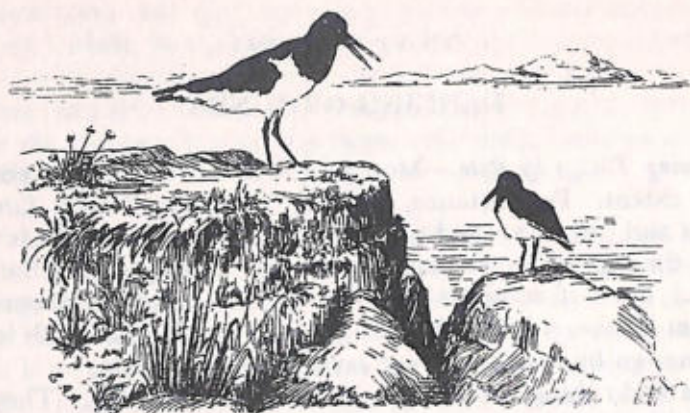
There are various sorts of co-operative antics performed by birds into which the spirit of play enters to some extent. Such doings nearly always serve some useful purpose in the life of the birds, as is true also of most of our games.

DANCING-GROUNDS

Doing Things by Rote.—Most people like to live in a groove to some extent. For instance, we feel "at home" with familiar things and people around us. If we have to move house it takes some time for us to feel as if we really "belonged" in the new place. Even if someone only moves the furniture around in a room it takes a little while to get used to it. The truth is that if things go by routine we are saved a lot of trouble.

Birds do things by rote much more than we do. They act rather like an old lady I knew who went on laying places for four people at tea because she had done so for several weeks and did not remember that the visitor has gone away. If a young guillemot is snatched away by a gull its parents will go on offering food to the place where it used to be as if it were still there ! If a nest is moved only a yard or two its owners may not recognize it ; habit makes them look for it in its old situation. Birds like to keep to familiar places. Watch starlings carefully and you will find that they have particular chimney-pots on which they perch and sing, and which they regard as their own. As we saw earlier, in spring male birds seize on a piece of ground, large or small according to the species, and drive rivals away. This "territory" may be some miles wide, as with eagles, or a space only wide enough to hold a nest, as in the case of gannets. Usually it is in the territory that the nest is made and the young reared.

Piping Parties.—Birds, too, have their favourite perches, roosting-places, and playgrounds even when they have no nests and are not thinking of nesting. Oystercatchers are conspicuous black and white birds with red beaks and pink legs and look rather like flashily dressed old gentlemen with very long red noses. In Europe they are common near the sea, but the American species has decreased. They like to gather in twos, threes, or larger groups to hold piping parties. One starts to utter his loud whistle, then another comes up and pipes beside him ; and, performing thus, they approach and jostle up to a third. It seems that this is often a female and the others are two rival males. Instead of fighting they pipe in com-

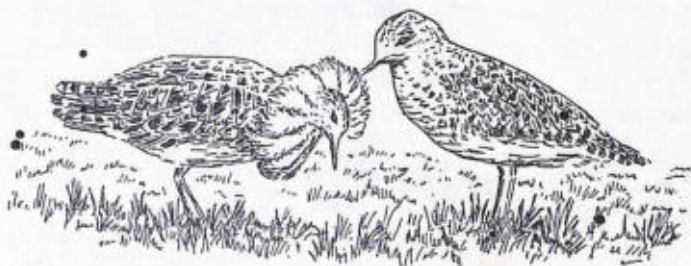


petition like rival bagpipers striving to outdo each other. They try to frighten their opponents without coming to blows, just like small boys at the beginning of a quarrel. Oystercatchers seem to enjoy their musical rivalry, for although when they begin they may seem angry with each other they appear to become so wrapped up in their song and dance that they forget to be unkind. A variation of this is when the birds form a procession. Two or three march along, the first one or two with heads bowed down towards the ground, the last with head in air, piping loudly and swaggering along as if the others were his slaves. There are two striking things about these performances : the birds often return to a favourite locality to display, and when a few start to sing and dance others will join in ; secondly, the more there are the longer the fun goes on. Thus birds tend to have particular places or ballrooms especially for dancing and, just like people at a dance, when the music starts and a few couples get on to the floor others feel they must take part too. Probably, it, was through such impulses as these that birds came to have social dances like the water-frolics of the black guillemot which were described in the last chapter.

Tournaments of the Ruff.—There are some birds which perform in a still stranger way than oystercatchers. The name “ruff” by which they are called describes them very well, because they have great fringes of feathers round their necks. At one time they were common enough in England, but when the fens were drained most of their haunts were destroyed and trappers finished

off those that remained. In spring each male bird takes possession of a tiny standing-place or "court," a foot or two across, and prances about on it so continuously that the grass and herbage are quite worn away. The first time I came upon a ruff's dancing-ground in Holland I was quite mystified. There on the green turf were a dozen or more bare, brown, circular patches quite close to one another. It looked as if fairies had been about! Later I saw the birds returning to them and watched them one by one settling on their little plots, jumping and dancing about at times as if quite mad. Facing up to their nearest neighbours the birds danced war-dances at each other. But when a female (or reeve) appeared they all stood still with heads bent down as if saying their prayers.

Thus the ruff carries to an extreme the kind of dance which the oystercatcher performs in moderation. Probably the ruffs' dance grew out of some performance like that which the oystercatchers still carry on. You may well ask, "What are these antics for? Why do the birds engage in them?" The truth is that the dancing-grounds are the rallying-places of a kind of bachelors' club. It is as if there were ballrooms in our towns and villages where gentlemen spent their time showing off, cutting capers, and sparring with one another, and to which ladies might go when they wanted to choose a husband. For it is the reeves who choose their partners and it is at the dancing-grounds that they find them. When a female appears all the ruffs stand dead still with heads bowed, as I have described, and the reeve walks right up to the ruff most pleasing to her, nibbles his neck feathers in token that he is her choice, and so they mate there and then. The tournaments are held at the same places year after year, and thus the reeves always know where to come to find partners. If the birds really fought each other the parties would be broken up, but as it is very seldom that anybody gets



seriously hurt they are able to keep up their dances regularly and continuously throughout spring and much of the summer.

Blackcock and Manakin.—Another British bird which has a very similar kind of dance is the blackcock, and there are other birds, such as the prairie chicken and sharp-tailed grouse of North America, which have such tournaments. But amongst dance experts we can hardly find finer performers than the little birds called manakins of Central and South America. When I was living in the jungle I went out one day in a dug-out canoe, paddled across a creek, and landed on the forest-clad shore. I had not gone far when I heard a sharp crack, and soon again—crack, crack! Was it a puma or tapir or perhaps a boa constrictor which had broken some twigs as I approached? I was quite puzzled and a trifle frightened. But at last I found that the snapping noises were made by a little yellow-breasted bird flicking his wing-quills together as he jumped from twig to twig. It was a manakin at his “court,” or dancing-ground. Each bird selects a spot in the jungle and cleans away every leaf and twig from the ground, tidying up the place very thoroughly; and here, day after day, he hops back and forth from branch to branch above his court, making his wings crack in mid-air as he does so. A little distance away another bird is doing the same thing, and some yards off yet another. There may be six or eight manakins’ “parlours” together in the jungle, each with its little expectant acrobat. And what is he waiting for? You have already guessed—for a mate. He sees her approaching long before human eyes can spy her, and immediately becomes all excitement, darting across and back again with loud snaps. She comes nearer, and at last joins in the dance, “setting to partners” with him, until they have had enough and they go off together into the jungle. Young sedge warblers have been seen playing a game resembling this. Two sit on twigs facing one another while a third looks on, then one springs at the other—who dodges—and each alights on the opposite number’s perch. They face round again to continue their exercise and the place-changing becomes quite rapid.

Argus Pheasant and Bird of Paradise.—I have only space to mention two other birds which have what we might call parlour performances in the jungle. The first is the argus pheasant. The cock clears an arena and there calls continuously and very

loudly ; eventually, if he is lucky, there steals up to him a female and he has the opportunity of showing off his wings, which are in appearance rather like a peacock's train, the feathers being adorned with large " eyes " somewhat like those in peacocks' plumes, but not so vividly coloured. The second performer is the magnificent bird of paradise, which tidies his court in much the same way as all these other birds ; he has wonderful shining and iridescent plumage and picks off leaves which shade his dancing-ground, enabling the sun to shine upon him and increase his glory. When the female comes to him he poses so as to make the most of all his splendours and quivers the ruff around his neck, impressing his visitor with the splendour of its metallic green reflections.

Thus we see that although the males of most British birds claim a plot of ground in spring to which the female comes to mate and then rear a family, some birds have a different plan. They have " courts," which are really territories of a special kind, where they make strange noises and perform various antics, and here they await the females. They put a great deal of energy into their displays, but as none of these fine fellows gives any help with nest-building or looking after the youngsters they can expend in dancing the energy which other birds devote to their domestic duties.

CHAPTER XIII

WHAT'S FOR DINNER ?

What Birds Eat.—We are able to eat a greater variety of food than any bird, partly because we can obtain the produce of distant lands and waters but also because we are not adapted, like so many creatures, to eat only certain limited kinds of food. The special forms of beak, feet and wings evolved by species of birds enable them to obtain their particular sort of prey.

Some, such as sun-birds, enjoy the nectar of flowers, while scavenger vultures will eat the droppings of animals. The rare Everglades kite lives on a certain species of snail. In Trinidad I saw an eagle which lives on crabs, and at Panama a falcon which hunts bats ; it looked to me to be just about the fastest thing on wings. I know a moorland cliff from which, on a lucky day, you may see a peregrine smash down upon a puffin, watch swifts catching flies high in the sky, and thrill with delight as a gannet plunges to catch a fish. Below you oystercatchers prise limpets from the sea-swept rocks and on the moor grouse are feeding on heather-tops, curlew and snipe probe for worms, and pipits seek out tiny grubs. In spring a tree may have a thrush on the ground beneath it pulling out worms, a tree-creeper hunting its trunk for insects and spiders, a woodpecker half-way up hacking out a grub, and warblers picking off caterpillars from the leaves.

Beaks, their Shape and Use.—As the shape of a bird's bill is adapted to the capture or picking of its food it often gives us a clue to the bird's habits. Whereas we make tools for various purposes birds grow theirs, and just as we can tell a plumber or a chimney-sweep by his tools so we can identify birds by their bills. Thus seed-eating species may have short, stout bills but insect-eaters' beaks are usually more pointed. Hawks' beaks are suitable for tearing flesh, pelicans have pouches for storing fish, in spring the bills of puffins enlarge into flattened plates, crossbills are equipped for opening pine cones, humming-



Puffin carrying sand-eels.

birds have long probes with which they suck nectar, and nighthawks have tiny bills and huge mouths for gulping in flying insects. You might guess, without knowing the birds' habits, that the long bills of curlew, woodcock, and snipe were for poking into damp soil, but you might be puzzled as to the use of the avocet's long, fine beak, which curves upwards instead of downwards like the curlew's, and you might think that the big beaks of toucans would be so awkward as to be a

hindrance to the birds. But if you were to see avocets skimming tiny creatures from the surface of shallow pools with their "cobbler's awl" bills or could watch a toucan in the jungle stretch out his long pincers and neatly pluck a big round fruit from the highest twigs of a tall tree you would realize that the strangest of bills are usually suited to some special way of feeding.

Variety in Diet.—Although the shape of a bird's bill is often useful in helping us to decide what sort of a bird we are looking at, we can easily make mistakes if we believe we can tell what species it is and what it eats just by looking at its bill. Herons' and cranes' beaks are very similar, but herons feed on fish and other animal food and cranes live largely on vegetable matter. There are owls which eat fish, kingfishers which devour mice, and vultures which relish the fruit of palms. The European cuckoo eats caterpillars but some species live on fruit. In the course of ages as birds change their feeding habits their bills become more adapted to deal with such food. Species which are closely related to each other may have quite different feeding habits. The shoveler duck "bibbles" water through its bristly bill, sieving out the living things, but the saw-billed ducks, or mergansers, catch fish. Woodpeckers feed on insects and grubs, but the American species which are called "sapsuckers" live up to their name although they also eat insects.



Toucan feeding.

Many birds of the crow family are able to live on a wide range of foods. One of them, the raven, is able to survive in deserts and on high mountains. But, roughly speaking, most birds keep to their particular food, however widely it may vary, and naturally are found where it is to be obtained. Thus when you are learning to spot the different kinds of birds it is useful to have lists of the species to be found in such places as woods or marshes, on lakes or cliffs, by the seashore, and so on. You need to remember, however, that some birds, such as sandpipers which nest on marshes or tundra, will be found in winter by the sea, where food is more easily obtained, especially when there is frost; also that during migration birds may turn up in unexpected places. After a little practice you are able to say to yourself, "There ought to be a red-headed woodpecker in this wood," or, "Surely I shall find terns, piping plover, and black skimmers on that beach." When you look at a large-scale map, you can even make a good guess as to the birds you are likely to see if you visit one of the places on it. Of course you have to make allowance for other things too, such as whether or not there are suitable nesting-places. For example, along a coast without any cliffs you would not expect to find colonies of murres. But where there is suitable food birds will sometimes change their

nesting habits. Falcons and nighthawks occasionally nest on tall buildings in cities and owls which normally breed in trees may lay their eggs on the ground.

Birds, Food, and Scenery.—If we remember that where their food is there the birds are likely to be we have the answer to some of the riddles which Nature sets. Why are rock-bound lakes in the mountains so disappointing to the bird-lover? Because not many plants grow in the water and there is little life there. How is it that huge multitudes of birds are able to breed in the arctic? Because the condition of the sea suits tiny floating creatures which occur in millions, and some birds feed on these, others on the fish which live on them. Why is it that although short-eared owls are fairly common in Ireland during the winter they hardly ever nest there? Because these birds usually feed their young on voles, and there are no voles in Ireland.

Every living thing depends on a host of other things. Each one of us depends for his food and livelihood not only on a great number of people—butcher, baker, and candlestick-maker, sailors and farmers in various parts of the world—but also, of course, if we go a step farther back, on the land and what comes out of it. And what grows in any particular place also depends on how much rain and sunshine it gets, how high the mountains are, and so on. Of living things we can say they grow and decay, they eat and are eaten. Nothing is left alone to do as it likes.

“ Big fleas have little fleas upon their backs to bite 'em,
And these fleas have lesser fleas—and so *ad infinitum*.”

If we kill off a bird or an insect we alter the conditions of life for more creatures than we can guess. If it were not for birds insects might overrun the world. There are at least half a million different kinds of insects already named and many new species are being discovered each year, whereas only about 8500 species and 35,000 subspecies of birds are known. Nobody should interfere with Nature without knowing thoroughly what he is doing.

Ecology. The study of how plants and animals depend on each other is an important science called ecology. You are learning it as you notice the kind of tree on which a bird nests or the insects or fish which it brings to its young. It is silly to say, for example, that a bird is useful because it feeds on insects.

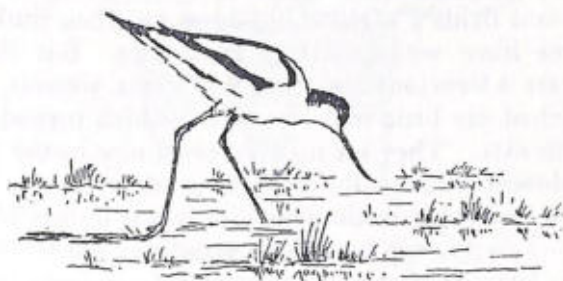
The question is, "Do the insects on which it feeds do good or harm?" Scientists have a clever way of finding out what food is given to young birds. They put up nesting-boxes containing a gadget which looks like a young bird's beak and opens automatically when the parent returns. He or she stuffs the food into this artificial mouth and it goes into a test-tube from which it can later be taken to find out what it is composed of. Chicks are not always fed on what suits the parents any more than a baby is given beefsteak.

Various Ways of getting a Meal.—Birds will do various remarkable things to obtain food. Crows fly up with shellfish and drop them on rocks to crack the shells in order to get at the creatures inside, tits learn to haul in a string which has some suet on the end of it, black-headed gulls do a kind of dance on the sand to make the worms beneath wriggle and so be more easily pounced upon, and phalaropes swim in circles, creating eddies to bring up insect life from the bottom of pools. A number of pelicans will work together in a circle "shepherding" a shoal of fish into a small space and then pouncing on them. By giving a special call African honey-guides attract men and honey-badgers to bees' nests in order that they may enjoy what is left over after the bees have been robbed. A finch which lives in the Galapagos Islands does an astonishing thing. When it is unable to get an insect out of a crevice it picks a twig or cactus spine and uses it to probe the creature from its hiding-place. There are very few animals or birds thus able to use a tool. Somebody has said that man differs from other creatures in being a tool-using animal, but apes use sticks to reach out for food, an Indian elephant has been known to poke a leech out of its foot with a splinter, some ants make their larvæ serve for sewing the leaves of their nest together by holding them up and making them spin threads across, and some solitary wasps grip a pebble in their jaws and ram down earth with it at their burrows. We cannot even say that man alone is able to make tools, for chimpanzees trim stems to make them suitable for poking out termites from their nests.

Early Birds—and Late.—A worth-while thing to do is to notice and record at what times of the day birds feed. In the books you will find very little about this. Just as people of various

nationalities vary in the hours of their meals so it is with birds. We have quite a large meal at breakfast, but many French people just have a cup of coffee. Spaniards have a big dinner late at night. A naturalist who fed tits outside his window found that blue tits began feeding earlier and went on feeding later than great tits. The song sparrow usually eats every twenty or thirty minutes during spring and summer. Many birds feed actively in the early morning—the best time to go birding. Black guillemots, however, join in water-waltzes so continually in the morning hours that they cannot have much time then for feeding; but as they do very little dancing in the afternoon I suppose they fish then. It is interesting to watch birds such as cormorants, grebes, and diving ducks at work. By timing them you can tell the depth of the water. Allow twenty seconds for the first six feet and ten seconds for each additional six feet. Coots are an exception to this rule because they don't hunt at the bottom but just grab some weed and bob up again.

There is plenty still to be discovered as to how birds feed, and the way to learn it is to go out and look for yourself.



Avocet feeding.

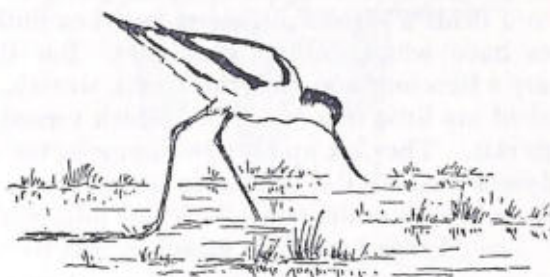
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Avocet feeding.

CHAPTER XIV

ROOSTING RUSES

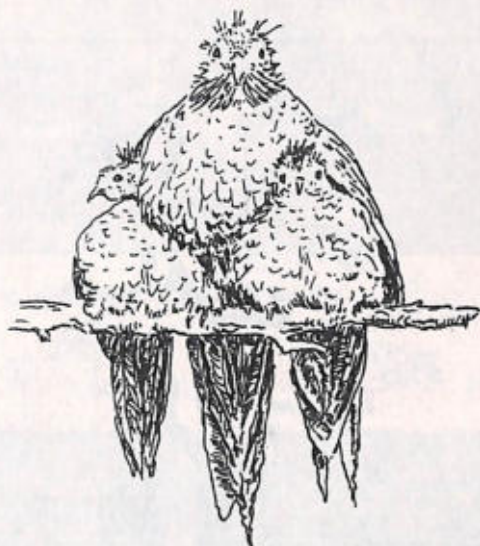
Danger at Dusk.—Have you ever lain snugly in bed on one of those cold nights when you could feel fairly sure that dainty frost-flowers would decorate the window in the morning, and before you fell asleep heard the sparrows stirring in the ivy outside? "A poor time they must be having," you thought; and indeed sometimes in bitter weather they get wet, chilled, and die. Not long ago on a snowy morning I picked up a forlorn-looking sparrow to warm it at home, but it died in my hand on the way. For a small bird, going to bed is a serious business because it is sometimes a matter of life or death to find a suitable place. He must discover somewhere reasonably sheltered from the wind, as dry as possible, and out of reach of enemies. Just as in cities watchmen, road repairers, railwaymen, post-office sorters, and a host of other people start work when we are going to bed, so in the woods and fields a night shift comes on when dusk falls and the thrushes have whistled their last notes. But these night watchmen are a ferocious lot—cats, foxes, rats, weasels, and owls. Once I pitched my little tent in a wood which turned out to be infested with rats. They sat up on tree-stumps in the dusk, they rustled in dozens through the dry leaves when it grew dark, and as I sat at the entrance to the tent—for it was impossible to think of sleeping—I could even hear them grinding their teeth together. Shakespeare knew that at night fierce creatures come out of their dens:

"Light thickens; and the crow
Makes wing to the rooky wood;
Good things of day begin to droop and drowse;
Whiles night's black agents to their preys do rouse."

So birds seek out dormitories as safe as they can find in a world full of perils. For the careless and unwary there is no awakening.

Roosting.—One way to get out of danger is to perch high up. The chickens in our hen-runs do not sleep on the ground, for

their wild ancestors, the jungle-fowl, learned to keep out of the reach of the many hungry creatures with sharp fangs which wander through the tropical forest at night. Turkeys choose a lofty perch if they can find one. So, too, pheasants roost on branches out of harm's way. Some species brood their young while perched thus. The hen birds look funny when they try to shelter their big chicks under their comparatively small wings. I know a wood in which, every now and then as you go through it, you may espy a pheasant sitting on a high branch of a tree. But they are strangely quiet birds. As you watch them they never



Rheinhardt's Argus Pheasant brooding chicks.

move, for they are stuffed dummies placed there by the keeper to draw the fire of poachers.

You will be able to think of many birds which seek shelter at night in trees. One of the most pleasant sights in England is to see the rooks streaming back to the tall elms in the gloaming. Those lucky enough to have lived near a rookery in their childhood will always remember their noisy evening chorus.

"I climbed the hill as light fell short
And rooks came home in scramble sort,
And filled the trees and flapped and fought,
And sang themselves to sleep."

RALPH HODGSON.

The Continental starlings which spend the winter in Britain come in large and small bands to their roosts, sometimes in trees and sometimes on buildings such as St. Paul's Cathedral. They make a tremendous uproar before they settle down—rather like some girls and boys during their first night in camp. Indeed, if you spend a night or two near a starling roost you will find that the concourse is very seldom entirely silent.

Company at Night.—Many birds like company at night. The gaunt-looking turkey vultures of America sometimes assemble



together on a dead tree—and a weird crowd they look against the starlit sky with their sagging wings and hunched-up shoulders. I have drawn a picture of them as I saw them at Panama. You may often see vast flocks of ducks together in winter on the sea or inland lakes. Some say that they paddle with their feet so as to turn in circles and not be carried ashore. It would be worth while trying to find out whether this is true. In Europe wrens roost in old nests, holes in hay stacks or in recesses amongst ivy. In cold weather a number huddle together for warmth—sometimes a dozen or more in a cluster. Even with all their



RUFFS DISPLAYING AT THEIR "HILL" (p. 69).

STONE CURLEWS CHANGING PLACES AT THE NEST (p. 23).





WREN AT HER DOMED NEST
(p. 55).



KINGLET AT HER
HAMMOCK NEST
(p. 49).

care to select a snug nook, now and then whole parties are found chilled to death. Although cactus wrens live in the American deserts they make nests in which to roost.

A queer thing happened in Dublin some years ago. A few pied wagtails started to roost together in a small tree in one of the busiest streets. These lodgings became more and more popular in the course of time until now there are two thousand or more birds which crowd nightly into the tree. Why they should congregate like this nobody knows, for wagtails do not go about in large flocks. However, sometimes more than a hundred will roost together in a patch of reeds.

Bed-time Politeness.—Long-tailed tits—birds so dainty that they seem to belong to fairyland—roam the winter woods in bands, keeping in touch as they flit from bush to bush by continually giving their sharp little calls, but when sunset comes they have a strange way of their own of settling down. The first bird alights on a twig about six feet from the ground, then number two settles close beside him, but when number three arrives he “elbows” his way in between the two. The other birds all squash into the line and the earlier arrivals have to ease off to right and left to make room for them, so that when the little flock is arrayed along the twig the first-comers are out in the cold at either end of the line. So first come, first served, hardly applies amongst long-tailed tits. It is quite in keeping with their refined appearance and ways that those who arrive early should give up their seats to relatives or friends.

The hen blue tit nearly always goes to roost earlier than her mate. But before retiring to bed they have a little frolic together. If she is already in her roosting-hole when the male arrives he calls her out in order that they may join in a good-natured chase.

The More we are Together . . .—You may have seen how bees swarm—hanging in a solid mass from a branch. Some tropical birds do much the same. When Indian crested tree swifts arrive at the roosting-place they fly around, gradually coming lower until one bird swoops to a branch near the top of a tree. This acts as a signal for all to perch on the tree. Then they begin to work their way towards the first bird, collecting in a feathery ball on top of one another. I think somebody in the crowd usually feels uncomfortable—and no wonder—for the

first attempt is seldom a success. So they fly off suddenly and start all over again. This may happen several times. But at last twittering ceases and they fall asleep.

Some folk think that European swifts, which dart about high in the air at dusk with rapid flicks of their crescent-shaped wings, sleep in the air, but naturalists who have kept watch at their nests during the night have noticed them creep in.

By crowding together birds help each other to keep warm, though probably when starlings or wagtails congregate at a roost it is just because they like each other's company. They may also gain greater safety on the principle that someone is likely to be awake and spy an approaching enemy if there are enough of you together. This does not always work, however, for sometimes a bunch of wrens is so sleepy that you can put your hand right into the midst of them. Partridges, which roost on the ground, form a circle. Quail also roost in a circle facing outwards, tails to the centre, closely packed together. A late-comer jumps on to the backs of the others and elbows its way in. When attacked they go off with a whirr in all directions and most of them can usually escape. This dodge is probably fairly successful if the night prowler is such an animal as a fox, but poachers are able to kill many with a charge from a shot-gun—man's capacity for destruction has out-paced the safety devices of birds. The ruffed grouse of North America fly into a snowdrift and squat under the snow—a good way of keeping warm, except that if rain falls and freezes the birds may not be able to get out.

Mateyness.—Quite a number of birds which nest in holes, such as chickadees and woodpeckers, also roost in such places, but British starlings, for example, sometimes roost in holes although they also have tree roosts. When they pair up in autumn they evidently like to be matey for through the winter they keep together in the same hole. If there is not a suitable roosting-hole near its nest the great spotted woodpecker will excavate one. The hen bearded tit snuggles under the spread wing of her mate, and after a bath they cuddle close to each other to dry one side; then reverse their positions so as to dry the other side. They are delicate little birds. When there is a hard winter almost all the few pairs in England are killed off, so they need to take plenty of care of themselves and each other. In the spring European blackbirds,

which roost in bushes six or eight feet from the ground, may be found at night only a foot or two apart, and I have no doubt that you will be able to discover other birds which like to keep near their partners when roosting. Of course birds often sleep on their nests, and sometimes one bird stands guard beside its mate.

The Tree-creeper's Discovery.—The brown creeper of America is very like the tree-creeper of Europe. You can be sure you are seeing one if you notice a small brown bird flitting to the base of a tree,



working up the trunk in fits and starts and poking into crevices. When I was a boy a friend of mine in Ireland discovered that tree-creepers made hollows in sequoia trees—which have soft fibrous bark—and used them as bedrooms. These North American trees were first planted in Great Britain less than a hundred years ago, so it appears that since then the tree-creepers have learned how to make cubby-holes in them by scraping with their feet and pecking with their dainty bills. Wherever I go about the countryside I always have a look at the trunks of sequoia trees, and I nearly always find tree-creeper roosts. You can spot them

by noticing the white droppings beneath the hollow. Did tree-creepers everywhere discover on their own what snug resting-places could be made in these trees, or was the discovery made by a few birds and did the others imitate them? We do not know.

Tree-creepers have not a regular bed-time. It varies in relation to sunset throughout the year as you can verify for yourself if you keep watch behind a tree trunk. You will see the bird alighting at the base of the tree and jerking upwards until he or she settles into the hollow. During the shortest days they go to bed twenty to forty minutes after sunset and at midsummer half an hour or slightly more before it. At midwinter they get up about half an hour before the sun but at midsummer the sun rises a few minutes before they do. Like some of us, they like to spend a few minutes getting properly waked up before going out into the cold. British tree-creepers are not at all chummy, for if a bird finds another in his wooden bedstead he hammers until the feathers fly, but continental three-toed tree-creepers are more sociable and as many as fifteen may huddle together on a cold winter night.

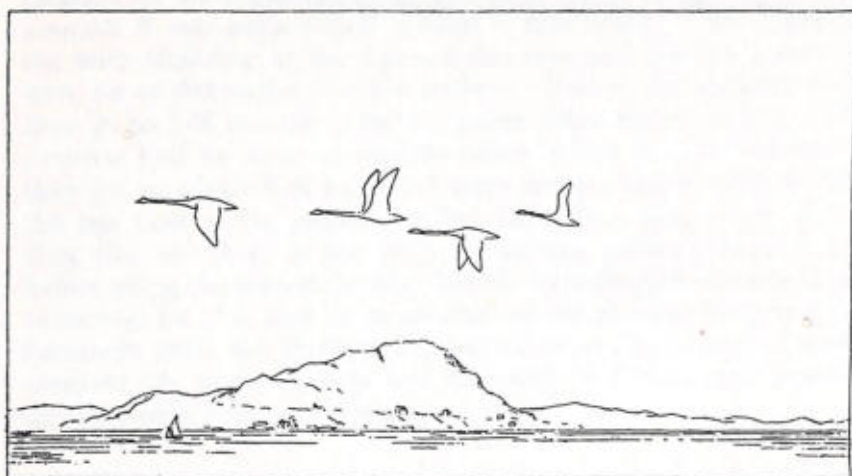
The Hornbill's Precautions.—Some pages back I pointed out how birds in the tropics had to take special precautions to prevent their nests in trees being robbed by monkeys and other tree-climbing animals. Because there are in the jungle so many bloodthirsty little creatures which can climb trees birds have to be just as careful about finding a secure place to roost. A species of South African hornbill has several different roosts to which the birds go in turn—so that no enemy can lie in wait at one of them and be sure that they will turn up. They perch on such slender twigs at the end of branches that no beast could reach them, and before going to roost they alight in some trees near at hand and suddenly, when they think the coast is clear and no evil-intentioned eyes watching them, they fly in swiftly and silently and remain absolutely still, crouching in their places.

An Automatic Lock.—You may have wondered how it is that birds don't fall off their perches when they are fast asleep. When a bird lets its weight down the muscles of its feet tighten and its grip becomes more secure. When next you have a

chicken for dinner you can experiment with it and notice how its toes move when you bend its legs ! Birds' feet are shaped to suit their mode of life. For example the hind toe of birds such as chickadees and crossbills, which can cling upside down, is particularly long in relation to the span of the foot. There are exceptions to most rules amongst birds and certain little parakeets are known as hanging or bat parakeets from their habit of spending the night hanging upside down as bats do.

CHAPTER XV

OVER THE HILLS AND FAR AWAY



A Mystery.—On some of the earliest pottery ever made there are bird designs. Although the drawings are rather crude we can be practically certain that they represent swans or geese. Why did these primitive folk draw pictures of such birds? Because they were important in their religion. They represented the sun and other life-giving powers for they came and departed with the changing seasons. The ancient Hebrews and Greeks, too, wondered at the mystery of bird migration. Nearly two thousand six hundred years ago Jeremiah compared the obedience of the birds to the laws of Nature with man's disobedience to the laws of God: "Yea, the stork in the heavens knoweth her appointed times; and the turtle-dove and the swallow and the crane observe the time of their coming; but my people know not the ordinance of the Lord." Yet, although people have always been interested in and puzzled over the strange impulse which compels millions of birds to set out on immense journeys every year, there is much still to be found out concerning migration. Probably there is no other regular and spectacular natural

happening which has puzzled so many people for so long. Only recently have we solved some of its mysteries.

Where Birds go in Winter.—Of course we know a great deal more about migration than our forefathers did. By putting rings on birds' legs marked with an address to which the finder of a ringed bird is asked to send information we have found out where birds go to when they leave us after the nesting season. Swallows ringed in Great Britain have been found wintering in the south-eastern tip of Africa, and many white storks marked in Denmark, Germany, and Hungary have been noted in the same region. We know that sandwich terns from Britain spend part of the winter along the coast of West Africa. The arctic tern, which nests within 450 miles of the North Pole as well as in the British Isles and eastern United States, may be seen by whalers during our winter in the antarctic. This is one of the birds which may appropriately be called a globe-spanner. Others are the knot and the curlew-sandpiper which nest in the arctic; both may go as far south as New Zealand.

Do not think that migration is always from north to south and back again. Two New Zealand cuckoos, the long-tailed and the bronze, make wonderful journeys to their winter quarters from New Zealand, the one to Fiji and Samoa, the other to the Solomon Islands. Some birds go thousands of feet up into the Himalayas to breed and others come down the mountains to the Dead Sea for the same purpose. Birds go to nest as a rule where conditions are best for raising a family—usually the coldest place in the parts of the world they visit. In the far north they find an abundance of insect life in spring and long daylight hours for their activities. But in some places in the tropics where there is a barren, dry season, the birds migrate so as to nest in a moister and more fertile region.

Flying Aces.—The longest journey which any birds are believed to make non-stop is from Alaska to Hawaii. This marvellous flight of at least 2000 miles is made by the American golden plover. But as most wading birds can swim to some extent it is not impossible that they may sometimes rest on the sea. A very close relative (the Pacific form) of this bird also nests in Alaska, only about a hundred miles distant from the nesting-grounds of the other race, but it migrates by quite a different

route and returns another way, making a great circle around and over North America and Canada. The birds first fly to Labrador and go on to Nova Scotia. They then set off for a great flight to South America and spend the winter in the Argentine. But when they return in spring they go towards Central America and across the United States and Canada.

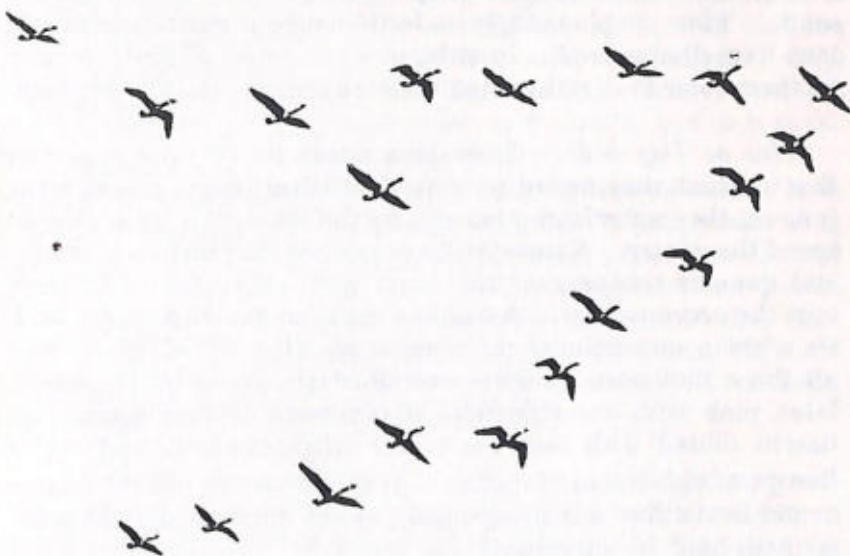
How Birds Travel.—When birds begin to come northwards in spring they can be pictured as advancing in a series of overlapping waves, surging up over Europe and North America as the tide comes in on a beach, each wave of birds settling down farther north than the earlier arrivals. Swallows reach Greece and northern Spain about 15th March, northern France about 1st April, and central Scotland a month later. It is the first of June before they have reached the most northerly point of Norway. When British wading birds are already nesting others of the same species may be passing over their heads bound for the tundras of Siberia, Spitsbergen, or Greenland. Some birds, however, arrive at their nesting-grounds in a great flock. People in one of the islands of the Pacific may look up one morning and see arriving an immense ribbon of frigate birds flying three or four deep and stretching as far as the eye can see. When storks are preparing to leave for the south they gather into flocks and start off together, but many of our smaller birds just filter back gradually southwards when their nesting is over. In autumn I have seen a willow warbler in a city, far from where it could have nested, feeding a fledged youngster. I have no doubt that these birds were on migration, for many migrating willow warblers turn up in this city garden each year at this season. Some species of geese seem to keep together in family parties in their flocks, and it has been claimed that experienced old birds lead the migration of certain kinds of duck; but this remains to be proved. We know that most birds do not migrate in families. The young may travel before their parents (and perhaps go farther) or, like young European cuckoos, leave after the old birds have departed. A naturalist in Sinai noticed that female chaffinches passed South a fortnight before the males but that blackcaps made both outward and return journeys accompanied by their mates. Several birds with peculiarities which made it possible to recognize them turned up year after year—indicating that some birds keep to exactly the same migration route.

Some birds travel by night and some by day : some, such as geese and cranes, go in very long " hops " :

" . . . rang'd in figure, wedge their way,
 . . . and set forth
 Their airy caravan high over seas."

JOHN MILTON.

Others, especially when returning southwards, go gradually, pottering about here and there. It is very seldom that birds



Canada Geese migrating.

fly so high as to be out of sight from the ground or sea, and often they keep quite low. Nor do they fly particularly quickly, but at their ordinary, unhurried speed, which for small song-birds is upwards of twenty miles per hour and for larger birds is about forty miles per hour. Geese and ducks may migrate at over fifty. On the whole, birds keep to certain traditional routes or airways—which, however, may be quite broad—but these may alter. Species which migrate in flocks, especially those which fly by night, carry on travel-talk consisting of calls which enable them to keep in touch. When I lived in a dirty industrial city in the north of England it gave me great pleasure to hear flocks of golden plover passing overhead as I lay awake in bed.

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The Ebb and Flow of Migration.—It is in spring that we cannot help but notice the arrival of migrant birds, such as the swallow, cuckoo, and warblers, but, except during December and January, there is always migration of some kind going on—and even then birds move about according to the weather. In June some birds will be already starting southwards when the laggards are still going north. Besides the birds which travel from the tropics to North America and northern Europe to breed, and then go back to warmer regions there are a number of species, nesting in the far north, such as geese and waders, which spend the winter further south. Thus purple sandpipers feed along our coasts when swallows have disappeared. In order to see a variety of birds we may let them come to us rather than travel to distant places to see them.

How do They do It?—Birds often return to the same region as that in which they nested or were themselves reared ; and, what is more, they sometimes go to exactly the same place each year to spend the winter. Naturalists have noticed that many guillemots and gannets reappear at the exact spot where they laid their eggs the previous year. A swallow has been known to come back six years in succession to the same nest. How did it find its way all those thousands of miles over forests roamed by elephants, lakes pink with the reflection of innumerable flamingoes, and deserts dotted with ostriches to the Mediterranean and across Europe to its home in Hungary? It is not easy to put the explanation into a few words, especially as not all birds use the same methods and a migrating bird may use different methods according to circumstances, such as weather conditions. Many birds “sight” on the sun to find their way and some seem to guide themselves by the stars, as seamen used to do. Experiments have been made to discover such facts. For example, when starlings in a large cage were deceived as to the position of the sun by means of mirrors,



Storm-bound Swallows resting on ship's rigging.

their flutterings, indicating the direction in which they wanted to migrate, were towards a different side of the cage from that to which they were attracted when they could see the sun. Incidentally, honey bees returning from a find of nectar-bearing flowers perform a dance from which other bees are able to tell the direction to take and the distance they must go. In experiments in which herring gulls were taken from their nests about 250 miles two years in succession, they found their way back more quickly in the second year. It seems that they learned to identify landmarks. Probably some birds on migration recognize landmarks, such as coasts and rivers. Even when we take into account all that has been learned lately about migration, mysteries remain. Thus young bronze cuckoos leave New Zealand a month after the birds which have reared them, and fly first to Australia, and then to the Solomon Islands, a journey of over 2000 miles.

We must not forget that many other creatures besides birds migrate. In East Africa wildebeest and zebras make long journeys. Eels go to mid-Atlantic to breed when they are full grown and the elvers find their way back to our streams and ponds. Salmon return from the sea to spawn in the rivers where they were hatched, and the monarch (milkweed) butterfly travels back and forth in North America. Numbers return each year to hang decoratively on certain trees in California.

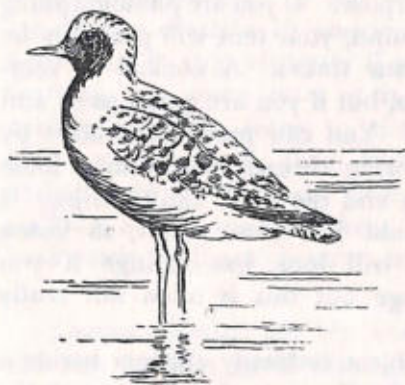
Homing.—Only through patient work and careful observation by a great many people can we hope to answer the riddle of migration. We can probably get some help by studying the power birds have of "homing." Pigeons will travel more than a thousand miles to get home, and a Manx shearwater taken to Venice returned a fortnight later to its nesting-burrow on a Welsh island. If it flew all the way by sea it must have travelled 3700 miles. Another, taken to Boston and released, was back in its nesting burrow in twelve and a half days.

We need to bear in mind that migration occurs when climatic changes bring about changes in a bird's body and trigger the impulse to fly away. For example, it is when birds have put on a lot of body-fat that they migrate in spring. Temperature, rainfall, day-length and good or bad feeding conditions may all affect the start of migration. There is no simple explanation of migration. A number of complicated activities and changes within the bird's body and mind, influenced by the effect of its

CHAPTER XVI

HOW TO GO BIRDING

How to make Notes.—You must not imagine that you need an expensive outfit in order to go birding. The most important things are extremely cheap—a pencil and paper. Why are they important? Because the only useful notes on birds are those made on the spot. If you rely on your memory you will find that you can't be quite sure about this or that. When you return from a spell of bird-watching, questions such as these will present themselves: "Did the old bird feed the young five times or seven times in the hour?" or, "Was the colour of the chick's mouth red or yellow?" and you will be unable to give a definite answer. If you then put down as a fact something of which you are not certain your observations are unreliable and worse than useless. It is a good plan to make little sketches and



Black-bellied Plover.

diagrams. Even though you may not be much of an artist there are some notes which can best be made as drawings. Such sketches are the naturalist's shorthand, and sometimes they are better memory-ticklers than pages of description.

Photographing Birds.—You will probably want to use a camera to help you in studying birds. It can both help and hinder. If you are intent

on getting the best possible photographs you will not be able to watch the birds as carefully as if you wanted only to get notes. Working a camera takes up a good deal of attention and renders it much more difficult to make continuous observations. The best bird observers are never the best photographers. Bird photographers have added to our appreciation of birds rather than to our scientific knowledge. There are few more exciting things than watching for and getting a fine picture of a bird,

but if you hope to increase our knowledge—and why not?—learn all about taking bird portraits but don't make getting a good photograph your main aim. Use your camera as an additional notebook to record interesting happenings. Excellent photographs have been taken and published of many species of birds—but how many show exciting incidents or noteworthy doings? Comparatively few. Try to get pictures of birds courting, displaying, or fighting. It is not easy, but far more worth while than just snapping a bird sitting on eggs or feeding its young. Some of the most sporting photography has been the work of naturalists who concealed themselves at birds' drinking- or feeding-places. This "Wait and See" photography is very exciting, for you never know what is going to turn up, and sometimes it may be an exceptionally interesting bird or animal.

The "Blind" or "Hide."—In order to photograph birds, all you have to do is to make yourself invisible. There is no difficulty about this. You make a hiding-tent, get inside, and wait. Sacking is as good a material as any for your purpose. If you are photographing a bird nesting on or near the ground, your tent will probably be square and held in place by four stakes. A conical or roof-shaped tent is all right to sleep in, but if you are going to sit and work a camera you need room. You can make peep-holes by cutting out little circles and sewing threads across in a loose network so that you can see out and the birds can't see in. It is important that the tent should not blow about, so fasten everything down carefully. It will look less strange if you cover it with branches or herbage but this is often not really necessary.

Naturally, if a big strange object suddenly appears beside a nest the birds will get frightened. So you must either put the blind a good distance away and move it up gradually—a little nearer each day for two or three days—or else construct it gradually. Less care is needed when working at the nests of birds in undergrowth, but at tree-top nests the blind should be made in stages. With timid birds, a useful dodge is to put a bottle at the hole where your lens is going to be so that they will not be scared by your camera's glass eye. It is also as well when you start taking pictures to get a friend to tuck you in. When he walks away the birds act as if the coast is clear. Small species, such as warblers, can

usually be photographed without such elaborate precautions. Sometimes you can go to the nest, put up your blind, get inside, and find the birds in front of you before your camera is ready. Of course you will not be such a cad as to keep the bird off so long that the eggs or young are chilled. Do what you will, you can't keep a good look out all round when in a blind and there is always the possibility that the birds will not behave quite naturally while it is there. This is why good observers often do without a blind and use binoculars instead, or else put up the blind so far from the nest that first-rate photographs cannot be taken. But there is no better way of noticing and appreciating the startling beauty of birds' plumage and movements than by watching, as a blind enables you to do, from a distance of only a few feet away.

Stalking.—If you can obtain the use of field-glasses or binoculars you are lucky, for they are a great help—though, as I have said, you can learn a great deal without them. Don't make sudden movements. If you want to point out a bird to your companion describe its position or raise your arm slowly. It is better not to stop abruptly if you see a bird close to you whilst walking. In some cases it is wise to look out of half-closed eyelids as birds seem to notice the glint and movement of your eyes and take fright. You can often get good photographs of sea-birds, such as birds of the auk family, by walking slowly towards them. Some photographers approach backwards ; but watch your step if you try this !

Caution.—Better not try working from hides in trees unless you are a really good climber, for in the excitement of taking a photograph it is easy to lose your balance, especially after an hour or two when you have scarcely any feeling in your limbs except "pins and needles." Sooner or later you will be interested in some of the birds which nest on islands. In many of these out-of-the-way places the boats you can borrow are leaky old tubs, or there may be no boats available : so it is just as well to learn to swim properly. Beware of currents and entangling weeds.

Attracting Birds.—In most cases you will have to seek out the

birds in their haunts—and great fun it is roaming the woods and hills or camping on bird-thronged islands ; but you can do something to bring them to you by putting out food in winter and providing nesting-boxes. Very interesting experiments have been made by placing food for tits where it was awkward to reach and noticing how clever they were in overcoming difficulties. Nesting-boxes enable you to keep regular notes of their inhabitants if you put them up close to your home. The most detailed notes I have been able to keep of birds feeding young were made when Venezuelan house wrens nested in my bedroom in Trinidad ! A great deal may be learnt by rearing young birds. It is becoming usual for people who wish to study a species very carefully to keep a number of the birds in an aviary so that they can compare their behaviour with that of the wild birds. One famous bird student has been very successful in his work with jackdaws because he reared and tamed them so that when they grew up they lived around his house in a natural state.

The best observations are those which are made continuously and regularly, so after you have gained some experience it is wiser to concentrate on as complete a record as you can get of a few nests or colonies of birds each season than to try making odd notes of a great variety. But of course you should keep a diary and enter in it when migrants arrive, and so forth. Naturalists sometimes have a box of cards with a separate card for each species of bird and fill in new observations as they make them.

Your Friends the Birds.—You will, of course, treat birds as your friends. If you are careful there is no reason why your activities should cause any bird to desert its nest. Don't put hides too near to nests or disarrange herbage or foliage so that prowling boys who are not naturalists, birds or beasts of prey can easily find them. Birds will give you a great deal of fun and interest all your life. In return, be thoughtful. The less you upset them and their affairs the more pleasure you will gain from them.

And now—out into the open, to the woods, the seashore, or where streams go singing down the hills. The earth is green and wide ; there is much to see and enjoy. Hidden near a bird's nest or by a lake shore you can enter a strange, new,

and lovely world which has been explored by comparatively few people. So come away. There are song sparrows in the dooryard, meadowlarks in the field, a coot on the pond, and perhaps a kingfisher by the river. Let us see what they are doing.



Pond Herons. After a painting on a Chinese temple.

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