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FIELD OBSERVATIONS ON BRITISH BIRDS

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James Keith Ogilvie

FIELD OBSERVATIONS ON BRITISH BIRDS

By a Sportsman Naturalist

(THE LATE FERGUS MENTEITH OGILVIE,

M.A., M.B., F.R.C.S., F.Z.S., M.B.O.U.)

With Illustrations

EDITED BY HENRY BALFOUR, M.A., F.Z.S., F.R.G.S.

WITH FOREWORD BY MRS. JOHN MASSIE

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LIST OF ORNITHOLOGICAL PAPERS AND NOTES

By F. M. OGILVIE

- 1.—“ Glaucous Gull at Aldeburgh,” *Zoologist*, 1879, p. 135.
- 2.—“ Ornithological Notes from Thorpe (Suffolk),” *Zoologist*, 1879, p. 265.
- 3.—“ Montagu’s Harrier breeding in Suffolk,” *Zoologist*, 1890, p. 76.
- 4.—“ Notes on a Norfolk specimen of the Red-breasted Fly-catcher (*Muscicapa parva*),” communicated by J. H. Gurney, F.Z.S. ; *Trans. Norfolk and Norwich Naturalists’ Soc.*, v. 1891, p. 197.
- 5.—“ On the Habits of the Stone Curlew or Thick-knee,” *Zoologist*, 1891, pp. 441 to 446.
- 6.—“ Long-tailed Duck off the Suffolk coast in summer,” *Zoologist*, 1892, p. 109. (Includes note on Scoters and Long-tailed Ducks feeding on *barley* from a wreck).
- 7.—“ Iceland Gull near Aldeburgh,” *Zoologist*, 1892, p. 114.
- 8.—“ On the recent occurrences in the British Islands of the Ruddy Sheldrake,” *Zoologist*, 1892, pp. 392 to 398.
- 9.—“ The Ruddy Sheldrake in Suffolk,” *The Field*, 6 Aug., 1892.
- 10.—“ Ruddy Sheldrakes in the British Islands,” *The Field*, 3 Sept., 1892.
- 11.—“ Ruddy Sheldrakes in the British Islands,” *The Field*, 10 Sept., 1892.
- 12.—“ Cuckoo calling on the wing,” *Zoologist*, 1894, pp. 306 to 308.
- 13.—“ *Netta rufina* in Suffolk,” *Bulletin of the British Ornithologists’ Club*, xiv. 1903-4, p. 62.
- 14.—“ Exhibition of an immature male example of *Clangula islandica* from the River Alde, Suffolk,” *Bull. Brit. Ornithol. Club*, xxiii. 1908-9, pp. 63, 64.
- 15.—“ The Persistence of the Right Ovary and its duct in the Sparrow-hawk,” *British Birds* (Witherby), iv. 1910, p. 216.
- 16.—[“ On the presence of two Ovaries in certain British Birds, more especially the Falconidæ,” *Proc. Zoological Society*, 1912, pp. 63 to 79 ; by T. E. Gunn, F.L.S. Communicated by F. M. Ogilvie, who was largely associated with this piece of research work.]

FOREWORD

BY MRS. JOHN MASSIE

THE intention of the writer of this foreword is merely to give, in a few lines, a slight sketch of the Author of these Essays from an intimate and personal standpoint. This may, perhaps, increase the interest in the scientific side of his character, as reflected in these pages.

Fergus Menteith Ogilvie was the sixth and youngest son of Alexander and Margaret Ogilvie, of Sizewell House, Leiston, Suffolk. He was born in London on November 1st, 1861, and died on the 17th January, 1918, of acute pneumonia, at the Shrubbery, his house in Oxford.

From his early boyhood, he showed a great love for animals, but his ornithological bent began to be first noticeable when he was about sixteen years of age. At that time, he met with a somewhat serious accident in the football field at Rugby, which necessitated his leaving school, and for the next year or more he was a prisoner to his bed or couch. During this time he became much interested in the stuffing and setting up of birds, calling in aid any one from the neighbourhood who would give him help. His beginnings in the art were very rough and rudimentary, and the results quite unpleasant, so far as the outward aspect of his rooms was concerned ; but the work (which he took up partly to relieve the monotony, weariness and frequent pain of a sick room) he pursued with ever increasing ardour, and with the thoroughness which was the hall-mark of all he undertook. Probably also his environment favoured a natural bent towards the study of bird life ; for the sea-marshes, a part of the Sizewell property, were an excellent hunting-ground for some of the rare seabirds ; and the Argyllshire property of Barcaldine, which eventually became his own, was also fruitful in good specimens for the collection he was making.

He decided to enter the medical profession ; and after leaving King's College, Cambridge, he went through St. George's Hospital, subsequently specializing in eye-work, with the object of taking up that side of the profession.

After he had taken his degree of F.R.C.S., and not long after his marriage with Miss Birch, the second daughter of the Rev. Augustus Birch, the well-known Eton Master, and afterwards Vicar of Northchurch, he became the partner of the late Mr. Robert Doyne, the distinguished oculist in Oxford, and took up his residence in that city.

His profession appealed to him far more from the scientific than from the practical side ; and those who knew him intimately (and they were few) realized that, for a man so abnormally sensitive and shy, the profession he had chosen was probably not the most appropriate to his characteristics.

No one would have used the word " brilliant " in connection with him, but all who knew him sufficiently to form a judgment would recognize the thoroughness and ability with which he pursued his work, whether it was ophthalmology or the personal hobbies of ornithology and the culture of orchids. No trouble or discomfort was too great for him. He went to the uttermost parts of the British Isles in pursuance of his investigations, if only he might increase his knowledge of seabird life. And, just as his collection of seabirds was accounted one of the best in the kingdom, so also his zeal and patience in orchid culture made him, in due time, the possessor of one of the finest English collections. His hobbies never degenerated into mere playthings. They were carried on with the vigour of an able man with the scientific instinct, who was steadfast and thorough in all that he took in hand.

In general society he was too shy and reserved to be seen at his best, but with his intimate friends, and in moments of expansion, he was a delightful companion, full of humour, and, with his very considerable power of mimicry, a capital raconteur, where the people of his anecdote had come under his own observation. Perhaps the power of infusing so much life and humour into the telling of an incident, may be traced to the fact that in his Cambridge days he had been a very good amateur actor, and a prominent member of the A.D.C. Unconsciously, when he was in the swing of a good story, he staged his *dramatis personæ* so that they lived before the eye with all their peculiarities and specialities well in the limelight. Though ordinarily a man of quietness, almost amounting to

sombreness, at these times of letting himself go he was the cheeriest of men and the best of *bons camarades*.

Those who knew him as a friend will realize that, though friendship came to him slowly, when once it was entered upon, it was extraordinarily loyal and enduring. His affection, indeed, would tend to make him exaggerate the friend's capacity, whilst he invariably failed to take a just measure of his own. Ostentation and brag, in any shape or form, were so alien to his nature, that not only did he refuse to place his mental equipment "on view" for his own advantage, but it was actually brought to light with difficulty, and chiefly through the instrumentality of friends, who were aware that his ability was much greater than any to which he himself ever laid claim. Self-depreciation is not a common failing, but he possessed it in a high degree, and to his own detriment. Yet, with this depreciation, or want of appreciation, of his own work, there was no tendency to detract from the merit of others. Rather were his judgments generous to a fault. But generosity both in word and deed was one of his essential characteristics; and this quality, together with his intellectual power, and his loyalty to a true friend, made him a man whose friendship, once gained, was worthy to be "grappled to the soul with hooks of steel." Those who have been numbered in the company of these, his friends, feel life to be duller, greyer and harder now that it is robbed of his presence. A straight man he was and a true. Another will not easily fill his place.

E. M. M.

PREFACE

THE eight chapters which are contained in this book have been adapted from a series of eight popular lectures delivered to the Ashmolean Natural History Society of Oxfordshire, between the years 1902 and 1916, by my friend, the late Fergus Menteith Ogilvie.

When Mr. Ogilvie died on 17th January, 1918, I was asked to write an obituary notice, with special reference to his work as an ornithologist; and I found, in collecting material for this, that, although he was, as I well knew, a wide and original observer and an excellent authority, he had published very little. I could only discover a few short papers and notes under his name in various periodicals. It seemed to me very regrettable that so able and enthusiastic a student of bird-life should have passed away leaving so little from the great store of knowledge which he had acquired, in a form accessible to the public. Being aware of this series of lectures, several of which I had attended, I suggested to his widow that they might with advantage be issued in book form. To this, Mrs. Ogilvie readily assented, and I undertook to edit the volume as a slight tribute to my friend's memory. This has proved by no means an easy task, especially to one whose time and whose ornithological knowledge are limited, since a very considerable amount of emendation was necessary, the lectures not having been designed for publication.

It has, nevertheless, throughout, been my endeavour, in adapting the lectures for publication, only to make such alterations and corrections as seemed absolutely necessary, and to retain, as far as possible, the author's own words and individuality. I have added footnotes where further explanation seemed called for, and, as far as time allowed, I have verified and corrected quotations from other writers.

The book will, I trust, prove interesting and instructive to more than one class of reader. *Naturalists* and others who derive pleasure from the study of British birds, their habits and economy, will find in its pages many shrewd and original remarks, based upon careful observations in the field, by one of the keenest and most cautious of ornithologists. Ogilvie's field-work was characterized by an enthusiasm which ever led him on, and which caused him to spare no trouble and expense in the pursuit of his hobby. At the same time, his enthusiasm was governed and restrained by that invaluable "escapement" caution, which made him hesitate to accept deductions based upon insufficient evidence. His desire was, as far as possible, to investigate the facts for himself, and thoroughly. His scientific training stood him in good stead, and he worked on scientific lines.

On the other hand, to the *sportsman* the book will, no doubt, appeal, since the author, himself an ardent sportsman and an excellent shot, offers much that is not only of interest, but also of practical importance, in his remarks upon British game-birds and wild-fowl. It is, indeed, difficult to determine whether his dominant passion was for natural history or for sport, since both of these pursuits seem to have had an equal interest for him, and each balanced and supplemented the other admirably. He was a thorough sportsman-naturalist of the best type, eager to weigh carefully the facts which he noted and to arrive at his deductions after a critical evaluation of the evidence.

Mr. Ogilvie's collection of British birds, beautifully mounted, carefully catalogued and formerly arranged in the Museum specially built at his home at Sizewell, on the Suffolk coast, has been presented by his widow to the Ipswich Museum, a fitting home, since the greater number of his specimens were collected in Suffolk. The collection certainly rivals the famous Booth collection at Brighton, to which it is little, if at all, inferior. The extensive series of British bird-skins were, at my suggestion, presented to the British Museum, where they will form, I understand, the nucleus of a special British collection of skins. Mr. Ogilvie had brought together a very fine library of ornithological works, and had spared no expense in surrounding himself with a suitable literary environment for the study of his favourite subject. At the time of his death he was engaged upon an important ornithological work, which, I fear, will never now be published.

In preparing this book for the press, I have received help from various sources, and desire to acknowledge this most gratefully. Firstly, I have to thank Mrs. Ogilvie for having so readily agreed to my suggestion that the lectures should be made accessible to the public, for lending me the MS. and photographs, and for undertaking the expenses of publication. To Mr. Donald Gunn I owe very cordial thanks for his sympathetic interest in the work, and for valuable assistance. He not only assisted me materially in adapting the MS., but to him I owe the best of the illustrations in the text. My wife, too, has co-operated in a variety of ways. In compiling the regretably short bibliography of Mr. Ogilvie's publications, I have benefited by kindly help from Mr. F. Martin Duncan, the Librarian of the Zoological Society, and from Mr. J. E. Harting, the well-known ornithologist. Mr. T. A. Morley, of Thorpeness, was good enough to supply me with information as to the alterations which have resulted in the draining of Thorpe Mere, operations which, alas! have almost completely spoilt (from the bird-lover's point of view) what was, up to a few years ago, a regular ornithologist's paradise. The Mere was certainly one of Mr. Ogilvie's happiest hunting-grounds. To Mrs. Massey we owe the Foreword dealing with her brother's life and personality. The volume is published as a tribute to the memory of one whose death involved a great loss to ornithological science and to those of his friends who were privileged to know him at all intimately.

HENRY BALFOUR.

I.—On Some of the Commoner Wading-Birds.

FIELD OBSERVATIONS ON BRITISH BIRDS

I.—ON SOME OF THE COMMONER WADING-BIRDS.

I

IN drafting what is merely a popular chat about Wading-birds, I have assumed that my readers are entirely ignorant of their appearance, their life-history, their changes of plumage, their migration, and indeed their everything. I have little to say that is interesting, nothing that is new, and I have only attempted to awaken an interest in a very beautiful family of birds, which are not as well known as they should be. Whether as egg (Golden Plover), nestling (Snipe), young in first plumage (Redshank), adult in summer, or adult in winter, I do not know any other British family that can approach them in their delicate beauty, or that shows the same extraordinary changes from their breeding- to their work-a-day winter-dress.

Moreover, it is a group of birds of which I am personally especially fond; but I have generally found, in showing what I may call an intelligent visitor round my collection, that such an one is at home with most of the land birds—Passerines, Owls, Hawks—and has, possibly, a passable knowledge of the Ducks and Sea-fowl; but when he is brought up to the Waders, he commonly confesses his entire ignorance, and classes them all in some special family of his own making, as “Oh, another of those sand-lark things,” or remarks “I never can see the difference between these birds; I call them all Sandpipers.”

From this it will be supposed that my intelligent visitor has had no opportunities of seeing Waders in a wild state, and that these birds are only to be found in some especially favoured spot, like the celebrated Breydon flats at Yarmouth, or the now equally well-known flats between Cley and Wells in Norfolk, and other such places, whose names have become familiar by recurring over and over again in our ornithological books.

Well, this is not the case. They are to be found, of course in greatly varying numbers, on almost every part of the coast-line of the British Islands, whether it be the rock-bound coast of Connemara, a sandy bay in Orkney, an eastern mud-flat, or a southern

shingle-beach, such as Dungeness. Given you have the shore and the sea, some Waders are almost sure to be within an hour's walk from where you start. Given an observant eye, good glasses, patience and a favourable locality, there is no reason why any lover of birds, who is not familiar with the commoner Waders, should not become so in a few visits to some watering place; my own preference being for the East Coast.

Waders can be seen at any season of the year; but there are, in spring and autumn, two migrations, the former being at its height in May, and the latter in August and September—the autumn migration including, of course, the young birds of the year, and being, on that account, infinitely the larger.

I propose to consider firstly some of the plumage-changes in the commoner Waders, then to make some observations on protective colouration, more especially as regards the young, and, finally, to describe a morning spent in some suitable locality at the height of migration time in spring, and to note the birds to be seen there.

I

GREY AND GOLDEN PLOVERS.—These two species are much more closely allied than appears evident at the first glance. The GOLDEN PLOVER is too well known in his winter dress—greyish-white underparts and golden-speckled back and head—to need detailed description. He is, in the South, at any rate, chiefly a bird of the uplands at this time of the year; arriving in large flocks from October onwards, the bulk leaving again towards the end of February. Fallows, fields of winter turnips and grass meadows, are all likely places, and sometimes they are found in enormous flocks of 500 or more. Their rather bright colouring would suggest that they would be easily seen in such situations, but that is not so—their colour is eminently protective, and you may pass a field with hundreds of these birds in it and never see one, unless their plaintive whistling note calls your attention to them, or unless they happen to rise on the wing. See the same bird on the move in summer in breeding dress. Protection seems thrown to the winds; the whole of the underparts have turned a brilliant black, with a clearly marked white eye-streak framing the black cheek. The bird itself, too, seems bent on attracting your attention in every way; he keeps up an unceasing alarm note as you watch him, stands well up on the most prominent ridge of ground, with his big, black eye fixed on you, and appears to have but one object in life—to make you follow him. He drops off the ridge, which is on the sky-line, disappears for a minute, and then reappears at a fresh spot, still calling and watching your movements. Now, what is the object of this? In the hollow of the moor, into which you are looking, lying half buried in the golden moss, are four little golden masses of down—little nestling Plovers—perhaps the most perfect instance of protective

colouration (if we except the nestling Ringed Plover), with which we are familiar among Waders. As long as the parents are uttering their alarm note, so long will these little fluffy balls, only hatched perhaps a few hours ago, remain squatted and motionless, with their necks stretched out, their bodies buried in the golden moss, so that all the lighter underparts, including the light eye streak, are hidden from view. The distinct plumage of the parent focusses all your attention on him ; his object is by slow degrees to wile you away from the neighbourhood of his chicks, and he adopts all sorts of feints and tricks, and a great pretence that he is really leading you towards the nest.

I will read you a note from my diary on this subject. I was birds-nesting one summer on some hilly moorland not very far from Kirkwall, in Orkney, a district especially rich in Harriers, Merlins, and Short-eared Owls. Curlews were breeding there in large numbers, also Dunlins and Golden Plover. It was too late in the season to look for Plovers' eggs, and, indeed, I was not wanting any, but I had long wished to secure some nestling Plovers for my collection. On the top of one of the hills was a small, nearly flat table-land, with a little swampy depression in the middle, the whole carpeted with stunted heather, coarse grass and rushes, and a beautiful golden moss. As I reached the top of the hill, and looked into the miniature valley, two Golden Plovers at once thrust themselves on my attention. Sometimes one or other would come quite close up to me as I lay down in the heather, calling continuously, sometimes they would disappear over the ridge for a moment, as if they had no interest in my goings on ; but directly I rose up to examine the ground, a Plover would reappear on the ridge, and indicate by every means in his power that his nest was in some other direction. I left the spot for a while, found one or two hawks' nests, and then returned as silently as I could. One of the Plovers was in the basin, and hurried out as fast as she could on my approach. The other, the male bird, was on sentry duty, but I had taken him unexpectedly from the rear ; otherwise, I make no doubt, he would have warned the female, and she would have been far away from her chicks on my approach. Having marked the spot I had first seen her at, I walked straight up to it, and thrust my walking stick into the ground as a guide. Round this stick I walked and walked, the Plovers uttering their alarm-note continuously, but nothing could I see of the nestlings, though I was practically sure they were within a few yards of me.

After half-an-hour's fruitless searching, I called up a native, who was acting as my guide, and we both resumed the search, still without success. Finally, I determined, as the sense of sight appeared useless, to try if that of touch would be more effective, and going back to the stick, I dropped on my hands and knees, and commenced running my hands over the moss. About three yards away from the stick my fingers

touched something warm and fluffy, and there, deep in the golden moss, so that the golden down was just on a level with the tips of the moss, motionless and practically invisible to the eye, crouched a nestling. My walking stick was actually touching a second nestling, and the other two I found about twelve inches away from it, but all by feeling for them—until I touched them with my hand I never *saw* one at all, though my eyes must have been often within less than a foot. Two nestlings I took, and two I put back again for the parents to bring up.

The GREY PLOVER is a bird of the mud flats. I have never seen one far away from a tidal estuary or some similar situation. In *winter*, the plumage of these birds is eminently protective; nearly white underparts, and a chequered back, giving an effect of quiet grey, and they are very difficult to see in the dull light of a winter's day, as they stand on the grey mud. It is almost always their very beautiful and characteristic cry which calls your attention to them, and, guided by the cry, you ultimately distinguish the birds.

But look at the same bird in *summer*. He stands out on the same mud bank in his brilliant nuptial dress, so that no one can fail to see him; his jet black underparts, his big black eye, and splendid white eye-streak, make him extremely conspicuous. I think that a Grey Plover, in perfect summer dress, is the most remarkable and the most beautiful of all our Waders. As we find them here in summer, a small flock will perhaps show two or three nearly perfectly dressed birds, all males; others in mottled dress, mostly males; and others again showing very little change at all; these latter are mostly females. They seldom acquire anything like a perfect dress, at any rate, in this country. But the late Mr. Seebohm, and Mr. Harvie Brown found them on the Petchora tundras, in Siberia, breeding, and in some cases were unable to distinguish the males from the females by their plumage. They found, too, as many naturalists have subsequently reported of other Waders, that the work of incubation is undertaken quite as much by the male as the female (*cf.* Trevor-Battye, Pearson, Popham and others).

The Grey Plover is peculiar in another point. The young of the year—that is in their first plumage—very nearly resemble immature Golden Plovers; they have grey, mottled breasts, and beautiful chequered, golden backs, strongly resembling Golden Plover. I have myself shot Grey Plover in September, and thought they were Golden, until I noticed their legs and their black axillaries.

The axillaries of a Grey Plover, at any age, are black, of our Golden Plover white. At the same time, the two birds are connected through the Eastern Golden Plover, which has smoke-coloured axillaries. The Golden Plover has no hind toe, while the Grey Plover has a rudimentary one.

Grey Plovers are remarkably easy to call; the young birds will always come to call, and their elders generally, unless they are in a large party and seriously bent on migration.

RINGED PLOVER.—This is an exceedingly common and very beautiful bird. There are very few parts of our coast where he is not to be found in some numbers, whether it be a rocky coast, a muddy estuary, or a shingle beach ; but it is in the latter situation that the bird is seen at its best. The back is a quiet dove-grey, and is protective if he is sitting on his eggs among the stones ; but his underparts are the reverse of protective—snowy white underneath, with a broad pectoral band of jet black, and a white forehead with a black band immediately above it, and orange-coloured legs. The bird can hardly escape observation.* Here, too, as with the Golden and Grey Plovers, I imagine that the old birds show themselves as much as possible when danger is threatening their offspring, and they adopt the same wiles as the other Plovers to lure the intruder away from their nests. The nest is little more than a depression scrubbed out among the stones ; yet, it was chosen with care, and the stones surrounding a nest seem always to be carefully selected, so that they may resemble as nearly as possible the four stone-coloured, spotted eggs, and, still more, the stone-coloured young, with their black-tipped down. I have myself never found a very young nestling Ringed Plover, though I have often looked for them. I have found them when they are a few weeks old, but never directly after they are hatched. I have specimens of them in the latter state, but I obtained them all by hatching eggs out in an incubator. Yet, I have constantly been over ground where I knew the birds were breeding freely, and where nestlings must have been quite plentiful.

The parents adopt the method of the Golden Plover, and noisily try to lure one away from the nest, while the nestlings squat motionless among the shingle, and are practically invisible to human eyes. The Ringed Plover, which breed on a shingle-beach, have one distinct advantage. In sunny weather they are able to leave their eggs unprotected much longer than other birds, for the sun falling on the shingle, turns the stones into a rough sort of incubator or baking oven, which retains the heat for some considerable time ; so that it is only during the night or during coarse, cold weather that there is any absolute necessity for the birds to sit on the eggs at all.

The Grey and Golden Plovers, which we have just considered, adopt a wedding-dress of black. Others of our Waders clothe themselves in a summer coat of rich chestnut (for example, the Godwits, Knots, Curlew-Sandpipers, etc.). None of these birds breeds with us, or, indeed, anywhere south of the Arctic Circle, and their eggs are amongst the most cherished possessions of collectors.† The

* When the sun is high, and the birds are *quite stationary* upon wet sand or upon a beach, the colouring seems to afford protection, and they are very hard to locate. The dark upper parts neutralize the high lights, and the white underparts neutralize the shadows, the effect produced being very "flat," and causing the birds to merge into the background, and to become almost invisible. The bold black and white local patches probably assist deception by breaking up the outline.—EDITOR.

† The Black-tailed Godwit is an exception. It formerly bred regularly in our Eastern Counties, and its breeding range does not appear anywhere to extend further north than *lat.* 65 degrees.—EDITOR.

egg of the Curlew-Sandpiper was only obtained for the first time in July 1895, by Mr. Popham, and I believe that his clutches still remain unique. These birds are very common in autumn, and by no means uncommon as passing visitors in the spring migration. In the winter, they are all more or less grey-backed and white underneath, a colour-scheme which is very protective on the mud. In the summer, their beautiful chestnut breasts and red-chequered backs cause them to be so obvious on the mudflats that the least observant can hardly fail to notice them. With these chestnut-breasted birds, as with the black-breasted ones, I believe their colouration is a distinct advantage to the species in the struggle for existence. The parents decoy away human intruders or fight their piratical enemies (*e.g.*, the Skua Gulls), while the young, which are very perfectly protected, squat in safety amid their Arctic surroundings, and remain hidden as long as their parents continue to utter their alarm note. There is a third group of Waders which, like the others, present a grey protective dress in winter, and acquire a mottled breast and brown back in their breeding dress—the Stints, Sanderlings, Common Redshank, Greenshank, etc., may be instanced.

Take the well-known Redshank as an example. In winter, his breast is white, his back a pretty stoney-grey and his tail crossed by numerous black bands, which only show up plainly when the bird is on the wing. These birds are the pest of the wildfowler. Their mission in life, like the Curlew's, seems to be to act as an automatic alarm to all other fowl, more especially to the flock of duck and widgeon for which you have been waiting for the past two hours, and are now punting towards with the flowing tide. Up gets one with his loud, piercing alarm note, then another and another, till, finally, every Redshank in the district is on the wing, calling lustily. Even the sleepest and tamest of Widgeon put their heads up and consider the punt from a new point of view. While they are still debating the question, the whole flock of Redshanks, perhaps forty or fifty in number, swirl over their heads with such agonized entreaties, that the Widgeon accept the advice, and make off to some position of safety. The Redshank is a beautiful bird, whether you meet him in winter or summer; a fascinating object to the naturalist, but he is the biggest spoil-sport going, and he is not a grateful object to see when you are bent on getting a shot at anything else. In summer, the Redshank changes his grey back into a rich umber brown, and his white breast becomes heavily streaked with black, arrow-headed markings nearly down to the vent. Not only does he change his clothes, but also his manners on the breeding ground.

As you step out of the punt on to the marsh, Redshank after Redshank rises and comes to meet you, sweeping by within a few yards of you, and executing all kinds of fanciful aerial flights, showing very distinctly their barred wing-coverts and tail. They are quite fearless now. At this season, too, they possess a curious fondness for perching, a habit I have never observed in winter. A favourite

breeding ground in Suffolk, with which I am very familiar, is intersected by a railway, and it is no uncommon thing to see four or five Redshanks perched on the telegraph wires, swaying to and fro, and ever and again uttering their everlasting cry. It is a point of some interest how a wading bird, with toes formed as a Redshank's are, is able to perch, and perch securely, on anything so thin and round as a telegraph wire. Their swaying to and fro is not due to the insecurity of their foothold, for you observe birds that have lighted on a gatepost or barway executing precisely the same movements, and indeed, you may often watch a Redshank on *terra firma* executing the most absurd bows and nods, when he is alarmed, and before he finally takes to flight.

A Redshank is one of the few birds with which I am acquainted that build sometimes open nests with little more attempt at concealment than is practised by a Lapwing, and sometimes the most elaborately hidden nests. A large, rushy tussock is selected, deep in the middle of which lies the nest, with a carefully-prepared passage leading through the tussock to the nest; and in some cases I have seen a sitting bird leave such a nest and deliberately arrange the grass or rushes over the opening, as though shutting the door, before flying off. One or two nests of this kind that I can call to mind now were exceedingly beautiful to look upon.

The Redshank is an early breeder, the four eggs being generally laid before the middle of April, and, in connection with their nesting, I may mention one curious habit which they have in common with a good many other Waders, notably the Lapwing, and that is the habit of making false nests. Any time after the second week in March, if you walk over a ground on which Redshanks are going to breed, you may find many of these false nests; little depressions scabbled out on the ground with a few bits of rushes and grass roughly arranged in them. They look like the work of a 'prentice hand—of a Redshank who was lacking in experience, and was trying to get his "hand in" before taking to the serious work of nest-building. What the meaning or the object of these false nests is, I have no idea, nor whether both males and females are engaged in making them, or whether it is only the male. Most of our Norfolk and Suffolk gunners hold the latter view; why, I don't know, and call them "cocks' nests."

Redshanks commonly breed on the marsh, or within a very short distance of the marsh, but I have found a Redshank's nest on an open common of whins and heather, a mile or more away from the water. In these cases, it is necessary for the parents to convey the young directly they are hatched from the upland common down to the marsh in some way or another, for they cannot obtain the necessary food in the former situation. Woodcock, we know, carry their young between their thighs, steadying them with their bills, and one would think that Redshanks must adopt some such plan, if they have to transport their young any distance. I

once, and only once, had an opportunity of seeing a family party on the move from the common to the mere, but on that occasion the old birds led the young ones, sometimes running in front of them, sometimes flying a few yards, and then alighting again, and stopping till the very small chickens had laboriously joined them, the whole journey being performed on foot.

The situation of the nest I happened to know in this case. It was about a quarter of a mile from the mere, on a whin-covered hill, which ran down rather steeply on the southern face towards the mere.

I was sitting perfectly hidden in the lowest of a range of shooting butts, which extended North and South along the breadth of the common, and from the butt I was able to command a fair view of the mere.

I was looking the mere over carefully with a telescope* to see what birds were on it, and whether there were any strangers about, for it was about the tenth of May, and the spring migration was at its height.

While engaged thus, I heard a Redshank call on the top of the hill, quite a soft note altogether unlike their ordinary clamorous cry. I turned round and looked up the hill with the glass, and presently a Redshank came into view and stopped on the skyline. Then there was another call, and a second Redshank flew over the skyline and dropped beside its mate. Both of them seemed to be waiting for something, or to be alarmed at something, for all their attention was directed to some object behind them, and all the time they kept uttering their soft, peculiar call note. After a pause, they ran down the hill a little way, and stopped again; one flew back a few yards and lighted on the ground, seemed to pick at something on the grass, and then ran forward again to join his mate. I now saw, for the first time, that four very small, fluffy balls of down were members of the party, and that the two parent Redshanks were shepherding them down the hill towards the mere.

I was perfectly concealed, and the birds seemed entirely unsuspecting of danger. Slowly the procession came down the hill, getting ever nearer and nearer to me, sometimes both Redshanks leading and calling, sometimes one flying or running back, and apparently acting as a parental whipper-in. They were, perhaps, a quarter of an hour before they reached me, and were then within a hundred yards of the water for which they were making.

I had hoped to see them finish their journey from my hiding-place, but, unfortunately, I was less well hidden from below than from above, and as the leading parent passed below my butt, she caught a glint from the barrel of my telescope. In a moment the scene was changed; both the old birds rose with loud cries of alarm,

* By the bye, a telescope is a far more satisfactory instrument than field glasses, where you can use it; you can't pick up flying birds very easily with it, but for examining a large area of ground, it is invaluable. I always carry both, but I imagine that I use a telescope five times as often as the field glasses.

MAP A.

and the nestlings squatted flat on the grass within a foot or two of my butt. I waited for a few moments to see what would happen. The parents disappeared in the rushes of the mere, and fluttered out on the edge, evidently with the hope of luring me after them. All the while they kept crying lustily, and the nestlings near me remained squatted and motionless.

I then stepped out, and picked up one of the nestlings in my hand—a little, soft ball of down, with thick but very weak knock-kneed legs, apparently hardly able to carry the weight of its body, much less to take the long excursion I had been watching. I estimated its age to be four or five days.

This action on my part brought both the parents out of the rushes, flying close round my head and uttering the most piteous appeals. I put the nestling down again on the spot from which I had taken him up, picked up my glasses, walked up to the top of the hill and lay down. It was quite half-an-hour before the parents would venture back to the young; but at last I saw them, after taking a preliminary flight round to see that the coast was clear, drop down again by their chickens, and gradually lead them along again, until they finally reached their goal and disappeared into the rushes.

II

I now turn to the second part of my paper. Let us suppose that we are quartered at Aldeburgh, a little town on the east coast of Suffolk, and have made some enquiries of the local fishermen-gunners about Waders and other birds, and where they are to be found. On the south side runs the river Alde, an excellent river for Waders when the tide is out, and the huge mud flats are exposed. But the very size of the flats makes it difficult to explore, except with a gunning punt, and a useful view of the mass of the birds feeding can only be got just at the time when the rising tide is lifting them off their last legs—hardly the place for the first study of wading life.

Immediately to the north of the town, and reaching to the village of Thorpe, lies another stretch of ground of a more hopeful nature. This is divided roughly into three parts, a *marshy part*, a *marsh-and-mud part*—the water in both being fresh, and each being separated from the other, as well as from the remaining third, or *salt-water part*, by a sea-wall made of turf and mud. The water in the salt-water part ebbs and flows with the tide through a little “haven,” covering the flats or leaving them bare. When the haven closes, as is usually the case, the flats become covered with a few inches of water, ever getting less and less salt as the proportion of land-water flowing in increases. Map A.

The whole is generally and collectively known as Thorpe

Mere,* though the different parts, as a fact, have separate names.

It is very small; that is very much in our favour if birds are at all numerous, because the different species are more readily recognised, and they can be more easily "picked up" again with the glasses if they shift their ground.

It presents three quite distinct varieties of feeding ground, and, best of all, there is a sea-wall between the first two meres, so that one or other side of the wall will almost certainly give you shelter, and a good stalk will often bring you within a few yards of a group of perfectly unsuspecting Waders, feeding, sleeping or what not.

There is still another advantage about these meres—many birds use them entirely for the length of their visit, but at the top of the tide, most of the Waders from the river come over here for an hour or two until the river-flats are again exposed.

I propose, then, taking the visitor out for an imaginary trip on the Thorpe Mere. I say "imaginary," although this particular day has been extracted from my diary, but it must be understood that this particular day in May was selected by me because it was a red-letter day.

The chief pleasure of working on the Thorpe Mere is the certainty that with care you can get a view of almost every bird that is on it. The foreshore has been largely built over lately, and other changes have damaged it somewhat as a collecting ground, but on good days, one may still see a good and varied show of birds, and no day is so bad as not to yield something. Our enthusiast, it is true, can do as well, perhaps better, at many other watering places along the Essex, Suffolk, Norfolk, Lincolnshire or Yorkshire coasts. The lie of the ground, and the manner of approaching the birds will vary, but there will be Waders to see if a reasonably good place be selected.

Before describing our spring day, may I say just a word about shooting and collecting.

We should have sympathy with and love for all birds, but I fail to understand why we should not take a toll of the Waders for eating purposes, as readily as of our game-birds, or even our domestic poultry.

You may say that, so far as eating goes, our game-birds are so much poultry, with variations. That may be true of Pheasants, it is certainly not true of Partridges or of Grouse. But, even if it were, these Waders have a far safer breeding nursery in their Arctic haunts (taking the Knot and Godwit as examples) than any amount of artificial help can ever give to our game-birds.

*The natural characteristics of Thorpe Mere have been greatly altered since this description was written. In 1912, "improvements" were commenced, with a view to increasing the amenities of Thorpeness as an ordinary sea-side resort. Bungalows have multiplied; an artificial lake has been created, and the marshy areas of the old Mere have been drained. Ornithologists will deeply regret the passing of this famous bird-resort, whose attractiveness to bird visitors will be greatly impaired.—EDITOR.

Supposing it were possible, and that every Knot that lit on our shores between August the twentieth and October the first, were shot on arrival. I do not think that this apparently enormous loss would make the smallest impression on the numbers which would arrive the following year, or years. The loss of Wading (as of other) birds each year on migration is enormous; but of this great total, probably not one in a thousand is caused by the shot-gun.

And, as far as autumn collecting is concerned, shooting, when combined with observing, seems to me to be perfectly fair and proper—your observations are confirmed or corrected, you have the skin for study and as a permanent record, and, lastly, if the bird is not wanted for preservation as a specimen, it is almost sure to be excellent eating. A good fat Knot, shot in December, and rapidly roasted (not overdone) with his trail complete, like a snipe, and served on toast is, in my opinion, a dish hard to beat.

If good and careful note-taking with a glass pleases better, I have nothing to say against it, except that, in the case of a beginner, such notes are of no value as records of facts, even with the common Waders; and as regards the really rare Waders, I should be very much disinclined to accept a field-glass view of, say, a Broad-billed or Pectoral Sandpiper as an accepted fact, even if it were authorized on the faith of some distinguished field ornithologist. The old adage, "What's hit is history, and what's missed is mystery," is perhaps truer in ornithology than in any other branch of Natural History. The inhospitality of shooting the chance (and rare) wanderer the moment he lights on our shores, is not really a very strong argument against doing so, if you are prepared to shoot the snipe who has his home with us. Probably not one-fourth, possibly not one-tenth, of those rare Waders that do land on our shores are ever seen; they are out of their "course," are too liable to disaster in their unaccustomed line of migration, to have much chance of striking the old nursery; and, if they happened to strike it, would find themselves but one of the many thousands of their species. Take again the Broad-billed Sandpiper, that is so rare with us, and is so common in its own countries. Sparing one bird, will, of course, not lead to its breeding in England, or outside the Arctic circle. This particular bird will have a far riskier passage to reach the breeding-ground or the autumn-winter feeding-ground, than one following the normal line of flight, and if it reaches them in safety, will be but a unit in a countless host.

There are birds which deserve every possible protection that can be afforded them. Take as examples the Golden Oriole and the Hoopoe, neither very rare, but both so showy and distinctive in plumage that they are seldom allowed to live long after landing on our shores. Yet, both these beautiful birds breed freely on the other side of the English Channel, have nested in this country many times, and would certainly become habitual summer residents here, if they were given protection from their human enemies during the

breeding season ; for those birds hatched in England would return to England to breed.

Observation through glasses is not enough, in my opinion, to establish the identity of a small and rare Wader, unless the conditions are very exceptional. The call or alarm note, on the other hand, is valuable evidence, provided that the observer has a good ear, and is perfectly familiar with the bird.

Personally, I am familiar with the notes of our own Waders, and therefore at once, notice any strange call. But beyond the fact, that the note is new to me and the size of the bird gives some help towards a rough classification, I am no nearer determining its species until I have it in my hand.

To return to our day's observation of a spring migration. It is the twelfth of May, and you have turned out of bed, as the enthusiast should, just before daylight. Early morning is, of course, the best time for observing all birds, Waders included. Fresh arrivals have dropped in during the night ; they are busy feeding undisturbed, and are far tamer and easier to observe than they will be later in the day. At the same time, Waders are accommodating birds, and if the enthusiast doesn't like early rising, he may see a fair number of birds at any time of day if the tide is suitable—for, remember, that the feeding time of Waders, by day or night, will vary with the ebb and flow of the tide ; that is, with the alternating exposure and covering of their feeding grounds. This rule applies to tidal flats rather than to the Thorpe Mere ; for the mere, being non-tidal,* is often at its best when the tide is high in the Aldeburgh river, and the birds, unable to feed any longer there, come flocking on to the mere, to wait till such time as the river-flats are again exposed.

You meet your local pilot, who is waiting for you with a punt, and pole gently up the main drain, dignified by the name of " the river," listening as you go, for there is hardly enough light yet to distinguish any birds very distinctly.

As you float along, you hear, far overhead, the bubbling cry of Whimbrel, and the answering cry of others still further away, but all at such a height as to make it certain they are bound for some other district ; and gradually the sound dies away, ever getting further and further south.

Then, as the punt passes slowly onwards, you spy a single Redshank ; rather strange that he should be so far away from the nesting Redshanks ; possibly he is an outcast or a sulky old bachelor.

After waiting—swaying and bending his body, and softly uttering his melancholy call-note—he suddenly rises in darting curves, screaming ' murder ' at the top of his voice. The silent mere wakes up ; Redshanks rise from all parts, each calling more vociferously than the other. With them rise nearly all the birds in the neighbourhood ; quite near you a small bunch of Curlew, that

*i.e., That part which is not flooded from the sea through The Haven.—EDITOR.

you had not noticed in the dim light, now rise and make off protesting; you hear the rush and rattle of hundreds of wings; you can distinguish the cry of Godwit, Dunlin, Ringed Plover, Stints and Grey Plover.

It is hopeless trying to do anything more until the commotion caused by the Redshank has died down, so we will stop the punt under that high mud-bank and wait for the full daylight to come.

After a short wait the daylight has grown so much that you think it worth while picking up your glasses again to spy the big flat. Even with the naked eye, you can see some grey bunches, which at first you take to be lumps of mud, but which, since they move, must really be birds of some kind,

There is one flock of about forty birds, Godwits, and newly arrived, for "there were none here yesterday evening," says your pilot with certainty.

Some are washing themselves at the edge of one of the side drains; some still half asleep; but the bulk busily engaged in probing the mud with their long, sensitive, tip-tilted beaks. With a little more light, you can see their colours more clearly, and you will notice that, out of these forty birds, some ten are in nearly perfect breeding-dress of rich, bright chestnut with brown speckled backs; others, again, are half-way between winter and breeding plumages; and more than half of them are in complete winter dress.

If you had these birds in your hands to examine, you would find males in all these three stages, and those in winter-dress would, perhaps, not show a single red feather, even at this late date. To me, it is an interesting point whether these grey birds are birds of the year,* which are not going to breed? For one assumes they do not breed without putting on their nuptial dress, and although it is the twelfth of May, these show no sign of any change. Nor does it seem possible for them to effect a change in time to be on the Arctic breeding grounds in June. In the old days, before the advent of a close-time, it was a common experience for gunners who shot the Godwits to find quite one-half of their birds in perfect winter-plumage at this date, or even later. The females, as we see them in this country in the spring, seldom show much change from their winter dress.

A little higher up on the flat are a pair of oddly coloured birds, which the improving light enables you to see perfectly. They are busily turning over some green shiny weed, and picking up the sandhoppers and small crustaceans which lie underneath it.

They are brilliantly, almost vulgarly, coloured birds, thick set, with short wedge-like bills, a tortoise-shell back, orange-coloured legs, and a black pectoral band. Turnstones, most certainly; and the next instant you get confirmation if you need it, for some-

* *i.e.*, Birds which have not completed their first year, having been hatched in the previous season.—EDITOR.

thing disturbs them, or they have exhausted their feeding-ground, and they rise with a call-note that is absolutely characteristic.

Just at that moment, rising on their own initiative, or in response to the alarm-note of the Turnstones, a mixed flock of small birds dashes over your punt, wheels, turns back over you again, and then settles further down the mere. Note how the whole flock simultaneously changes colour, from dark to light in the sunshine, as they turn their backs or their white breasts towards you. Those are Dunlins, and with them—as you can tell by their note—are a few Ringed Plover.

On the spot from which they rose, there is still a solitary bird. This your gunner is doubtful about. At first he had taken it to be a Sanderling, but, after a look through the glasses, thinks it is a Ringed Plover, though he is puzzled by the fact that it did not join the others in the flock. He pushes the punt up a side drain, so as to get a nearer view, and, as he hands the glasses back to you, whispers “Kentish Plover—and the first I have seen for three seasons.”

Look at him; a handsome bird, with back of nearly uniform grey, a white breast, on which is a black band that fails to meet in the middle, so that the white of his underparts is continuous from chin to vent, and his legs are lead-coloured. He is very like the common Ringed Plover, but his incomplete gorget, and his lead-coloured legs betray him—a very rare bird in these parts. A little beyond him is a small lot of eight or nine birds—absolutely distinctive—perhaps the most beautiful of all our Waders in summer dress. You see at a glance that they are Plover,* and most of them seem to be in full breeding plumage—black as jet on their underparts, with chequered backs and startlingly white eyebrows, they stand out very clearly against their background of grey mud.

Push the punt towards them till they rise, and then listen to their call-note, which is unmistakable when once heard. Your gunner whistles their call-note, they answer him uneasily, and then, refusing to be beguiled, make off in a north-westerly direction, presumably to the river.

As you push on, one or two grey flapping Herons rise, with loud cries of “Frank.” Next, you are attracted by a great outcry from a flock of gulls, who seem to be mobbing and worrying some birds, of which you can only just catch a glimpse, as they are in the bottom of a side drain, and nearly out of sight.

After some manœuvring you get a view of the persecuted objects—two long-legged, white birds, with yellow ruffles and broad bills, with spoon-shaped ends, marching up and down the shallow water of the drain, slashing their bills from side to side in the water, rapidly sifting and retaining anything edible. These are a pair of Spoonbills, uncommon but not very rare visitors, and unlike most of the rarer Waders, more often seen in the spring than in the autumn migration.

* Grey Plover.—EDITOR.

Both are in perfect breeding plumage, and you stop and watch them for half-an-hour till, wearied at last of the persistent mobbing by the gulls, they slowly rise, spreading their large wings and trailing their legs rudderwise, and so sail away for the Aldeburgh river. Neither on the ground nor on the wing have they uttered a sound.

A pair or two of Greenshanks are calling away to the south, and your puntsman speedily brings them within view by a well-imitated whistle. Whimbrel have occasionally passed overhead since you have been on the mere, and now on the big flat you observe a small flock of five birds, which at first sight look like Curlews, but which the glasses show to be smaller birds, with shorter beaks and a white streak down the middle of the crown. These are Whimbrel, very much like Curlews in their behaviour, but infinitely more difficult to bring to call, though less wary of danger.

The morning is now getting well advanced, so you run the punt under the wall, and proceed to look over the middle mere. There are a good many birds on it, but nothing that you have not already seen on the mere proper, so you decide to walk down one of the ditches and up another, to see what Sandpipers are about. You have hardly started, before a Common Sandpiper springs from under the bank, almost at your feet, and with a loud, penetrating cry, dashes round a corner, and settles again abruptly a hundred and fifty yards further up the same ditch. You rise one or two more of the same species as you pass along. Then a pair of larger and darker birds, with broad, black bars on their tails, start off with loud, vociferous cries that startle everything in the neighbourhood, and fly on as if they have determined to leave the country altogether. Then suddenly they wheel round and drop almost to the ground, alter their minds and rise again, and, finally, plunge down into the same ditch again some considerable way further up. These are Green Sandpipers. A closely allied species, the Wood Sandpiper, may often be seen in these same ditches in the autumn, but rarely in the spring.

However, you trudge the ditch down to the very end, in the hope of seeing something more; but beyond flushing several other Common Sandpipers, and the same pair of Green Sandpipers, you see nothing more in this mere.

The third mere is on your way home, and you cross it, rather tired and hungry, on your way home to breakfast. Here you see several pairs of Greenshanks, a good number of Snipe—the males indulging in their wonderful musical flights, so that the air is full of their “drummings.” Redshanks are plentiful, of course; there are more Sandpipers, and one fair-sized Wader that you can only see on the wing—brown in colour with a soft protesting note, not unlike the Knot’s—possibly a Reeve, your gunner thinks. This is the last bird of any interest, and you reach the town again about half-past nine o’clock, tired and hungry, but very well pleased with what may be fairly taken as a record day on this small piece of water, mud and marshland.

II.—Gannets and Cormorants.

II.—GANNETS AND CORMORANTS.

THE Gannets and Cormorants are of the Pelican family, the most aristocratic of the sea-fowl; they owe their position on the avian tree to various structural peculiarities which we need not enter into now; but there is one other reason, unconnected with structure, which places them far above the Grebes, Divers, Guillemots and such-like birds, and that is the condition of their young when newly hatched, small, naked, blind, and as utterly helpless for weeks as a young thrush or sparrow. The eggs are small proportionately to the size of the bird,* and offer a marked contrast in this respect to the enormous egg of the Guillemot or Razor-bill.

THE GANNET.

The Gannet, or Solan Goose, breeds round the British coast on rocky islands, on the precipitous cliffs often far out in the open sea, and occasionally close to civilization. The number of birds forming one of these breeding colonies varies, of course, greatly in different stations, but is always considerable. They are eminently gregarious and probably no colony consists of less than 25 pairs of birds, and more often numbers 500, or 1,000 pairs or more.

There is but one breeding station round the English coast, Lundy Island in the Bristol Channel. In former times, large numbers of Gannets bred here, but owing to constant persecution, the numbers have dwindled and dwindled, and at the present date, the colony, if it exists at all, is probably the smallest round the British coasts. Off the Pembrokeshire coast a recently formed and increasing colony exists on Grasholm Island, of which I propose to treat presently. In *Scotland*, the Bass Rock, from which place the bird derives its specific name, on the east, and Ailsa Craig on the west, are the two most commonly known stations. But there are also large colonies in the St. Kilda Group; on a rock, Sulisgeir, north of the Lewis; and on the Stack and Skerry (Suliskerry), in the Atlantic, west of Stromness in the Orkney Islands. In *Ireland*,

* Average size of the egg, about 8 cm. $\times$ 5 cm.; average weight, 3 oz. Length of adult bird, 84 cm. to 95.5 cm.; weight, 4½ lbs. to 6¼ lbs.—EDITOR.

there are two stations, the one on the Bull Rock, Co. Cork, and a large one on the little Skelligs, Co. Kerry, both in the extreme south-west.

The total number of known breeding stations in the United Kingdom does not therefore exceed nine.

Grasholm Island is probably one of the least known of these breeding sites, and on that account, it seems worth while describing a visit I paid to the lonely sea-girt rock some years ago.

Grasholm is situated, as I have already said, off the Welsh coast, lying out in the Atlantic opposite the middle of St. Bride's Bay, the two extremities of the bay being formed by St. David's Head to the north, and by Skomer Island to the south. The nearest land is Skomer, and from St. David's, the island lies W.S.W. about 12 or 14 miles.

Grasholm itself is a somewhat conical chump of rock, about an acre in extent, rising sheer out of the ocean. Its western face, which bears the full fury of the Atlantic storms, is steep and precipitous. To the south and east, the cliffs slope down somewhat. There is a more or less flat table-land forming the summit, covered with coarse grass, and occupied by innumerable Puffins. There are only two spots where a landing can be effected on the Island, and then only in very fine weather, the one to the east and the other (and better) to the south.

Like the Stack and Skerry in the Pentland Firth, a visit to Grasholm is a matter requiring some forethought. Often enough, after an arduous journey, one finds, on reaching the rock, that a landing is impossible, owing to the swell. For this reason, one is forced to choose an absolutely calm day without a breath of wind, and further to select a good-sized, seaworthy boat in case the weather should turn squally. A decent sailing breeze renders it certain that a landing would be impossible, therefore rowing the whole way there and back becomes a necessity, a distance of, perhaps, 40 miles, allowing for the set of the tide.

Having made elaborate preparations, I waited for a suitable day, and on June 13th, my boatman called me at about 4 a.m., and told me that it looked an ideal day, and that we ought to be able to make a landing without much difficulty. I turned out at once, we soon reached the little harbour of St. David's, Porthclair, and we were off on our voyage by about 5 o'clock. Our crew consisted of myself and two boatmen, the senior of whom was also a professional cliff-climber of the first rank.

The sun was grilling, the air breathless, and we had five hours real galley-slaving before we reached our destination. We chose the southern landing-place, and effected a landing without difficulty, leaving one hand in the boat, while N— and I, taking ropes, etc. with us, clambered up onto the grassy plateau above.

The cleft in the rock formed a miniature harbour, and above our heads were hosts of Kittiwakes sitting in their swallow-like

nests, and on some of the ledges above them Guillemots and Razor-bills.

These, however, we disregarded, and crossing over the grassy top, came to the northern side of the island, where the Gannets' colony lay. From the top, one could see nothing of the sitting birds, but beyond the island, many Gannets could be seen over the sea. Of these, some were adult birds in their white and cream-coloured plumage, passing to and from the island in a continuous stream, the returning birds loaded with the spoils of their fishing, and the outgoing birds setting out for more. Others, however, evidently belonged to the unemployed, and these were all non-breeding birds in various stages of immaturity from two to five years.* They were sporting and diving round the island during the whole time of our visit, and though I do not imagine they were allowed to land on the rock, they seemed on perfectly friendly terms with the old birds.

Grasholm is, I think, remarkable for the presence and number of these young birds. It is an almost universal rule that breeding birds drive the immature birds of their own kind away from their nesting places, and never allow them in the neighbourhood at all. Here, however, quite 20 per cent. of the total number of Gannets were non-breeding birds.†

On reaching the edge of the cliffs and looking over, the Gannets' colony was brought into full view. At the time of my visit, there were perhaps 200 to 250 pairs of birds breeding on the island, and the nests were thickly placed wherever the rock formation formed suitable table-lands for that purpose. The narrow ledges and crevices in a rock face that serve well enough for the Guillemots and Razor-bills are of no use to the Gannets; they choose a rock of some considerable extent, more or less flat, and affording space enough for a number of nests to be built together, placed well above the sea and out of reach of the Atlantic rollers, and often enough overhung by the cliffs above. The northern aspect of Grasholm presents many of these flat table-like rocks jutting out, and on most of them the Gannets' nests were thickly dotted. Selecting a point where the cliffs were not overhanging, and which afforded a fairly easy descent, I left N— on the top to manage the rope for me, and having taken off my shoes and stockings, I slipped over the edge, and clambered down to the rocks below without much difficulty.

Before going down, I spent some time watching the Gannets on their nests, and a very interesting and amusing sight they were. The nests were placed so close together, that the sitting birds were in some cases actually touching each other, and the birds were continually pushing and shouldering their next-door neighbours,

* Opinions differ as to the period at which the *adult* plumage is assumed. The time which elapses before the final stage is reached, has been variously stated by authors as 2, 3, 4, 4½, 5 and 6 years. I *vide* "The Gannet," by J. H. Gurney (p. 484), who himself favours 2½ to 3 years. — EDITOR.

† Non-breeding birds in immature plumage are fairly numerous on the Bass Rock, and may be seen in the immediate neighbourhood of the breeding colonies. — EDITOR.

and keeping up a constant guttural quarrel, occasionally snapping with their beaks, and making a great clatter, but apparently doing no real damage.

Some were sitting on their solitary egg or brooding their chicks, others were engaged in feeding their young. The manner in which this is effected varies according to the age of the young ; in the case of the newly-hatched nestling, the mother, standing by the side of the nest, regurgitates a quantity of semi-digested fish into her mouth, lowers her head to the level of the little naked monstrosity, opens her bill widely, and the young one inserts its

FIG. 1.

bill and takes such food as it requires, or as the mother thinks good for it. As the young grow older and stronger, the same sort of proceeding is followed, only the young now thrusts the whole length of its head and neck down into the mother's gullet, pushing itself in as far as it possibly can, and taking the food out of its mother's crop. Finally, as they attain nearly their full size, they are fed on the natural fish as they are brought in by the parents.

As I climbed down, the Gannets with fresh eggs made off to sea at once, but those with much-incubated eggs and young were very loth to leave, and some I could almost touch with my hand before they would stir. Some few of the nests were empty ; probably they had been robbed by the Great Black-backed Gulls, for there

were a pair or two of these birds on the island, but the majority contained either young or a single egg, small for the size of the bird, pale blue in ground colour, and overlaid with a chalky material, which makes the egg look white when newly laid, but which soon becomes soiled as incubation proceeds.

Of the young in the nests, there were to be seen examples of various ages. Some were newly hatched, hideous little black objects, naked, without a trace of down, and the eyelids not yet open; others, perhaps 14-21 days old, were covered with a soft, white down, and were very quaint and beautiful to look at. These birds are 10 or 11 weeks before they are fit to leave their nests, and the last stage of the plumage is exceedingly curious. They have now acquired the dark brown, spotted plumage belonging to the first year, the tail and quill feathers are well developed, but the head and neck still retain the fluffy, white down of infancy, so that the bird looks like a brown Gannet masquerading in a barrister's wig (Fig. 1). This wig, and the remains of the nestling down, are speedily lost as the feathers of the year push their way out, and the down is shed as the feathers acquire their full length.

It is very rare to find birds in the exact stage of plumage I have just described, and I know of no illustration figuring such a bird, except on the plate in Booth's "Rough Notes." The late Mr. Booth, perhaps the best field ornithologist of our time, kept this species in captivity, and recorded the changes in their plumage from the nestling to the fully adult bird.

Unsavoury as any large bird colony must be, I think nothing equals the Gannets' home in this respect, and the stench on this hot, sultry June day was really almost unsupportable. This is due, not so much to the excrement of the birds, which, of course, thickly covers the ground, as to the great quantity of fish-remains, in every stage of decomposition. I don't suppose more than half the fish brought to the young by the parents is consumed, and the rock I was standing on was littered with uneaten fish in a horribly putrid condition; and besides these, a number of packets of semi-digested fish, done up rather like a parcel of smoked sprats in a fishmonger's shop, only, of course, of a greater bulk. Gannets often fly far afield in search of their food, and they swallow the fish they capture in order to ensure its safe portorage. On returning to their nests, they disgorge their load of fish, which has become partially digested during the flight, and is then found in the form of the rather neat packets I have described. These packets are again swallowed by the sitting bird, and, after a further process of digestion, the food is offered to the young. Besides these fishy remains, there were a few entire fish, which appeared to have been recently caught, and were, presumably, taken at no great distance from the rock.

The nests, if nests they could be called, were of the most elementary description, small heaps of tangle and scraps of sea-weed loosely put together, from 4 to 6 inches in height, and occasionally a few

tufts of coarse grass in the central depression, the whole rotten and fermenting, and adding its quota to the general stench.

The great waste of fish which occurs at all these breeding-stations has been a source of some surprise to me. Considering the enormous amount of food required by the growing young bird and the sitting parent, and the labour involved in obtaining a sufficient quantity—the birds frequently flying 50 miles or more to the fishing grounds—it seems strange that the supply should always be kept up so far above the necessary limit. I have formed a theory which may possibly account for the fact. Gannets feeding as they do, on surface-swimming fish, are dependent for their supply on the weather. If a gale arises, as often happens in an English summer, the fish swim at a greater depth, and beyond the ken of the Gannets' keen eyes. If the gale continues for three or four days, during the whole of that time the bird will catch nothing, and it is possible that the fear of such a catastrophe occurring is at the root of the habit, and that the bird's instinct teaches him always to keep a day or two's supplies in hand, as long as he is able to do so.

After examining one or two more of these colonies, I climbed up to the top again to inspect the rest of the island. The top was thickly covered with Puffins, and absolutely honey-combed with their burrows, so that, in crossing the ground, one had to walk warily or else one's foot broke through the light turf covering the burrows and one descended heavily on the unfortunate Puffin sitting below. The Puffins, like the Gannets, were passing to and fro in a constant stream in search of food, and one noticed a curious fact in the way they carried their fish—almost every bird coming in held not one but three or four fish crossways in its bill. These fish were small—about the size of whitebait—and were probably the prey of the herring and sprat, but the point of interest was how did the bird manage to hold, say, two fish in his bill, and at the same time catch a third? Did he drop the two he was holding to catch the third, and then gather the fallen ones again? I have no explanation to offer, but among the hosts of birds coming in with fish, I never saw one that carried less than two fish at once.

The Puffins suffered considerably at the hands of a pair of Peregrines that had nested on the rock. The Falcons seemed to knock the unfortunate birds about out of spite and sheer mischief or excess of high spirits. I saw one Falcon in the afternoon knock three or four Puffins down in the space of a minute. He never attempted to gather his prey, but let them lie in the water where they fell. No doubt, they did make use of the Puffins as food, for there were no pigeons on the rock, or other suitable prey, but, judging by what I saw that afternoon, they must have been in the habit of knocking down nine or ten birds for every one they utilized as food.

We examined a good many Kittiwakes' nests, and climbed along some of the best of the Guillemots' and Razor-bills' ledges,

taking an egg here and there, and, finally, it being then about five o'clock, we packed up our spoils, and signalled for the boat to return to the landing place.

The voyage home was very long and uneventful, but the heat of the day having passed, we did not suffer as much discomfort as on the voyage out. We found very little bird life, most of the sea-fowl having returned to their homes by this time. Towards eight o'clock, as it was growing dark, however, we fell in with a number of birds just setting out on their fishing. These were the Manx Shearwaters, of which there is a colony on Skomer, and which are nocturnal in their habits, sleeping in their burrows by day, and starting out on their labours as dusk begins to gather. They have a curiously silent flight, gliding past one in the gathering gloom like ghosts indeed. I know no bird, except perhaps some of the owls, whose flight is so absolutely noiseless. The effect is curiously uncanny; they appear suddenly out of the darkness, and disappear again like spirits of another world.

We reached our harbour about 10.30 p.m., tired out, but thoroughly pleased with our day's outing.

The Gannet is essentially a bird of the ocean, and, except during the breeding months (roughly April 1st to September 1st) never sets foot on land. I have already pointed out that the Gannet does not acquire his fully adult plumage till the sixth year,* and, I think, the majority of the immature birds of from one to five years old, make their home entirely on the sea, though some small percentage accompany the adult birds to their breeding grounds, and remain in the neighbourhood during the nesting time. Gannets, however, do not confine their fishing operations to the open sea far away from land. They may frequently be seen in the autumn fishing in flocks at the mouth of estuaries, and such-like places, where there is a strong tide and plenty of fish. One then finds them fishing just outside the tidal bar, adult white birds, black and white birds in various stages of immaturity, and the dark speckled birds of the year.

Blakeney Harbour, on the Norfolk coast, is a favourite resort of theirs in September and October; at that season in most years they can be seen in considerable numbers.

Of all the sea-fowl there are none so interesting to watch as a flock of Gannets fishing. Flying at first some 20 feet from the surface of the water, they quarter the ground backwards and forwards like a setter ranging for grouse, until they find a shoal of fish; mackerel, herrings, pilchards and sprats are their favourite prey, but no surface-swimming fish comes amiss. Having found the shoal, the Gannets rise high in the air one after the other, until they reach the height of 60-70 feet or more. Then, watching the actions of a single bird, you see him turn his head downwards, so that his eyes are presumably directed at his quarry, poising motionless with outstretched wings for a moment to steady himself, then suddenly

* v. Footnote on p. 23.—EDITOR.

clapping his wings to his side and plunging headlong into the waves below like a thunderbolt ; * a cloud of spray rises as he strikes the water and disappears. After a short interval he bobs up again on the surface like a cork, rests for a second, and then flaps off and takes his place in an orderly way in the fishing flock above. Bird after bird dives, disappears and repeats the same manœuvres, and the amount of fish consumed by fifty or sixty Gannets at work, even in an hour or two, must be enormous.

They do not always make their dive from a great altitude ; sometimes they will plunge on their prey from a height of 20 feet or less, and I suppose that in these instances the fish are swimming quite on the surface, but as a rule they do make their dive from a height of at least 60 feet and often 100 feet or more. It is, of course, no chance diving ; they actually see the fish swimming at a depth of, say, 7 or 8 feet from 60 to 100 feet above the surface of the water, take their aim, plunge, and hardly ever miss their shot.†

The largest flock of Gannets I ever saw in autumn or winter was in the English Channel about the middle of November, 1899. I was crossing to Ostend, and rather more than half way across we ran into a huge multitude of Gannets, that had evidently struck a very large shoal of fish, and were very busy with them. These birds were, without exception, as far as I could see, in fully adult plumage, and the bright sun shining on their white plumage made them singularly effective objects. They were absolutely fearless of the steamer and very intent on their fishing, and as we passed through them, the birds were often plunging within 20 or 30 yards of the boat, so that I could see the colour of the eye quite plainly. The Gannets "header" is absolutely characteristic. However far off the bird may be, if he is within the range of vision at all, the lightning plunge from a great height, and the clouds of spray that rise as he disappears into the sea are unmistakable. It is a matter of regret to me that I could find no illustration of a flock of Gannets engaged in fishing. None of the books I inspected, figure the Gannet's dive, though I am sure in these days of universal photography, they must have been snapped in the act over and over again.‡ The Gannet has a very elaborate system of air-sacs, both underneath the skin and in the osseous system, which can be inflated or emptied at pleasure, and it is, in a great measure, to these, I imagine, that this bird is indebted for its remarkable diving power,

* This description is not quite accurate. Since the Gannet's prey is not stationary, but continually moving about, it is necessary for the bird to maintain its power of steering *during the descent*, so the wings remain *partly* extended, and are not "clapped to the sides" until the bird is within, say, a yard of the water. Control of direction is thus retained, and slight changes in direction can be effected up to the last moment.—EDITOR.

† It is not easy to determine whether the plunge has been successful or not, since Gannets do not, usually at least, rise to the surface with the fish in their beaks, but pouch their prey while still submerged ; direct evidence of success is thus lacking.—EDITOR.

‡ A very clever sketch of Gannets diving for fish, in which the successive attitudes during the plunge are accurately rendered, is published in Mrs. Hugh Blackburn's book on the "Birds of Moidart," 1895, pl. 79 ; also in "Birds drawn from Nature," 1862, by the same artist, pl. 2.—EDITOR.

falling from a great height like a stone shot from a catapult. The force with which the birds strike the water is very severe, and their bony skeleton has a special mechanism to lessen the shock as far as possible. In the arrangement of the shoulder-girdle, the coracoids are articulated in a direction nearly parallel to the axis of the sternum, instead of nearly at right angles to it, as is the case with most birds, even with their near relations, the Cormorants ; the object being to increase the strength, and at the same time to offer as little resistance to the diving progress as possible.

In common with many other sea-fowl whose home is the open sea, Gannets suffer very severely in stormy weather, if these conditions are prolonged for any length of time. Their lives depend on the fish they catch ; the storms drive the fish from the surface to deeper water, and there they remain until the weather moderates. The wretched birds are unable to rest on the broken water ; food they have none, and they are buffeted and tossed by the gale day after day, until, finally, they perish of exhaustion and starvation.

On the east coast, I have seen the high-water mark strewn with dead sea-fowl, Guillemots, Razor-bills, Puffins, Little Auks, and Gannets, after a prolonged gale.

If you skin any of the unfortunates, you find their stomachs absolutely empty without a trace of food, and their bodies wasted to mere skeletons. I sometimes wonder what toll the storms take of Gannets and such like birds, whose manner of life keeps them out at sea and far from shelter of any kind ; one must think in very big figures. A gale of even two or three days' duration entails the most horrible suffering for the poor creatures, and if it persists for any length of time, death must be their fate ; death in a most cruel form — starvation, exhaustion, one ceaseless battle against the elements, and failure in the end. There is no bird, to my mind, that seems so full of vigour and the joy of living, when the world goes well with him, as a Gannet, and no more pitiable sight than the same bird buffeting up against the relentless "north-easter," struggling on without food, without strength, and finally falling exhausted and being washed up by the incoming tide.

Gannets have practically no enemies to face but "winter and rough weather," if we except *man* (he is their only vertebrate enemy). Their size and strength protect them from being preyed on by other birds, and yet their annual death-rate must be very high.

Immense flocks of Gannets sometimes accompany the herring-fleets in the North Sea, or rather accompany the shoals of herring which the fleet are in search of, and in this way are often of service to the fishermen in indicating the exact whereabouts of the fish. All day long the Gannets are soaring and diving round the smacks, together with hosts of Gulls. These latter birds are fishing too, but their methods are very different ; sometimes they pluck the fish out of the net itself, if they should be entangled in the upper meshes near the surface, sometimes they snatch a fish off the surface of the

water, but their innings really begin when the fleet of nets is being drawn ; they then become exceedingly bold, and often seize a fish from the net as it is being hauled over the side of the boat, or pick up the chance fish that are tossed overboard as the " take " is being shaken out of the nets into the boat.

Preying on the Gulls are numbers of Skuas, a parasitical Gull, which is too lazy or too inefficient to do his own catering, and spends his time in pursuing any successful Gull within his reach. The pursued, protesting loudly, endeavours to escape, until, recognising the hopelessness of his case, he disgorges his fish, and is immediately released by the Skua, who adroitly catches the fish before it has fallen many feet in the air, while the disappointed Gull returns to his fishing.

Skuas, I believe, never catch a fish for themselves ; at least, never when there is any other species handy that can labour for them. On the other hand, they are very courageous, and will often attack Gulls of much larger size than themselves. With the exception of the " Great Black-backed " Gull, I think they will successfully rob any of the common species up to the size of the Herring Gull, though, no doubt, they prefer the smaller Gulls and Terns, which give them less trouble.

I have rather wandered away from the subject of Gannets, but speaking of the presence of these birds around the fishing-fleet in the North Sea, brought to my mind what a wonderful picture of bird life one may see there in calm weather, if the fish are plentiful.

There is a curious method of capturing Gannets which is of very old standing, and is, I believe, very successful, though I have never seen it employed myself. A herring, mackerel or other suitable fish, is tied on to a small board eight or ten inches square, and the board is then thrown into the sea. Presently, a Gannet, soaring high above, detects the fish. He dives at it with his usual headlong speed, strikes the board with terrific force, and almost always breaks his neck then and there with the impact.

I mention this plan, because it conveys an idea of the extraordinary speed the Gannet attains in his downward plunge, better than any description of mine could do.

CORMORANTS.

Of the Cormorants, we have two species resident on our shores, the Shag, and the Common or Greater Cormorant.

The Shag or Green Cormorant (*Phalacrocorax graculus*) goes by a number of names in different parts of our Islands, among which may be instanced Scart, Scarf, and Crested Cormorant, and is often enough confused by the natives with its larger relative, and simply called the Cormorant.

It is essentially a marine bird, and never, as far as my experience

goes, frequents fresh water lochs or inland lakes and meres, as the larger species habitually does. It is exceedingly plentiful round many parts of our coast, but more especially on the western sea-boards of Scotland and Ireland, whose wild and indented cliffs form suitable sites for nesting purposes.

Many of these precipitous cliffs are honey-combed at their base with caves, generally having a considerable depth of water in them, even at low tide. These caves are the joy of the Shags, and here they may be found breeding in numbers, perhaps a dozen or more nests being placed close together. Their nesting-sites are not limited to these spots: there may be none in their locality, and then they will choose ledges and fissures on the cliff face, generally fairly near the top, and in such recesses it is seldom that two pairs are found breeding in close proximity. I do not think the bird is naturally gregarious, but the gloomy, water-washed caves form such secure and ideal nesting sites, that they are much sought after by the birds, until every ledge becomes packed with nests. Not because they care for each other's company, but because they like the spot.

The nests are seldom placed at any great height above the water (8-10 feet), and during rough weather the birds must be heavily and continually drenched with spray. The structure of the nest is rather more elaborate than those of many sea-birds, being constructed in the main of sea-weed put together with some care, together with any oddments the bird has picked up at sea—bits of stick, rags, and even bits of paper. The inside is neatly furnished with grass or finer bits of sea-weed. The eggs, the books tell us, are three to five in number; my experience does not confirm this statement. Three, I think, is the usual number, two are common, four rare, and I have never yet seen five eggs in a nest. The egg itself is of a curiously long, oval shape, small for the size of the bird, light blue in ground colour, and overlaid with the same chalky, white material already spoken of in the case of the Gannet.

I have taken a boat round into many of these caves, and the effect is curious coming in from the bright sunlight outside into the gloom and darkness. Above overhead, one hears hoarse croaks of the Shags, round about you hear something splashing in the water, possibly a seal examining the strange visitors, or, it may be, some of the Shags tumbling off their nests; and gradually, as one's eyes become more used to the twilight, one is able to distinguish a row of long, dark necks stretched down from a ledge on the rock nearly above one's head, their emerald green eyes blinking angrily at the intruder.

If one decides to inspect the nests, supposing they can be got at at all (for, of course, many of these cave-colonies are absolutely inaccessible), and commences climbing up to them, the birds keep on darting their necks over the side, croaking and snapping their bills, and, finally, when almost within reach of one's hand, they hustle off with a noisy clatter, some flying out to the mouth of the

cave, and others falling down, tail foremost oftener than head foremost, anyhow into the water below, and making their escape by diving.

The nests and surroundings are much less offensive than are those of the Gannet, or even of the Common Cormorant, in my experience; chiefly because the excreta and fishy remains that would naturally accumulate about the spots, are thrown over or drop over into the sea below, and the constant drenching with spray probably assists in the cleansing process. Nor has the bird itself that disgusting pungent, musky odour that clings so long to the Gannet and Cormorant, even to the skins in your cabinet.

The young are born blind and naked, and are exceedingly ugly, and increasing age brings little improvement in the matter of looks. They gradually acquire a sooty-brown covering of down, and this in its turn is gradually shed, as the dull brown feathers of the first plumage make their appearance.

FIG. 2.

The adult bird in, say, the latter end of February, is a very handsome object, in a bottle-green dress, with a lustrous metallic sheen, which lights up wondrously in the sun's rays.

The sexes are alike, and both are adorned with a crest of curled feathers on the top of the head, the curl being directed forwards, giving the bird rather a rakish appearance (Fig. 2). This adornment is acquired early in January, or even by the end of December, attains its full beauty by the middle of March, and is lost, or nearly lost, by the beginning of May, before incubation has commenced.

Shags, of course, live on fish, and are the most hard-working of birds in pursuit of their prey. As a rule, they fish only at certain hours of the flood and ebb, and prefer a ground where a strong tide-race is running, such as one may find between an island and the mainland.

To such a feeding ground they may be seen streaming out from the rocks just as the day begins to break, if the tide serves to their mind. For the next two or three hours, one may watch them singly, in pairs or in small parties, according to the season of the year, diving almost without intermission. Then the tide begins to

slack, or the water becomes, for some reason, unsuitable, and one sees them, one after the other, rising heavily from the water and making off to some favourite rock, often a half-tide rock, which they use as a kind of clubland. On one or two such rocks, all the Cormorants in the neighbourhood generally gather, and there, for the next three or four hours, they continue to sit, especially on a fine bright day, digesting their meal and hanging their wings out to dry. This is, I suppose, a necessary proceeding after their long and more or less continuous immersion in the water. Thirty or more of these birds all standing up with their wings fully extended on one rock, form a most absurd sight. Even on a bright day, the sun seems to take a considerable time in drying the feathers, so that they maintain the same position often for an hour or more at a stretch.

Presently the tide changes, and their instinct teaches them that the water is again in a fit condition for fishing, and they begin to lumber off again to their duties, some simply slipping down the rock and commencing operations at once, others taking to the wing, and making for more distant grounds. If the club-rock is of any height, the birds, as it were, throw themselves off, and get sufficient power with their wings before they reach the water, to keep themselves from touching it, and gradually rise again to the level they usually maintain when flying. If the rock is low, however, they cannot get sufficient impetus on, and hit the water and spatter along the surface for some distance, only rising to their proper level after 15 or 20 yards.

The Shag rises very heavily and clumsily from the water, a fact of which it is fully aware, but once fairly started, the flight of the bird is strong and rapid, much more so, indeed, than its appearance suggests. If you come unexpectedly right on top of a Shag, which has no warning of your approach, as, for instance, in sailing round some rocky promontory, he never attempts to fly in the first instance. He *dives* at once, comes up again some 70 or 80 yards away, and then flaps along the surface of the water for some distance, until he has acquired sufficient impetus to raise his body in the air. If, on the other hand, you sail near to a flock of these birds in the open, they will not allow you to approach nearer than 60 or 70 yards, and then they all take to wing.

My point is that their instinct teaches them that, in an *emergency*, diving is the only safe way of avoiding a danger suddenly sprung upon them.

The Shag's—and, indeed, all the Cormorants'—method of diving is absolutely characteristic. He really springs right out of the water, turns over in the air, and takes a noiseless header; but the body is so close to the water throughout this manœuvre, and the action is so quick, easy and free of effort, that one hardly follows the middle stage where the body of the bird is really out of water altogether, the moment when his paddles are just leaving the water with his

kick off, and the beak is just meeting the water to complete the downward half of the semicircle which he describes (Fig. 3).

They are able to stay under water for a great length of time—four or five minutes at least—and to travel during that time at a great pace with or against the tide in any direction, using, as all

FIG. 3.

these birds do, their wings as well as their feet to propel themselves with. Therefore, to those who would pursue a wounded Shag that is diving strongly, I would offer the advice "Don't"; the chances are all in favour of the bird.

If you compare the Cormorant's method of diving with that followed by one of the true Divers, *e.g.*, the Great Northern Diver, you see how entirely different the two systems are.

FIG. 4.

At rest, the latter bird sits with fully half the body out of water. When preparing to dive, or when frightened, he sinks the body lower and lower, till merely the top of his back and head and neck are left above the water line; then he sharply meets the water by lowering his head, and the body follows the head, so that the dive is completed

without any additional part of the body being shewn from start to finish of the action (Fig. 4).

These Divers can hardly ever be induced to fly; they trust almost entirely to their diving, to escape from any awkward situation they may find themselves in, and, I suppose, their diving is mechanically more perfect than that of the Cormorant, but it is much less interesting to watch.

Shags are exceedingly plentiful on most of the rocky shores on the west coast of Scotland and Ireland, where they far outnumber the Cormorants. There is, therefore, no objection to shooting a few if the specimens are wanted to serve any useful purpose.

As *food*, the natives of some parts hold them in some estimation. An old moonlighter on the Galway coast, who was in the habit of accompanying me on my sea-going expeditions, told me he preferred a Shag to a Wild Duck, and I generally shot two or three in the week for his table. For myself, I have never had the courage to taste one, whether old or young, and I hope I never may. I imagine that they must be incredibly fishy and nasty.

I believe that Shags might be utilized to good purpose, however, by naturalists, who are engaged in working out the fish-fauna of a district, more especially of the wild and rocky shores forming the Shags' home.

They obtain most of their fish near the bottom, but nothing that passes their way comes amiss, and one often finds their gullets crammed with fish of several different species, and sometimes of quite rare kinds. After the contents of their crop have been examined, the bodies could be utilized as food by the natives, and the feathers have some small value for bedding purposes.

The following is a note on the contents of the stomachs, etc., of two Shags shot on the Galway coast, and serves for an illustration of the service they might be, on occasions, to the man working out the fish of the district.

1. ♂ adult.—The stomach was filled out with a green-streaked wrasse, measuring eight-and-a-half inches in length, and the tail-portion of another fish.

2. ♀ adult.—The stomach was filled with an entire wrasse, seven-and-a-half inches long, the remains of several smaller ones, and two small gar-pike, four inches in length.

The larger species of Cormorants, commonly called "the Cormorant," is closely-allied to the Shag in many ways, and its habits are in the main very similar, though they present some striking differences, which I can only just touch upon. The young of the year resemble those of the Shag so much, that the two birds are often confused, but they may be readily distinguished by the number of tail feathers, this species having 14, as against 12 in the Shag.

As to its breeding sites, it commonly selects steep cliffs or rocky islets, and never, as far as I am aware, makes use of the sea caves so popular with the Shag. It is far more gregarious than the smaller

species, and is often found in large colonies, *e.g.*, on the Farne Islands. Still, they are also found breeding in solitary state towards the top of the steep cliffs, which they choose for their homes.

In number and appearance, the eggs are very similar to those of the Shag, though the egg is somewhat larger, and the number in the clutch is, on the average, greater (four instead of three). The young are indistinguishable from those of the Shag in the nestling stage, and pass through the same phases to reach their plumage of the first year.

The Cormorant differs from the Shag in several important particulars. In the first place, it does not confine itself, in the choice of a nesting site, to the immediate neighbourhood of the sea. There are several inland colonies, the nests being placed on steep and more or less inaccessible rocks far from the sound of the sea, notably the well-known breeding-place in Merioneth. Nor do they confine themselves to rocks, but nest on trees—often in company with Herons—in considerable numbers.

Up to about 1825, fifty to sixty pairs nested regularly on the trees bordering Fritton decoy in Suffolk. And at the present day, there are at least three such “rookeries”—if I may use the word—on islands on the Loughs of Counties Mayo, Galway, and Roscommon. The nests, in these cases, are sometimes built close to the ground, but more often at a considerable height (thirty feet or more), large and bulky structures much better finished than the nests of the rock-breeding birds.

Unlike the Shag, they, unfortunately, do not confine their fishing operations to the sea. There is hardly a loch in Ireland or Scotland that is not poached by this bird. On the larger lochs, their numbers are considerable, but even the smallest lochs seldom escape the attention of at least one of these birds. They destroy, of course, a very large quantity of trout, and once the Cormorant has taken to inland fishing, he is very reluctant to return to the sea.

They seem to acquire some sort of prescriptive right to a small Highland loch—I mean that a single bird secures the fishing rights from his colleagues, and is left in undisturbed possession of his property.

On the Dhubh Loch, a small piece of water in Argyllshire, with which I was familiar, one Cormorant was always to be found, either actively fishing or drying his wings on a rock. For some days I didn't disturb him, though I was regularly up at the Loch, and I never saw but the one bird. At last I took a rifle up and shot him, thinking to put an end to the poaching, but there I was mistaken, for on the following day when I arrived, I found another Cormorant hanging out his wings on exactly the same rock as his predecessors. On the following day I shot the second bird, but two or three days after, a third appeared, and I then gave up the unequal contest, the heirs of the first Cormorant were apparently as the sands on the seashore.

The adult Cormorant in his breeding plumage is a very handsome bird, with his rich metallic dress, white thigh-patch and white crescent on the throat. This dress is not very common, and, I believe, a number of the Cormorants that are breeding will be found without these distinguishing marks.

11th March, 1903.

III.—The Common and French Partridges.

III.—THE COMMON AND FRENCH PARTRIDGES—SOME NOTES ON THEIR NATURAL HISTORY, AND ON THEIR VALUE AS BIRDS OF SPORT.

POSSIBLY the majority of my readers may feel that some better subject might have been chosen for a lecture than the Common and French Partridges. Every one knows the Common Partridge—dozens of books on ornithology describe its ways and habits—and the same remark applies in a lesser degree to the French Partridge. Why, then, waste our energy discussing what is already fully known and described?

Well, my answer is this. The Partridge *is* a very common bird—it is ubiquitous. Everyone, from the schoolboy upwards, is familiar with the sight and sound of the bird, and in some small degree with its habits; but, notwithstanding this, there is a great deal in the life of the Partridge which is not recorded anywhere, and much that is recorded in our leading text-books that is incorrect.

One might say the same of any bird if one knew enough about it. I don't suppose the Common Sparrow is in the least sufficiently described. Anyone who specialised in the Sparrow could probably record a lot of new facts about that bird—and correct a number of errors.

It is not possible that a writer of a text-book of ornithology should be a naturalist specially qualified to deal with every bird he has to write about, and, as a matter of fact, many of them, for one reason or another, are cabinet naturalists rather than field naturalists dealing with their own personal experience, and, as a result, they trust to the statements of others, and these statements get copied from book to book, long after they are known to be incorrect.

Now, it has been my lot, for a period of something over 20 years, to have been more or less in the position of an overhead, or consulting keeper, on an estate of some size in Suffolk, and in my unregenerate days I spent a large part of the summer on the ground, and was out at most hours of the day and night during the breeding and rearing season of the Partridge, studying their ways

and attending to their needs according to my lights. So that, while I entirely disclaim any scientific knowledge, I do lay claim to being something of a specialist in the ways of the Partridges as I found them on this particular ground, and I have been surprised to notice how widely many of the habits and ways of this bird differ from the descriptions published in many of our best-known books.

I propose to occupy your time in following the life history of a pair of Grey Partridges from January to September, dealing with the various enemies they have to face, their courtship, nesting and family cares; to contrast their ways with those of the French Partridge, and, finally, to consider them both together as sporting birds, and to indicate what, in my opinion, is the best way of protecting them and of increasing their numbers on such grounds as are suitable to them.

By the end of February, almost all the coveys have split up and separated into pairs—indeed it is by no means unusual, if January is open, to find them paired off before the end of that month; but, in that case, they commonly reunite into coveys if cold, frosty weather sets in. This reunion of pairs into coveys is, no doubt, mainly due to the greater warmth which the birds obtain when huddled up close together at night, in the ordinary position of a covey, shoulder to shoulder, forming a circle with their tails in the centre;* but also partly because the cold abolishes for the time their amatory instincts.

February and March are very good months during which to study what Partridges you have on the ground. Partridges feed mainly in the morning, and again in the afternoon. During the middle hours of the day, if they have been able to secure sufficient food at their morning feed, they are found resting in such cover as there is, dusting and cleaning themselves. Now, there are comparatively few spots at this time where the birds can get the food they like best. The majority of the fields are ploughed, the roots are pulled, and even the grass and other seeds shed on the rough lands and in the hedgerows are gone.

But there is one exception to the nakedness of the land from the birds' point of view. I refer to the clover fields. In Suffolk, we commonly sow clover seed with the barley. When the barley is cut, you have a stubble rich in grains that have been spilt in the harvesting, and through the stubble, a fine crop of young clover coming up—a "maiden layer," as we call it. As the autumn wanes, the birds gather the spilt corn, and in the winter there is a fine crop of young tender clover. In the following summer, the clover

* J. G. Millais ("Nat. Hist. of British Game Birds," 1909, p. 115) describes the heads as being directed inwards, towards the central point, and, in a letter to myself (16th Oct., 1918), he confirms this, as being the result of his own observations. On the other hand, Macgillivray, Dresser, Swaysland, Lilford, Seebohm, Stonham, Rev. C. A. Johns, Hudson and others agree with Mr. Ogilvie in stating that the heads of the "jugging" birds are turned outwards, and the tails towards the centre. This seems obviously to be the more practical arrangement, since, not only would the birds fit together better in the small space, but they would also be able to observe the approach of enemies.—EDITOR.

will be cut and harvested, the aftermath fed or kept for seed, and, finally, the field will be ploughed early in October.

I have laid great stress on these "maiden layers," because something like three-quarters of the Partridges of that district will be found on such a field, often travelling a considerable distance to reach it, and returning to their own home after each morning and evening feed. Partridges very seldom roost in the winter on a clover "layer," on account of the wet, but generally choose a ploughed field or other bare place. There are only a few of these "layers" on the estate, and one can easily, in an afternoon, ride or walk over them all, and the Partridges on them will represent a very large percentage of the total stock of birds on the estate.

In March, courtship proper will have begun. In the great majority of cases, the birds will have definitely selected their partners. Here and there, where the males are in excess, constant fights will take place, often resulting in the older male ousting the younger from the possession of the female, a most undesirable occurrence when it happens, looked at from the breeding point of view. The old males are not only more pugnacious and stronger birds, but they are also either infertile or much less fertile than the young male, and the result of the union is likely to be a small laying, a still smaller hatching, and a large percentage of rotten eggs.

Throughout March, while pairing is going on, fighting is generally continuous and severe. These fights are very amusing to watch—the two males, bristling with fury; feathers raised and wattles showing, rush at each other, striking and buffeting with their wings, generally jumping a few inches from the ground. So intent are they on their battle, that they pay little or no attention to an observer who is reasonably careful. The "round" may last three or four minutes; the lady, close by, picking up a seed here and there and preening herself, is apparently quite unconscious of the furious rivalry she is exciting. The fighters now separate a little distance, and recommence feeding, and peace seems to be declared, till one or other approaches too near the female, when war is instantly declared again. So the battle continues with intervals over a considerable period, possibly a week or more, until one of the two is finally vanquished, and the happy pair are left to their honeymoon. I have often watched fights of this kind, and I never could see that the Partridges inflicted any real damage on each other, their principal offensive weapon seemed to be their wings; their bills they rarely used, and their feet they didn't appear to use at all.

The fights, no doubt, do have some real meaning and the better fighter wins the prize in the end, but the noise and bluster of the battle is out of all proportion to the harm done.

The studied inattention of the female is most amusing to watch, and, I conclude, she exercises no choice in the matter at all, beyond promising her hand to the better man.

By the beginning of April, the pair are in the thick of house-

hunting, up and down hedgerows, selecting a suitable residence. I don't think they ever select the exact spot for the nest at once. Their first step is to select the fence they will nest in, and in this fence they, or possibly only the cock, scrab here and there as if the nest were being begun, but these "scrabs" never get any further, and sometimes one finds nine or ten such "scrabs" in a fence which is only tenanted by one pair of birds.

Partridges are very curious in the sites they select. Fences* are by far the commonest choice, and it is very hard to tell why some particular fences are so very popular. Thus, I know a fence, perhaps 200 yards long, which year after year holds eight or nine nests; and another close by, in much the same condition, which rarely holds more than one. Speaking generally, I think they like fences that are not too high, as these latter often get thin at the bottom; on the other hand, they dislike too thick a bottom; possibly it holds the wet too much, or, possibly, they cannot see enough of their surroundings when on the nest. Of course, they by no means confine themselves to fences, sometimes nesting in clover fields and sometimes on the commons, in the latter case choosing small whin bushes, and sometimes choosing sites so open that one has to screen the nest artificially with a branch or two of dead whin or an armful of brambles.

But it is the hedgerows that will hold the bulk of the nests.

They have a most annoying tendency to select fences by public roads, or by the side of public paths, or even a small whin bush on the quarter of a grass road on the common. In fact, they seem to find some satisfaction in choosing the most public site they can. In the case of the nest I am thinking of on the grass road, at least one cart and often more (besides foot traffic) passed over this road every day during the whole period of sitting, and yet the bird hatched out in safety.

The birds, having chosen their site, proceed to scratch a slight saucer-like concavity in the earth, and into this they rake a few blades of grass or dead leaves, but for all practical purposes, there is no proper nest.

It is not much use looking seriously for Partridge nests before the 20th April, and the bulk of birds will not be laying before the last days of that month or the early days of May; but there are always a few pairs that lay earlier than this. I have found an egg on April 11th, and in the last week of that month they are quite numerous. It is commonly said that one egg is laid every day, but this is not correct. I investigated the point rather carefully, for a number of years. I marked each season about a dozen nests. I noted the number of eggs in the nest, and the date, and then later noted the date on which the bird sat.

In this way, one found, for instance, that on April 26th, 1894, a certain nest had one egg in it. On May 15th there were 15 eggs

*i.e., Hedges.—EDITOR.

in that nest, and the bird was sitting, giving, as the time occupied in laying 14 eggs, 19 days, an average of 1.356 day to every egg laid, or, roughly speaking, one egg in every $32\frac{1}{2}$ hours in that particular case.

Taking a large number of nests on the same principle, during a period of six years, I got an average result of one egg in 1.43 days, or, roughly, $34\frac{1}{3}$ hours; and, I believe, this represents a fair average, taking one season with another, but it must be remembered that birds that lay very early, say in the second half of April, are generally slower than the May birds, and that cold weather retards the laying very considerably; a severe spell of frost still more so, and, indeed, it not infrequently spoils the eggs already laid. Moreover, I am inclined to think that the first few eggs and the last eggs of a clutch are produced more slowly than the middle numbers. Thirty-four hours per egg is a fair average for the whole clutch, but it must be understood that that time does not represent the exact time for each separate egg.

Partridges' nests are generally, though by no means always, well concealed, and the easiest way to find them, as one walks along a hedgerow, is to inspect the bottom growth and watch for any signs of a run or track leading up the bank into the hedge. The journeys of the birds to and from the nest cause a narrow beaten track, across which they bend the herbage over more or less curtain-wise, in order to conceal the run; and, by just raising the curtain with one's stick, and peering into the fence, one can generally find the nest. I think 15 eggs is about the average number the Grey bird lays, but the number may be considerably higher or lower—anything over 20 indicates, as a rule, that more than one bird has been laying in the nest.

Until the bird sits, the eggs are laid anyhow in the nest, one on top of the other, with no attempt at order of any kind. Except at the actual time of laying, the bird is away from the nest; but, and this, for many reasons, is a very important point in the economy of the Partridge, the eggs are always carefully covered over with dried grass and other material before the bird leaves. Each time she returns, she rakes the material to one side, lays another egg, and replaces the cover before leaving. This instinct is, no doubt, of very real service to the species, as it helps to protect the eggs from innumerable enemies during the long period (19 or 20 days) over which the laying extends. Incidentally, I may say, that this habit is found in widely separated families, *e.g.*, the Grebes, who always cover their eggs with decaying vegetable matter whenever they leave the nest, even during the period during which they are sitting.

On the day the last egg is laid, the Partridge for the first time arranges the eggs in their proper position with great care, spreading them out regularly and evenly, so that she can cover them to the best advantage when she begins to sit. On this day, she leaves the eggs *uncovered*, and on the following day she commences sitting.

For the first four or five days, any small accident will cause her readily to forsake the nest, but after the first week is over, she is a most resolute sitter and nothing in reason will make her desert. It is a common thing when they are cutting clover with the machine to cut over a Partridge's nest while the bird is sitting, and literally cut her in half with the blades of the clipper. Good keepers take the greatest pains to ascertain what nests there are in the clover field before it is cut, and the man on that beat is always present at the time of cutting.

Sometimes the driver of the clipper, going round and round in ever-decreasing circles, is able to see the bird flutter away from the eggs as the machine passes close by, and then warns the keeper, who mows out with a scythe a small patch of about a square yard containing the nest, and to this patch the bird will almost always return, if she is sitting hard, within the space of an hour, even though she has to pass by half a dozen farm hands to reach her nest.

The period of incubation is 24 days, rarely extending to the early part of the 25th day, but never less than 24. In the case of the French Partridge, the period of incubation is only 23 days, and the practical importance of this point was brought home to me many years ago. I found a Frenchman's nest with five eggs in a very unsafe position, and I took the eggs and placed them in a grey bird's nest I knew of, which then contained 13 or 14 eggs, and was more securely placed. The grey bird laid one or two more eggs and then began to sit. On the 23rd day the five French chicks hatched out, her own were just beginning to chip, and would, no doubt, have hatched by the end of the next day. But the Grey bird, thinking she had hatched all that were hatchable in her nest, went off with the five French chicks, and left the 16 eggs of her own to perish. This explains why we never see a mixed covey of French and English chicks led by either English or by French parents, despite the fact that French birds often lay eggs in the English nest, and vice versa.

The sitting Partridge only leaves the nest for a short period, generally in the early morning, but after the sun is well up, to feed, and during this short absence, she makes no attempt to cover the eggs.

Nature has made a wonderful provision in the case of the Partridge, and, indeed, all game-birds. These birds possess a very strong scent, which enables dogs and innumerable enemies to hunt them down with certainty; and this scent is present for some eleven months out of the twelve. During the period of incubation, the scent is suppressed entirely, or so little is left, that you may take a first-rate dog within a foot or two of a sitting bird over and over again, and he will not evince the smallest interest in the locality. How this suppression is effected I don't know, but I imagine it is in connection with the digestive organs; at any rate, it is an absolutely essential provision, as, without it, no amount of protection could save the ground-breeding game-birds from complete extermination.

During the period of laying and sitting—a period which extends in the case of a clutch of 15 eggs, to, say, 44 or 45 days—the male Partridge is in close attendance on his partner. Suppose the first egg were laid on April 20th, then the chicks would be coming off about June 4th.

But April 20th is rather an earlier date than the average time for depositing the first egg. Taking the 1st May as the date for the first egg, then the hatch will take place about the 14th or 15th of June—and, at home, I always reckon the week in which the 15th June falls, as the chief hatching week of the season.

This is the really critical time for the Partridge, and the prospects for the autumn shooting depend, in a very large measure, on the climatic conditions prevailing for the next three weeks.

Before the period of incubation, the sitting bird will put up with a good deal of cold, or even cold and wet together, which is the worst possible combination; and after the chicks are three weeks old, and beginning to get their first quills, they can resist a moderate amount of bad weather, but from the 15th June to the 7th or 14th of July, bad weather, prolonged cold, much wet, and an absence of at least an average amount of sunshine, means a very heavy death-roll, and a loss in the worst years of, perhaps, 85 per cent or more of the young birds.

The season of 1903 was such a one, and the young Partridges were drowned and starved and frozen literally by thousands. Many of the best shootings in the Eastern Counties were not shot over at all, and where shooting was permitted, the bags did not reach more than one-fifth or one-sixth of their normal dimensions. As a case in point, on our own ground, which in a good average year yields about 1,300 brace, we made a total of only 265 brace.

I shot over a little outlying farm in the early days of September in that year with three or four guns—a farm that should give from 15 to 20 brace. We killed nine grey Partridges, and every one of them old birds. We only found two coveys, or what appeared to be coveys, and one or two single birds, and when we shot into these two coveys, we found them made up entirely of old birds, which, having no chicks of their own, had collected together, as their natural instinct taught them to do. There was not, as far as I could ascertain, one single young bird on any part of that farm.

The opposite condition, as regards weather—a prolonged drought with 14 or 15 hours unbroken sunshine per day—is, in my experience entirely favourable at this critical time.

I have never known a drought to do any harm to the birds, though the farm crops, the hay, clover, corn and roots may be burnt to a cinder. An occasional light shower is, no doubt, beneficial in periods of great drought, the dews are almost always very heavy, and in the early mornings every blade of grass is bathed in moisture. Partridges do not require much fluid, and these dews provide them with their daily needs. If a drought occurs, with very small dews,

or without any dew at all, then the birds do suffer, but this is a most exceptional occurrence.

A good many circumstances regulate the number of eggs in the nest. Partridges are most prolific in their first year. The female hatched in June, 1904, will lay a fuller clutch in 1905 than the female hatched in 1903, and their fecundity rapidly diminishes each succeeding year; a female which has survived beyond four years is, I think, for all practical purposes sterile. The same holds good with the males, and it is only from the union of males and females of the preceding year that we get a full clutch and a full hatch.

A nest which only contains, say, eight or nine eggs when a bird sits, is even more unsatisfactory than its paltry number indicates, for, probably, half the eggs in the nest will prove to be rotten; here one would suppose that the female is old, and her ovaries exhausted. A large nest of 18 or 20 eggs generally hatches out well, but occasionally you find such a nest which will only yield five or six chickens or less—and in this case, I believe we are dealing with a faulty male. When an *old male* has paired with a *young female*, the number of eggs laid seems to show that the latter bird is normally prolific, and the number of bad eggs to show that the fertilization was incomplete.

This all indicates how important it is that young birds should pair together. If it were possible to shoot off all old birds, males and females, at the end of the season, the stock the following year would be enormously increased.

We may now suppose that we have come to the day of hatching—say June 15th—and from this time onwards the male shares equally with the female the parental duties. While the eggs are chipping, the male sits by the side of the nest, and as each moist little ball of fluff comes out of the egg, it is passed over to the male, who “broodles” it, while the female remains tight on the eggs. Thus, one might find, if one disturbed the Partridges on this day, seven or eight chickens under the male by the side of the nest, and the female finishing the hatching of the remaining eggs.

A Partridge chick, like those of all game-birds, when newly-hatched, is covered with a beautiful fluffy down, and is able to run and to a certain extent to take care of itself from the moment it comes out of the egg.

As soon as all the eggs are hatched, the parents lead the little mites away from the nest on to the nearest feeding ground, probably the field adjoining the bank on which they nested, leaving in their old home nothing but broken egg-shells and rotten or unhatched eggs. If the dew is very heavy, they will not take the chicks into the rank, wet growth, but pick up what they can on the “outsides.” As the sun gains strength, and the vegetation dries, they get further afield into the clover or young corn or peas, these latter being an especially happy hunting-ground, by reason of the amount of insects, blight, and so on, which may generally be found in the crop.

They never return to their nests. At night, they sleep out in the fields, each parent taking about half the chicks and "broodling" them, until the first of the daylight sees them start off on their rounds again.

In bad weather or cold weather, they seek the shelter of some friendly bank or fence, but never, I think, anywhere very close to the site of their nesting place. If a very heavy thunderstorm overtake them in the daytime in the open, and they find that it is impossible to shepherd their chicks back to shelter in time, both parents will squat, call all their chicks in and "broodle" them till the storm is past. The parental instinct is extraordinarily strongly developed, in the male quite as strongly as in the female. When any danger - a dog, or human being, or what not, is suddenly sprung upon them, they utter a warning cry, and the chicks, like well-drilled supers, squat flat upon the ground, as if they were trying to squeeze themselves into the very earth itself, with nothing to show the presence of life but their little black, beady eyes. As long as the danger remains imminent, the parents keep up an incessant chuck-chucking, and the chicks remain absolutely still and motionless.

This instinct in itself is very curious, for it is evidently inborn. A chick that is only two or three hours old will "squat" at the warning cry, with the same celerity and certainty as a chick of three or four weeks. It can be no question of learning by experience and parental training. It will squat at that cry, and at that cry only, though not from any knowledge of the safety so acquired. Partridges reared under a hen never squat, although danger is threatening, and the foster mother is clucking in a dreadful fluster. The 24-hours old chicks are evidently frightened, and often damage themselves in their frantic rush for the coop, or other place of imagined security; but "squatting," which is their only real chance of safety in an emergency, is never resorted to. The necessary stimulus is absent, and that stimulus is supplied by one particular cry of the parents and nothing else.

The parents themselves face the danger, whatever it may be, courageously. If it is a dog, they will flutter away a few yards in front of his nose, hardly able to fly, and then drop one wing as though broken, and limp and struggle a few yards further, of course in a direction away from the chicks. One bird generally occupies the stage at a time, usually the male, and if his wiles fail entirely, the female will join in, and fly across the dog only a foot or two away, so that he can almost catch her in his mouth as she passes, and will go through the most desperate antics to draw him away from the dangerous neighbourhood. Their performance with a human being is very much the same, and they appear perfectly fearless at such a time. I once had a cock Partridge rush at me and peck my gaiters, because he could not draw my attention away in any other manner. Crows, rooks, or hawks, which are threatening their chicks, they receive in the same spirit. The female at once covers the chicks,

while the male flies to arms, and buffets the intruder to the best of his ability with his wings; and they generally succeed in driving away a much larger and stronger bird.

It must not be supposed that success always attends their efforts, and it is no uncommon thing for one or both parents to lose their lives in defence of their young. One such incident occurs to me. June, 1890, was remarkable for a series of very heavy thunderstorms with fine intervals. A pair of birds had led their young from the adjoining warren out on to the open Bentlings bordering the sea, very probably in search of ants' eggs or some other delicacy. The chicks numbered 13, and were about a week old. These Bentlings are sand hills covered with short grass and clumps of the bent grass, but of cover, properly speaking, there is none. On the warren, 100 yards or so distant, there was ample shelter for any emergency, and between the Bentlings and the warren was a broad, naked stretch of short wind-swept turf and sand. In the midst of their operations on the Bentlings, and with no warning, a thunderstorm suddenly broke out—one of the very worst storms of that thunderstormy year. Recognising the danger the parents gathered up their chicks in haste, and essayed to get back to the cover of the warren, the chicks lagging behind, as they ploughed along over the flooded ground. Half way across the open space, the old birds saw the hopelessness of the attempt, and squatted flat on the open stretch, and raising their wings, each parent took five or six chickens under their shelter and stolidly sat on, hoping that the storm might cease, and give them a chance of getting their family into shelter.

Well, the storm did not cease, or at any rate did not cease in time, and these two birds remained at their post, unable to move without the certainty of losing their young, and there they died. The keeper found them some time later, stiff, and sodden with wet, with their wings half opened. On lifting first one, and then the other bird from the ground, he saw the whole extent of the disaster, the 13 chicks lay dead, huddled together under two dead bodies. He replaced the birds and sent for me, and I saw what I have described. Is it possible to conceive a stronger instance of the parental instinct—if that is the right name—than this?

We may now suppose that we have reached the middle of July, and that the youngsters are four or five weeks old; they have lost almost all their down, and replaced it with short, stumpy quills. The tail feathers and the wing-quills are getting well forward, and the chicks themselves have grown to about the size of blackbirds. They are able to take much longer journeys with their parents in quest of food, and are much better able to face any unwelcome change in our variable climate. They are getting too big for the old birds to cover all at night, and some are in consequence left out, but I think they change and change about, and those that are not actually under the parental wing, cuddle up to each other, and get a good deal of warmth in this way.

Soon after this, the most forward chicks make their first attempts in the business of flying, and as each day passes, they grow stronger and stronger, till by the end of the month, our covey will be able to follow the parents in the air over a low fence, or if danger threatens, to fly off in different directions for some distance before they squat.

From this time, the anxieties of the parents are much lessened. The power of flight rapidly increases, and in the middle of August, the young birds can cover quite long distances without exhaustion. The birds should now be three parts grown, and have fully acquired their first or nestling plumage. With harvest in full swing, they betake themselves to the stubble fields in the mornings and evenings, readily gathering a plentiful supply of grain, while they spend the heat of the day (10 a.m. to 4 p.m.) in the adjoining root fields, taking dust baths and arranging their toilets. They feed on the stubble again in the evening until dusk, and at night, they all roost together in a family circle, tails in and heads out, covering an absurdly small space of ground. The nesting feathers are at this time being rapidly replaced by the permanent feathers, and these, as in the case of most other birds, at first resemble the plumage of the female parent. In the case of a young cock, the male feathers gradually replace the female feathers up to the New Year. By this time, most of the males are in full feather, but I have often shot birds in January— young cocks—the feathers of whose wing coverts are still mixed, partly male and partly female.

The covey keeps together to the end of the shooting season, and they rarely permit any stranger to join their party or to roost with them. Sometimes, however, two or more covies appear to enter into an agreement, and do mess and roost together, and this seems to occur much more in some seasons than in others. Even then, I think, they are more like various tenants of one house that live in the same building but have separate flats. I think each family still keeps more or less separate, though they outwardly join together for the common good.

The plumage of the Partridge is so well known that it is unnecessary to describe it in detail. There are some points, however, about the plumage which I should like to emphasize, because attention is not sufficiently called to them in books, and because they are important.

[These are the sexual differences. Most books lay stress on the horseshoe patch on the breast as the distinctive feature of the cock bird, and even a good many keepers still look on a well-marked horseshoe as a certain proof of a cock.]

It is due to Mr. Ogilvie Grant of the British Museum (Nat. Hist. Depart.), that we have, at last, got a clear idea of the sexual variations in plumage. Mr. Grant is, probably, the greatest living authority in this country on game-birds. I mean the game-birds of the world. He is responsible, amongst his other published works, for the catalogue of Game Birds (vol. xxii.) in the National collection,

to which volume I would refer you for details on Partridges' plumage.

In 1891, Mr. Grant published one or two papers on the subject. The question he sets himself to answer was this, "What are the differences by which a male Partridge can always be distinguished from a female Partridge after they are mere chicks?" He opened by showing the fallacy of the horse-shoe mark on the breast as a sexual distinction. He quotes from all the best-known writers, Yarrell, Dresser, Seebohm, Irby, Saunders and Naumann, the great German ornithologist. Most of them describe the horseshoe in the female as being either entirely absent or represented only by a few scanty spots, and the remainder state that the horseshoe is not assumed by the female till the second or third year. From his own observations he deduced the following facts:—

1. That both male and female Partridges possess the chestnut horseshoe patch.
2. That the patch is best developed in the *young female*, *i.e.*, the bird of the year, and gradually becomes less and less marked.
3. That in certain districts, more especially on the light, sandy soils of the Eastern Counties, the horseshoes in the female are not well developed, and are sometimes entirely absent, even in young birds. This he doubtfully attributes to the effect of soil or climate.

I have shot Partridges in many different parts of Scotland and England, and I am in entire agreement with him, that the patch is well developed in the young female almost universally, the exception being certain Eastern Counties, including Suffolk, where a good horseshoe in the young female is uncommon, and where the white horseshoe (*i.e.*, entire absence of chestnut feathers) is not very rare.

The importance of the horseshoe question is very great. It has happened over and over again that orders have been given at the end of the season, on certain estates where the shooting has proved unsatisfactory, to destroy a certain number of cocks, in the hope that the reduction in males, particularly old males, would prove beneficial to the stock the following year.

The keepers are, in consequence, told off to shoot as many birds with a well-developed horseshoe as possible. It is certain that if they execute these orders with any success, they must be killing hens with the cocks, and not merely hens, but *young* hens, which have their horseshoe especially well developed, and which are, of course, the birds beyond all others they want to protect. Under these circumstances, it is not surprising that the results are not so satisfactory to the shooting stock as the originators might wish.

Having excluded the horseshoe as a mark of sexual distinction, Mr. Grant shows that there is one guide to the sexes which he believes to be infallible. This is the difference in the marking of the lesser and middle wing coverts. In the male, without going into detail, these feathers (Fig. 5, A) show a central buff stripe down the shaft of

the feather, without any cross-barring. In the female, (Fig. 5, B) the central buff stripe is somewhat wider, and is joined by cross bars of a similar colour. In October, November and December, one often shoots a bird with the feathers of the wing coverts mixed. The explanation of this, I have referred to already. The Partridge is at first habited in female feathers, and the full male plumage is only gradually assumed as the year wears out.

Young birds are easily differentiated from old birds, by which I mean birds that have moulted their primaries at least once. Young birds have the tip of the first primary pointed or acuminate—old

FIG. 5.

birds rounded. Housekeepers who are desirous of purchasing young birds for their table, should bear this point in mind.

A second and less secure test lies in the colour of the legs; an old Partridge has blue-grey legs, and a young bird stone or clay-coloured legs. This is a satisfactory test for the first two or three months of the shooting season, but towards the end of December or January, the difference in colour is much less marked, some of the young birds having legs of a horn or bluish horn colour, hardly distinguishable from those of the old birds. The test of the primary feather is absolutely reliable at all seasons.

WEIGHTS OF PARTRIDGES.

An English cock Partridge weighs about $14\frac{1}{2}$ oz. on the average, and the female about $\frac{1}{2}$ -ounce less. I have accurately weighed a great number at different seasons in Suffolk, and at different times of the same season, especially with a view to seeing whether they suffered much after a long frost. The heaviest Partridge I have any record of is $16\frac{3}{8}$ oz. (16.37 oz) shot on January 24th, 1893, after a long and severe frost. Of ten young cocks shot on the same day, the average was 15.037 oz. (or well over the average), and of three old

cocks, 14.99 oz. Anything over 16 oz. is a remarkable weight for a Partridge, and I have only a note of five of that weight or over, out of a large series which I weighed and tabulated. The weights after a long spell of cold are of interest, showing how well the Partridge is able to look after itself, and how little it suffers, when the Passerine and other birds are perishing in large numbers from cold and starvation.

Another point which my table of weights brought into prominence was the comparative weights of the young and old birds. The young cocks, I found, were always heavier than the old ones. Not a very great difference, perhaps $\frac{1}{2}$ ounce, but it was constant. In the case of the females, the reverse condition was the rule; the only very large female I have ever seen (16 $\frac{1}{4}$ oz., a most exceptional weight) was an old bird—and the average of a considerable series showed a small but constant difference in favour of the old bird.

Here is a table of the average weights of 87 English Partridges shot in the season 1892-1893.

26 male <i>juv.</i>		14.91 oz.
17 male <i>ad.</i>		14.63 oz.
23 female <i>juv.</i>		14.16 oz.
11 female <i>ad.</i>		14.44 oz.

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This may seem a trivial point, but there must be some reason for the decreasing weight of the cocks, and the increasing weight of the hens, and, I conclude, that this must be due to the effects produced on the males and females respectively, during the season of reproduction. The male never recovering quite the same weight as he possessed before the first nesting, while the female seems to feel the effects much less, or even to be benefited by them.

I propose now briefly to consider the French Partridge, selecting mainly those points in their domestic economy in which they differ from the English bird, and contrasting them. And then to say a few words about the creatures that prey upon Partridges, English or French (the one race suffering equally with the other).

The French Partridge is not indigenous to the country. They were first introduced by the Marquis of Hertford in 1770 on his Suffolk Estate of Sudbourne, near Orford. Here the climate and the light, sandy soil suited them, and they multiplied exceedingly. Lord Rendelsham introduced some in the same year on an adjoining estate. Other centres in the Eastern Counties were also chosen for the introduction, and in the course of a few seasons, these birds had become firmly established. From East Anglia they gradually spread over the country, sometimes by natural wanderings, more often by deliberate introduction artificially, until there was hardly a county in England or Wales that had not at some time or another

held French Partridges. But it was found that these birds could not maintain themselves, or, at any rate, could not increase, except under certain special conditions of soil and climate, such as only a few parts of England, especially Norfolk and Suffolk provided. In other localities they dwindled and died out. I believe at the present time, a French Partridge is quite a rarity in a day's shooting over something like three-quarter of the total acreage of England and Wales. Where the environment was suitable, they became firmly and permanently established.

These were the days of flint-locks and muzzle-loading guns, long stubbles reaped with a sickle, and many other conditions which are now obsolete. Partridges were then shot over dogs (setters and pointers), and the ways of the French bird, very soon and very fairly, caused a bitter outcry among the sportsmen of olden times. It was found that their habits were entirely opposed to those of the grey bird. At the sight or sound of danger, these latter birds squatted tight, and hoped that the trouble might pass them by; the dogs winded them and stood, the guns came up, and the covey as they rose, afforded a good chance to several guns. The French birds, on the other hand, never squatted, but at the first sign of danger began to run, whether they were in stubble or root, and continued to run until they were out of danger. The dogs, quite unaccustomed to this novel kind of Partridge, would begin pointing as they first got the scent, and then slowly and cautiously draw the whole length of the stubble with the birds running in front of them at an ever-increasing distance, only to see them finally top the distant fence while the pursuers were still 100 or more yards short of it.

It is no wonder that the Frenchmen were abused in those days. Where they were numerous, they made shooting over dogs impossible—the dogs themselves were spoiled. It was said, and I daresay truly, that the French bird's example corrupted the grey bird, and that they, in their turn, refused to lie to dogs as they had done in former times. A great outcry arose against the French bird, and in many places determined attempts were made to exterminate them. The eggs were smashed when found, and the birds were poached, and shot anyhow and anyway, and, in short, treated like vermin.

My sympathies are with the sportsmen of those days. To them, the birds must have been an unparalleled nuisance, spoiling their dogs, their tempers and their bags. But now all this has changed. Partridges are walked up, or driven to the guns; for either of these forms of sport, certainly for the latter, the French Partridge is equal to, and in some ways superior to his English cousin. But they have got the bad name, and it sticks: turn where you will in the sporting or natural history works connected with the bird, you will find nothing but unqualified abuse. It is remarkable that all the most violent philippics directed against this bird are

penned by men who have had very little personal knowledge of their ways ; the few articles which have a good word for the Frenchman, are the work of Suffolk and Norfolk naturalists, to whom the bird is as familiar as the English. For over 20 years I have enjoyed the sport of Partridge shooting in Suffolk, for the last fifteen almost exclusively "driving," and I should like to put forward my personal testimony to the value of the French Partridge for sporting purposes, and to protest against the unfair and ignorant attacks made upon him by the majority of professional writers on Natural History.

The French Partridge belongs to the genus *Caccabis*, a genus which is spread over the Palearctic, Ethiopian and Oriental regions, and is widely removed from the genus *Perdix*, of which our Partridge is the type.

I don't think the "Red-legs" separate for pairing quite so early as the grey bird, and one may often see coveys of these birds after all the English birds are paired off. Their nesting, however, occurs at about the same time, and, as a matter of fact, the earliest nests found are most commonly those of the Frenchman. Thus, I have a note of a nest found with four eggs in it on April 15, 1893 ; this would point to April 8th or 9th as the day on which the first egg was laid, and is the earliest date I have for any Partridge's nest. The Red-leg, on the whole, is probably a little earlier in laying, say rather less than a week earlier on the average, but as she usually takes a longer time laying the clutch, the time of hatching is approximately the same. The site chosen for the nest is similar to that of the Grey Partridge, but they are more prone to nest in woods than is the latter bird, and, occasionally, choose quite extraordinary places for that purpose ; for instance, the top of a hay-stack, or a low pollard tree, or a thatched roof.

During the period of laying, the eggs are never covered while the bird is off them ; that is to say, they are never covered at all, and a much heavier toll is taken by egg-eating vermin of these eggs than of those of the English bird on this account. The number of the eggs is very variable, but 15 eggs is about the average, and 18 is not very unusual. The period of incubation is 23 days, against 24 in the case of the English species.

After the eggs are laid, the male bird pays little or no attention to his wife. In fact, he generally leaves her to perform her domestic duties alone, while he goes to his club and enjoys himself. You may sometimes see small coveys of these birds on the young corn-fields in May, and they are all male birds, whose wives are looking after the nursery.

French Partridges desert their nests on very small provocation. When a Grey bird has really settled down to the work of incubation (after five or six days), she is a most resolute sitter. It is not so with the other species ; they will desert their eggs after sitting for a fortnight or three weeks, or even when the eggs are chipping,

as readily as in the first few days, and many nests are lost every season from this unfortunate habit.

At the time of hatching, the chicks are placed at a great disadvantage as compared with the English chicks, owing to there being only one parent present on duty. The male hardly ever bothers himself to be present, and many chickens or eggs are lost from the bird not being able to brood a number of newly-hatched chickens and finish off hatching at the same time. In consequence, she often goes off with the chicks which have hatched, and leaves four or five unhatched eggs in the nest with live chicks inside them, or while the last eggs are being hatched, some of the earlier chicks perish from cold. When the time at last arrives to take the chicks afield, the French Partridge exhibits no sort of forethought for the wee things she has charge of. She drags them prodigiously long journeys through wet corn or over heavy plough, leaving a number of dead behind whenever a tolerably heavy shower comes on.

If danger threatens, she makes no attempt to protect her helpless offspring. No trailing of broken wings and other wiles to draw the intruder away. "Every one for himself" is her motto, and at the first sign of disaster, off she flies and leaves the chicks to manage as best they can. For all these reasons, a Red-leg is stigmatised by the keepers as a "bad mother," always "drabbling" her young about, giving them no rest. Sixteen or seventeen eggs in the nest is no very unusual number, but how often do we see a covey of anything like that number in mid-July; twelve is unusual, and eight or ten the more common number.

If one turns to any book dealing with the French Partridge, one cannot help being struck by the insistence with which writers refer to the habit of the species of *perching* in trees. One would imagine from their unanimity that a covey, when flushed, habitually flew to the nearest trees and perched there. Now, I have no doubt that the habit *has* been noted by sufficiently good observers, but I am quite convinced it must be a very rare occurrence. For myself, I have lived in the centre of a first-rate Red-leg district, and have shot over it for 25 years. I must have seen many thousand Red-legs flushed in that time, and I have never seen one perch, or attempt to perch in a tree. Nor have any of our keepers been more fortunate. I have seen, on occasion, these birds sitting on a low wall, sunning themselves early on a summer's morning, while the ground was still dripping with dew, but I never saw one attempt to alight anywhere but on the ground, when they were involuntarily flushed by beaters, dogs or other enemies.

The statement that the French has nearly exterminated the English bird in many districts is not in accordance with fact. It is true that the French bird will exist in some localities where, for different reasons, the English will not; but that is due to the surroundings, and not to the pugnacity of the former species. Kill all the French Partridges in the locality, you will not benefit the

other species. The ground is unsuitable for them, and you would effect the clearance of the only Partridge that would flourish there, not increase the number of Grey birds which would not.

The late Mr. Seebohm, an admirable writer at most times, has evidently acquired all his information of the bird at second hand. He says,* in speaking of the Common Partridge: "In the Eastern Counties of England, it has been partially exterminated by the Red-legged Partridge, but still occurs locally in these counties." Just consider the concluding line, "still occurs locally in these counties." I imagine that the bags of the Common Partridge made in Norfolk, Suffolk and Cambridgeshire, would more than equal the total number killed in all the other counties of England put together. And yet, these same counties are the stronghold of the French Partridge. Could one ask for a better refutation of the crimes the French bird is supposed to be guilty of.

The weakest composition I ever read concerning the French Partridge, was in a book entitled "Birds of our Rambles," by C. Dixon, a very prolific writer on ornithology. In one and a half pages of print in a small 8vo. volume, he made more mis-statements than one could conceive the space at his disposal could possibly allow. Amongst other things, he says: "I can name reliable witnesses of actual fights between the two birds" (*C. rufa* and *P. cinerea*); "nay more, where it" (*C. rufa*) "has been actually watched killing an entire brood of English Partridges just as they got their first set of quills! Comment is needless." I quite agree with the concluding sentence: he does not say what the male and female Grey-birds were doing during this holocaust, but, as I have endeavoured to show, they are the most devoted parents, and it is quite certain that they must both have perished before the offending French bird could have seriously begun the massacre of the innocents. The statement is, of course—reliable witnesses and all—nonsense pure and simple.

The call of the French Partridge is quite unmistakable, so is that of the Grey bird, but they are very different. The Grey bird's call is almost impossible to put into words that would convey anything to those unfamiliar with the sound. It is a kind of crake, *chis-ick*, repeated over and over again, and if I had to reproduce the sound, I think I should borrow a door with rusty hinges and work it to and fro.

A Frenchman, on the other hand, has a loud, combative call, which savours a little of the farm-yard, and which may, I think, be written *chuck, chuck, chuck, chuck-aw*; one member of the genus† takes his familiar and scientific name from the sound.

The French Partridge is a considerably larger and heavier bird than the English, and the male is two or three ounces heavier than the female. A good male Red-leg will weigh anything between

* "British Birds," II., p. 452.

† The Chukar Partridge (*Caccabis chukar*, Grey).—EDITOR.

1 lb. 2 oz. and 1 lb. 5 oz., the young cocks always weighing less than the old ones. Seeing how little trouble the males that are mated take over their responsibilities, one would expect that they would gain, instead of decrease, in weight as the years go on. The sexes are alike in plumage, and it is not possible to tell a male of the year from the female without dissection. After the first year, the male begins to develop a wart or callosity on the back of his leg above his hind toe. This is really a rudimentary spur, such as Pheasants and Game Cocks possess in a perfect condition, and it becomes more and more developed as the bird gets older and older, but in its highest form of development, it never gets beyond the stage of a large wart ; that is to say, it never becomes of any use for offensive purposes.

It is supposed by many writers that hybrids occur between the French and English Partridges. I can only say that I have never seen such a hybrid, and I believe the supposition to be entirely without foundation. Of course, I am speaking of birds in a state of nature and not under artificial conditions ; but even in the latter instance, I am not aware that any authenticated skin is in existence shewing the product of the crossing of these two species. Bigeneric hybrids are always extremely rare in nature, and I cannot imagine the smallest grounds for supposing that two such widely separated genera as these would be likely to cross in a state of nature, or, for the matter of that, in confinement ; and if they did, I should expect the union to be infertile.

I mention the point, because notes appear in the *Field* and other papers every year recording the shooting of such an hybrid (properly authenticated with dates and names and everything else). And there is hardly any one who is known to be interested in birds who does not receive one or more such specimens every year. Now, I have had a fair percentage of such specimens sent to me, and I have never had the least doubt what they were. They were half-grown French Partridges, pure and simple, in the rather peculiar plumage which perhaps gives some colour to the idea of their crossing with the English birds ; and they had been shot in September or even in October, at a time when most of the Frenchmen had completed the moult, and were in full plumage. These imaginary hybrids were just ordinary French birds in their ordinary plumage at that age. Being a late covey, probably a second nest, they were only half grown in September, and then, when shot or caught by the dogs, they were looked on as something very extraordinary, simply because the shooters were ignorant of the changes in plumage which takes place in this particular bird. They probably knew the downy chicks, and were of course familiar with the full feathered bird, but this half-way stage entirely confounded them. As I said at the opening of the paper, we are very ignorant, for all our multitudinous host of super-illustrated books, of the life history and plumage changes of *any* bird, even the common Sparrow. The reason is not far to seek.

The bulk of intelligent keepers and field naturalists, who know, don't write, and the cabinet naturalists, who do write, don't know.

The enemies of the Partridge are innumerable, and I don't propose to waste any great length of time in discussing the better known ones, but wish rather to draw attention to some of those which are less commonly put on the black list.

I need hardly emphasize the fact again that the show of birds you are able to put before the guns in October, will be regulated more by the climatic conditions which obtained in the critical four weeks (June 15–July 15), than by any damage which the recognised enemies of Partridges could achieve. At the same time, good keepers can effect a lot. The difference between a keen hardworking man who knows his work, and a slack public-housey kind of man who doesn't, represents fully a hundred birds on the beat.

The principle of the reliable man is to prevent accidents occurring, and if he cannot do that, to catch the offender at his first offence. Hedgehogs, for instance, are very fond of Partridges' eggs, and if, unhappily, they raid a fence with a number of sitting birds, it is likely, if left in peace, that they will presently clear the lot. The good man may trap the hedgehog before he begins, but in any case he will know all the nests on his beat, and give them a look every day, and at once discover the mishap. The first nest spoilt by the hedgehog will also be his last, for he is easily trapped. My public-housey friend may also effect the death of the hedgehog, but, very likely, only when he has destroyed four or five nests in the same fence.

In order of demerit, from a game-preserver's point of view, the Stoat, or "blacktail," as we call him, comes easily first. Nothing comes amiss to him, fur, feather or eggs. I found a nest, or rather a temporary home of some Stoats some years ago under a heap of dead whin-faggots on one of the commons. Three nearly full-grown young ones at home; two I shot, the third I lost for the moment. I then fetched some traps and hung the young ones up over the traps, and before night I had got the remaining young ones and both the parents.

In their larder I found four or five partially-eaten and two entire rabbits, quite fresh, none of them full-grown, one fresh leveret, the remains of another of considerable size, several thrushes' wings, and a portion of an adult female Partridge, no doubt a sitting bird, whose eggs the parent Stoats had eaten. In the same year, from the same cause, I remember losing nine Partridges' nests on one small common early in June. The result of bad luck, and the particularly wary beasts we had to deal with. These eggs were all much incubated, and, giving an average of ten young birds per pair, the damage these Stoats did in the one locality, represented at least 100 birds. We finally exterminated the family, but it cost us nine nests to achieve that end. In this case, we couldn't find the Stoats' nest, and though we covered the ground with traps, we could not

get them. Once we found their home, we finished them off without difficulty.

Rats, weasels and hedgehogs are all destructive, being passionately fond of eggs in any form.

Cats that have once taken to poaching become confirmed in their evil ways. Fortunately, they generally confine their attention to rabbits, but they sometimes stumble by accident on a sitting bird, and spoil a nest. They have the habit of returning to their kill the following night, if they haven't finished it off at once, and can then be easily trapped with their own kill as a bait. Dogs—pet terriers, lurchers, and all kinds of hunting dogs—are very destructive if they are allowed out of control on a shooting ground in the nesting time. It is not that they scent the Partridge on her nest, but in their pursuit of rabbits they hunt the hedgerows, etc., and not infrequently blunder on the sitting Partridge, smashing the eggs and pulling a handful of feathers out of the retreating bird. Pet dogs should be kept at home at these times, and stray dogs summarily dealt with and buried.

Of feathered enemies there are many, most of them being egg-stealers. *Facile princeps* comes the Rook. He is an inveterate egger, and in a dry summer, his depredations are very heavy. The significance of the dry summer is, I suppose, that the growth is so short and stunted, that the Rook has much less difficulty in finding the nests, than when there is a luxuriant undergrowth, which effectually conceals them. Both French and English nests suffer, but the former far more severely, by reason of their being left uncovered. Rooks don't, by any means, confine themselves to Partridge eggs; earlier in the year they spend a large part of their time quartering the marshes, grass lands and commons where the Lapwings nest, and taking a heavy toll of their eggs.

Magpies in my part of Suffolk are practically extinct. Jays are very troublesome in the coverts, but give no trouble to the man on the Partridge beat.

Only two Hawks are likely to give any trouble. The Sparrow-Hawk and Kestrel, the former, however, almost always nests in the coverts, and feeds his family on the young hand-reared Pheasants, and it will fall to the lot of the Pheasant man to deal with him. The Kestrel is a very occasional offender, but I think they are something like the man-eating tiger—once they have begun to take game-chicks, and find how easy it is and how full the supply, that particular pair never bother to procure other food for their young. Where you have to deal with such a pair, they must be destroyed, but under ordinary circumstances, I think the species deserves protection.

Of the four common Owls, I believe they are all entirely harmless as regards feathered game, and do an enormous amount of good in the way of killing rats, mice, field-voles, etc., etc. They are strictly protected with us.

I think I have noted most of the common enemies we have to

guard against during the breeding time ; but I should like to tell very briefly the misdoings of one other bird that I caught red-handed for the first time this last summer. A pair of Red-backed Shrikes* had a nest not far from a meadow in which were a few coops of Pheasants and some Partridges, that we were compelled to bring up artificially. The keeper told me he had been losing Partridges—the Pheasants were, of course, much larger—for the last two days, and he could not find out how : Jays he thought. We walked together along the fence bounding the meadow, the fence having two or three strands of prickly wire running through it, and presently we heard the angry chattering of the male Shrike, and saw the family, the mother and four fully-fledged young ones, a little beyond him. While I was examining them, I heard an exclamation from my companion, who was examining the fence, and turning round, I found that his attention was directed to the upper strand of prickly wire. Neatly impaled on this were four or five downy Partridge chicks, their heads battered in and brains picked out, otherwise they were sound.

We may now turn to the last part of our subject, the value of the Partridge as a sporting bird. Partridges may be attacked on a big scale by three different methods.

1. They may be shot over setters or pointers, in the same way as Grouse are shot on the Scotch non-driving moors. This form of sport is but little followed in the majority of English counties at the present time. Why ? Because of the presence of the much-abused Frenchman ? Not at all. It is because of the altered conditions of farming more than anything else : the machine-clipped stubble, in place of the ragged stubble of 40 years ago, reaching half-way to one's knees ; the machine-drilled roots, running regularly in long, straight dringles, in place of seed sown by hand broadcast ; and, lastly, it is owing to the difference between our modern weapons and the old-fashioned muzzle-loaders then in use. After each shot, a lengthened period had to be spent in reloading, and a good dog, who was absolutely steady and would remain at the "down charge" for as long as necessary, was a *sine qua non*.

Shooting over dogs should, in my opinion, at the present time be confined to those grounds where the birds are very few and far-between, where there is little or no suitable cover (*e.g.*, roots), but much rough grass or moor-land, which holds a covey here and there at long intervals. A brace or two of wide-ranging setters will save an enormous amount of unnecessary labour, and materially add to the prospects of the bag. In fact, without dogs on such a ground, the chances of the sportsman shooting anything at all are not very rosy.

2. They may be walked up ; guns and beaters making a line, driving the birds from the stubbles into the roots, and then shooting the latter. This is probably the commonest form of Partridge shooting, and is certainly the most suitable for all small shootings.

* See "Field," July 8, 1911, p. 112, "Butcher bird killing young Partridges."

3. Lastly, Partridges may be driven over the gun. In my opinion this is not only the best way of shooting Partridges where the conditions are favourable, but it affords the finest sport which can be obtained with a gun in this country.

Unless your shooting is of some size—not less than 400 acres—driving is out of the question. It would mean driving the bulk of the birds off your own ground and on to your neighbour's, with a problematical chance of their returning. The same is true of outlying tongue-shaped bits of land on the border of a big estate. These can seldom be driven with profit, and are more useful as a source of supply for the larder of the house at the commencement of the season, and for giving to younger generations a little experience.

Driving, to be carried out in anything like perfection, needs much organisation, and, beyond all, numbers of well-trained men, who know the ground thoroughly, are keen on their work, and have had several seasons' experience. Trying to drive with an undisciplined mob of 15 or 20 men is hopeless.

There can be no question that the practice of driving birds over the gun instead of walking them up is very beneficial to the stock of birds that that ground will hold. It has been found over and over again that the introduction of driving has increased the average stock of birds two- and even three-fold. I may quote my own experience. In the days of walking up, our average bag lay between 400-500 brace. After a few years driving, the average rose to 1,000, and is now nearer 1,500. The reasons for this increase are many, but I would especially emphasize one of them. Single old birds, barren pairs, etc., are shot off; even in the case of coveys, the parents are frequently the leaders, and are the first birds to come to grief as they top the fence.

The *alpha* and the *omega* of Partridge-raising is to have as large a stock of young, and as few old, birds left on the ground at the close of the shooting season as possible. This is exactly what driving tends to bring about, and is almost the converse of the walking up method. In the latter, the old birds, barren pairs and so on, are just the birds that least often offer the chance of a shot; while even in the case of coveys, it is the young birds rather than the parents that suffer most, and it is no uncommon thing to exterminate all the young birds in a covey in thick cover, such as seed clover, potting them one after another as they get up. Now, this can never happen in driving; one covey may offer a chance to two guns, and they may both secure a brace, one or both the parents being most likely among the slain, and then passes out of the day's reckoning. It is very unlikely that that covey will be dealt with again on that day, but if this were so, it would only mean another two birds out of the pack, and the great chance that the survivors were all young birds.

I think, too, that driving is generally a much more merciful form of shooting than walking. In the former, the bulk of the birds are killed outright, or missed outright, and the temptation to take

very long shots is reduced to a minimum. A really bad shot is practically harmless to driven birds, the shot going ten yards or so behind or below the object he shoots at. In walking birds up, "tinkering" is much commoner, and the total of birds that are hit but not bagged is always considerable. Here, an absolute duffer can do a great deal of harm with a gun, adding little more to the bag than he would in a day's driving, but plastering every covey he shoots at with stray pellets.

In following this sport, the Frenchman is incomparably useful. In many respects he gives better sport than the English bird; he flies hard, and high and straight, and I know few greater pleasures in life than to pull two of these birds out of the skies as they pass at top speed. The pleasure in my own case is all the greater by reason of its rarity.

Let me just sketch the outline of one drive, to show why I think so highly of the French bird for the sport. It is a fine morning early in October. The beaters have driven a number of stubbles into a 40-acre field of root: at the far end of the field is a common, and here the six guns are placed in suitable shelters. It is blowing very strong from the west, making a dead fair wind for the birds. A whistle sounds, and the drive has begun: for some time one hears nothing but the tap-tapping of the beaters as they slowly advance. In front of them, a covey of Frenchmen are separating up before taking to flight; there are twelve in all, but each one will take a line of his own. They never keep bunched up together as the Grey birds do.

Now they are up! "Over, over" cry the beaters, and away in the distance you see them coming, extending themselves as they get nearer, each bird choosing his own line. There is no vacillation about a Frenchman. He has a very shrewd idea that there are guns posted between him and the common he desires to reach, but little he cares for that. He has decided to run the blockade, and trust to his pace to carry him through. There may be other shots fired before he reaches the line of guns. He only quickens his flight. He set his course when he rose, and to that course he will stick or die in the attempt. No unseemly wavering, no efforts to break back; on he comes straight, and high at a desperate pace, 70 or 80 miles to the hour. Sometimes his fate meets him, and he dies, like the gallant bird he is, in mid-air, neatly stopped by a well-judged shot; and often he goes on unharmed with a shower of lead and explosives fruitlessly poured after him. Just one hoarse chuckle he gives, as he passes over the discomfitted gun, and then flashes out of sight, looking as though he never meant to stop.

This one covey of twelve birds will very likely afford chances to four out of the six guns waiting in ambush at the end of the field. What will the grey birds do in the same field? Some, at the commencement of the beat, rise in front of the beaters, and fly three parts of the way down the field, and settle in the neighbourhood of

PLATE I.

F. M. OGILVIE IN THE BUTTS, SUFFOLK.

the guns. These birds, disturbed at the shooting in front, will break back and face any danger rather than pass over the firing line. Another covey tries to sneak over the hedge, is cleverly held up by the flanking beater, and gives the outside gun a long and difficult chance.

Perhaps the remaining two or three coveys do come forward to the guns, but they fly low, and the beaters are too near by this time to allow one to take them in front—one cannot open fire behind until they are past the line of guns. Fidgetted and worried, one finally makes what should have been an easy shot a very difficult one, and it is only here and there that a bird falls as the Partridges stream away.

In our imaginary drive, we have put up in all six coveys of Grey Partridges (say 70 birds), and the one covey and a few single Frenchmen (say 15 or 16 birds), and our bag at this stand is 18 birds, 6 French and 12 English, and in every case the French birds afforded infinitely the finer shooting. I do not mean to decry the Common Partridge. He is an excellent bird for sporting purposes, and is so full of guile that he is often uncommonly difficult to secure, especially where the fences are low, and, consequently, the bird is not raised sufficiently to shoot at in front with any safety. But the English Partridge needs no defence from anyone: it is the poor Frenchman I ask a kind word for. I never go through a day's partridge-driving in Suffolk without thanking Providence for providing so fine a sportsman, and congratulating myself on his presence.

He has faults I know. I have not disguised them, but for driving he is a grand bird, and I hope that some echo of my admiration for him may find its way to my readers, and do something towards rehabilitating his very tarnished reputation.

22nd February, 1905.

IV.—The Common Snipe.

IV.—THE COMMON SNIPE.

(*Gallinago Cælestis*, Frenzel).

THE Common Snipe (*Scolopax Gallinago* of Linnæus and *Gallinago cælestis* of Frenzel and most modern writers) is a bird with a very wide geographical range, covering almost the entire Palæarctic region in the summer, and extending into the Indian region and beyond in winter.

In summer, it occurs as a straggler in Greenland : is abundant in Iceland, the Færoes, the British Islands, and the whole of northern and mid Europe as far as the north of Italy.

South of 70° N., it is common in Scandinavia, Russia, Siberia, and the whole breadth of Asia ; the southern breeding range being limited by Lat. 40° . An occasional straggler reaches Japan.

In the winter, its migrations extend to both sides of the Mediterranean basin, Asia Minor and Persia ; enormous numbers winter in China, Burma, and India, the southermost flocks reaching Ceylon, the Phillipines and Malaysia.

In America, our bird is replaced by Wilson's Snipe (*G. Wilsoni*), a species so closely allied as to be scarcely distinguishable from the old world form.

In the British Islands, the Snipe is common both as a summer resident and a winter migrant. Most numerous in Ireland, it breeds freely throughout the length and breadth of Scotland, including the Orkneys and Shetland, is common in Wales, and nests in greater or less quantity in most English counties, excluding some of the Midlands.

On the east coast, Norfolk and Suffolk are exceptionally favoured—the low-lying marshes, broads and fens in close proximity to the sea, offer a more or less ideal summer home for the Snipe, even in these days, when so much bog and waste-land has been drained, reclaimed or otherwise rendered sterile for this class of bird.

The majority of my observations on Snipe in the breeding season have been made on the Suffolk coast, where the bird still nests rather commonly. The particular ground with which I am most familiar has a sea frontage of about five miles. The marsh

land extends to upwards of 1,000 acres, and in most places is only separated from the sea by a narrow tract of low sand-hills covered with marram grass and other marine vegetation. Where the sand-hills are an insufficient defence against the encroachments of the sea, the marshes are protected by sea walls, varying from six to fourteen feet in height, and constructed of earth removed from the adjoining marsh.

These walls, on occasions, fail in their object, and the sea breaks through, flooding the meadows, and doing an incalculable amount of damage. This was the case in November, 1897, when the sea burst the wall three hours before the top of the flood tide, and covered the ground with two or three feet of salt water, besides throwing hundreds of tons of sand and shingle on to the land nearest the beach. Nor did the damage end with the marshes alone, for the salt water, streaming over the level flat, reached all the lower-lying woods or belts, and stood for weeks in some of these to a depth of eighteen inches to two feet. As a natural result, the trees were killed in large numbers, especially the Scotch Fir, Ash, Poplar and Alder, which formed the greater proportion of the big timber.

Before proceeding to deal with the life-history of the Snipe, I should like to spend a few minutes in discussing the sounds which emanate from the bird.

These are three in number :

1. The alarm note.
2. The breeding note or love song.
3. The musical "drumming."

The first and second of these are undoubtedly vocal. (1) The alarm note is generally rendered by English writers as "scape" or "sceap," and is heard throughout the year. In summer, the note is much less frequently used than during the autumn and winter months. A Snipe flushed between April and June sometimes calls and sometimes rises silently, but so far as my experience goes, over 50 per cent. make no sound. It is hardly necessary to add that a bird never "sceaps" when leaving her eggs, whether she is frightened or whether she is going off for her own pleasure.

In the shooting season, on the other hand, the alarm note is almost always heard: fully 95 per cent. of the birds "sceap" when they are flushed, and it is quite a rare event, at that time of the year, to put up a *Common Snipe* that goes off silently.

2. The second note is also a vocal sound, and is confined entirely to the breeding season—it is really a love song, I presume. It is an exceedingly simple bi-syllabic sound, repeated over and over again with an almost irritating monotony. The song is common, I believe, to both sexes; though, for obvious reasons, it is the male that is most frequently heard.

This note has been variously written by different authors. To my ears, the best combination of letters is Pralle's (Hanover)

"Gick-jack": these two syllables, repeated *ad nauseam*, convey a very good notion of the Snipe's song.

Almost every writer on birds has made an attempt to reproduce this sound in the form of a printed word, and each one has strung together an entirely different arrangement of vowels and consonants to that end:

Here are some examples:

1. Pralle (Hanover) "Gick-jack, gick-jack."
2. Macgillivray "Zoo-zee, zoo-zee."
3. Wolley "Keet koot, keet koot."
4. Stevenson "Chuka chuka."
5. Seeborn and H. Brown "Tjick-tjuck, tjick-tjuck."
6. Harting "Chook, chook."
7. Yarrell and Thompson "Tinker, tinker."
8. Lilford "Cheevuck, cheevick."

This list might be almost indefinitely increased, but the instances I have given show, I think, the futility of trying to put a bird's song into the form of a printed word. In the Snipe's call we have the simplest form of song imaginable; two short syllables of the same length, the second varying slightly from the first in sound, repeated over and over again. Now, suppose you presented these verbal representations of the note to an intelligent person entirely unfamiliar with the sound, what would it profit him? He would read, with amazement the extraordinary variety of words put before him. He would repeat "Tinker, tinker," "Chook, chook" and "Gick-jack," each combination would produce an entirely different effect, and he would remain in a condition of complete mystification of the real sound that each writer tries to convey by an entirely different set of letters.

"Gick-jack" happens to reproduce exactly the vocal sound to my ears; many of the others are equally useful, *provided only you know the note beforehand*. Macgillivray's "Zoo-zee" is to me nearly as good as Pralle's "Gick-jack." Wolley's "Keet-koot," and Stevenson's "Chuka chuka" are very satisfactory; and yet these four efforts have nothing in common except their brevity.

To those who *know* the song, almost any one of them would serve well enough as a written representation: to those who do *not* they are worse than useless, and this multiplicity of words *can* cause nothing but confusion.

Perhaps some day we may induce the birds to sing into a gramophone, and get popular records. But, until such times, a bird's song can only be learnt at first-hand from the songster himself and no amount of written words will ever give us a true conception of the real sound produced.

Passing now from the two sounds which are universally admitted

to be vocal, we come to the third sound made by a Snipe, round which a fierce controversy has raged for the past 100 years or more. The question is as burning now as then, and seems no nearer settlement.

This noise has been likened to many beasts, *e.g.*, insects, lambs, goats and horses; it is very variously described as "humming, droning, drumming, bleating, or neighing." Tennyson speaks of "the swamp, where hums the dropping snipe."*

Provincial names for the Snipe, based on this noise, are found in very many languages; and one may almost trace the geographical range of the Snipe in the breeding season, by observing in what countries such names are found to occur.

As the sound is almost entirely confined to the breeding season, these names naturally cease as one passes on to countries outside the breeding range.

I have drawn up a table of such names as I have been able to collect, together with their literal translation in English; and you will observe that even the small number in my list covers a very considerable portion of the Snipe's breeding area—that they do not cover the whole, is simply due to the difficulty in unearthing them from little-known languages, like many of the branches of the Slavonic tongue. I believe that every country where the Snipe breeds has some name for this bird, founded on the drumming noise.

PROVINCIAL NAMES OF THE COMMON SNIPE DERIVED FROM THE
"DRUMMING." OR "BLEATING"-NOISE MADE BY THE BIRD IN THE
SPRING

DANISH—*Hingstefugl* = "stallion-bird"; *Myre-hest* = "marsh-horse."

NORWEGIAN—*Horse-gjök* = "horse-cuckoo"; *Rosse-gauk* = "horse-cuckoo"; *Humre-gauk* or *-gjög* = "neighing-cuckoo"; *Himmer-hest* = "sky-horse"; *Skudde-fole* or *Skodde-föl* = "mist-foal."

SWEDISH—*Hors-gök* = "horse-cuckoo"; *Himmels-gel* = "sky-goat."

ICELANDIC—*Hrossa-gaukur* = "horse-cuckoo."

ORKNEYS AND SHETLANDS—*Horse-gouk*, *Hoars-gouk* or *Horse-gok* = "horse-cuckoo."

GERMAN—*Himmels-ziege* = "sky-he-goat"; *Himmels-geiss* = "sky-she-goat"; *Haber-bock* = "oats-goat."

ENGLISH—*Moor-lamb* (Lines.); *Summer-lamb* (Norfolk).

GAELIC—*Gabhar-athair* = "goat-of-the-air" (Perthshire and the Western Islands); *Meann-an-athair* = "kid-of-the-air"; *Naosg* = imitation of the 'drumming' sound (Harris, Lewis, and N. Uist).

IRISH—*Gabhar-reodhtha* = "goat-of-the-frost"; *Gabhar-oidhche* = "goat-of-the-night"; *Meannan-aeir* or *Meannan-aerdha* = "kid-of-the-air."

WELSH—*Gafur-wanwyn* = "goat-of-the-Spring"; "*Gafur-y-gors* = "goat-of-the-marshes"; *Dafad-y-gors* = "sheep-of-the-marshes."

*Tennyson "On a Mourner," line 9.

FRENCH—*Chèvre-volante* = "flying-goat"; *Chèvre-céleste* = "goat-of-the-sky."

GREAT RUSSIAN—*Barashek* or *Barachet* = "lamb" (diminutive of *baran* = sheep).

LEITHISH—*Pchrkona-kasa* = "thunder-he-goat"; *Pchrkona-ahsis* = "thunder-she-goat."

LITHUANIAN—*Perkuno-ozys* = "thunder-goat"; *Perkuno-ozelis* = "thunder-kid";
Dangans-ozys = "sky-goat"; *Dewo-ozys* = "God's-goat."

FINNISH—*Taiwaan-wuohi* = "sky-goat"; *Taiwaan-jaara* = "sky-ram." (?)

The majority of these names liken the sound to the *bleating* of a goat or the *baaing* of a lamb.

The Scandinavian names, on the other hand, compare the noise to the *neighing* of a horse.

Numerous legends have gathered round the Snipe, due to the drumming sound it makes.

In parts of Sweden, the belief still exists that originally the bird really was a horse, and has been miraculously changed into a Snipe.

"Once on a time," the story runs,* "a peasant had a horse, which for several days together was led by a servant to a distant pasture entirely destitute of water, without the animal having been previously allowed to drink. One fine afternoon both master and man proceeded to the field, which was well fenced, for the purpose of fetching home the horse; but on arriving there they found, to their great surprise, that he had vanished altogether. Whilst pondering on the matter, they, to their still greater wonderment, heard a neighing overhead, and the next instant saw the lost steed quietly drinking from a spring in an adjoining pasture. They hastened to secure the animal; but as soon as he had drunk his fill, and under their very eyes, he was transformed into a Snipe, and forthwith flew up in the air, where he was afterwards heard neighing as long as daylight lasted."

In compiling the above list, I am greatly indebted to several distinguished Professors for assistance.

For the Scandinavian words, to Prof. P. Vinogradoff; for the Slavonic words, to Prof. W. R. Morfill; for the Celtic words: Welsh, to Prof. J. Rhys, Principal of the Jesus College, Oxford; Irish, to Prof. T. K. Abbot, Trinity College, Dublin; Gaelic, to Rev. J. Sutherland, of Ledaig.

All observers are agreed on certain facts connected with this drumming noise.

1. That it is heard, speaking broadly, only in the *breeding* season, in this country, say, from March 20th to mid-July. I refer to exceptions at the end of this paper.
2. That it is heard only when the bird is on the *wing*, never when it is on the *ground*.†

* "Game birds and Wild Fowl of Sweden and Norway," Lloyd, p. 234.

† Hintz, "Naumannia," 1854, p. 290, who urged that the sound was produced vocally, asserted that the birds would bleat sometimes while perched upon trees.—EDITOR.

Snipe 'drumming'

3. That it is only during a certain part of the flight, namely, the downward stoop, that the sound is produced, and then when the feathers are held in certain definite positions.

I may make matters plainer if I attempt to describe this peculiar flight here.

The Snipe rises from the ground, and with bold sweeps, ascends obliquely till he reaches a considerable elevation, the wings being fully opened, and the tail closed as in ordinary flight.

Perhaps it utters its "jick-jack" note on the upward journey, perhaps it is silent—anyway, there is none of the vibratory "drumming" heard. The height the bird attains is very variable: sometimes he soars up till almost out of sight; at others, up to 40

FIG. 6.

or 50 feet only: but he must rise a considerable distance in order to produce the "drumming."

The Snipe having now reached the desired level, takes a sharp, downward stoop, making an angle of about 45° with the ground. As he turns his head down for the plunge, he spreads his tail to the uttermost, at the same time elevating the fan somewhat over his back (Fig. 6).

The wings are half closed, and the shoulder-joint is locked and held rigid. With the commencement of the downward stoop, the drumming sound is heard (allowing, of course, for the time the sound may take to travel to the observer): it grows louder and louder as the pace increases, reaches a maximum, and then begins to decrease again as the Snipe nears the end of the downward flight, and ceases suddenly, perhaps 50 feet from the ground, as the bird sharply turns its course, and goes off again on its ascending flight.

So you may watch a bird, sometimes for an hour or more at a stretch, continuing these bold aerial flights up and down over the marsh in all directions, but the sound is only heard during the *downward* pitch.

The action of the wings is very peculiar. They are, as I have said, half closed, or, at any rate, nothing like fully expanded, and the humerus is held fixed and rigid. But you will notice, when the bird happens to execute a "drumming" stoop within easy reach of accurate observation, that the distal parts of the wings are shivering with a tremulous vibratory movement, this movement being imparted by the muscles of the forearm and hand; that is, that all movement takes place from the elbow and below, while the arm remains fixed to the trunk.

Such is a cursory description of the "drumming" flight: the manner in which the sound is produced has been, and still remains, one of the most vexed questions in ornithology.

As long ago as 1856, Herr Meves, the curator of the Stockholm Museum, wrote an elaborate paper on the subject, which was translated by John Wolley, and published in the Proceedings of the Zoological Society for 1858 (p. 251 *et seq.*).

As recently as January 15th of the present year, P. H. Bahr read a paper "on the bleating or drumming of the Snipe" before the same society, confirming Meves's original observations, and extending his experiments to other members of the family.

In his paper, Herr Meves advanced the view that the sound originated through the current of air falling on the two outer feathers of the tail, and throwing them into vibration. According to him, the outer tail feathers were responsible for the drumming, and no other mechanism was called into play; neither the vocal organs nor the wings taking any part in the production.

In support of his theory, he made a number of ingenious experiments; he mounted one of the outside tail feathers, "the sonorous feathers," as he called them, on a fine wire, and this again on to a stick. By drawing this stick sharply through the air, he succeeded in reproducing the drumming sound with great exactitude.

Prior to Meves's paper, the drumming had been attributed by some* to a vocal sound, and by still more to a vibratory sound caused by the movements of the primary feathers of the *wing*. Among the supporters of the *wing* theory, were many distinguished naturalists, including Naumann, Macgillivray, Jardine, Saxby, Blyth, Hancock and Harting. These observers altogether refused to accept Meves's experiments as conclusive, and some of them have written very able papers in support of their own views.

We have now three groups of theorists:

(1) The vocal (only); (2) the tail (only); (3) the wing (only),

* *e.g.* Bechstein, "Naturgeschichte Deutch," vol. iv., p. 190; Hintz, *l.c.*; Zöppritz "Ornith, Centralblatt," Nov., 1880. Seeböhm, "British Birds," iii., p. 244, inclined towards the vocal theory, but did not commit himself to it. The Rev. H. H. Slater, "British Birds," illustrated by Frohawk, vol. v., p. 112, also supports the vocal theory.—EDITOR.

and to these a fourth may be added, who attribute the sound to a *combination* of the wing and tail.

To this fourth class I confess I belong myself; unkind critics may describe us as "sitting on the fence," ready to fall off on either side, and say "I told you so"—still, it seems to me, the most reasonable of the four.

1. Against the vocal theory there is an infinity of arguments, and very little can be urged in its favour, except the natural expectation that such a sound would proceed from the bird's throat. One would expect, if the sound were vocal, that it would occasionally be heard on the ground, or during the ascending flight, or at some other time than during the downward stoop. Such is not the case; and it is, to my mind, inconceivable that the bird should restrict its song to this tiny portion of its daily existence, or that the peculiar flight should have no relation to the sound.

There is, however, a much stronger argument against the vocal theory.

On rare occasions while the Snipe is on the downward stoop, and the drumming noise is heard, the "*jick-jack*" note may be heard from the same bird at the *same time*.

Why a Snipe should so rarely sing and drum at the same time, I don't know, but it is certain that it is most exceptional to hear the two sounds together. A drumming Snipe is, presumably, braced up for the effort—rigid and tense—with his whole mind set on the flight before him. To expect him to *sing* at such a moment, is very much on a par with expecting an athlete to burst into song as he tops the bar in the high jump, or comes up "the straight" in the quarter-mile race.

Still, rare as it is, Snipe do sometimes drum and sing at the same time, as I have myself had aural proof of this, and one such instance appears to me amply sufficient to quash the vocal theory.

2. The "pure tail" theory is much harder to disprove,* but it may be fairly pointed out that Meves's tail-feather experiments are not so perfectly conclusive as they would appear at first sight.

To bind the isolated feather on to a wire, and this again on to a stick, but feebly represents the same feather in its place in the living bird. To mount it with its outer side forward, and then produce a drumming by drawing the stick sharply through the air, does not prove that the bird itself makes the sound in the same way.

It is more than doubtful if the Snipe can, or does, set his outer feather forward:† and Meves himself admits that, in order to imitate

* "A. H. Evans ("Birds," 1899, 203) favours this theory, as also does W. P. Pyecraft ("Hist. of Birds," 1910, p. 170); E. Selous ("Bird Watching," 1901, p. 53) accepts Meves's experimental evidence as conclusive, although his own observations of the Snipe drumming lent support to the theory of the wings being the producers of the sound.—EDITOR.

† P. H. Bahr, in a very important and careful paper on "The 'Bleating' or 'Drumming' of the Snipe" (Proc. Zool. Soc., 1907, pp. 12-35), clearly establishes the fact that the outer tail feathers *are* extended at right angles to the long axis of the bird's body. His experimental anatomical researches confirm his views, which he supports with much sound argument. I have repeatedly verified this myself.—EDITOR.

the sound at all exactly, it is necessary to impart with the arm a shivering motion to the stick, as it is carried downwards through the air.

Stevenson, writing from personal observation, points out that snipe drum at times "with the least possible fall," and often a very considerable fall occurred without any drumming. The former of these statements is a strong point against the "pure tailers": the feather on the stick must be driven with great velocity through the air in order to produce the sound at all—certainly a greater velocity than the snipe makes use of in an average downward stoop. The drumming with very little fall, almost forces one to the conclusion that the noise is being produced by some other agency than the tail feathers alone.

The Snipe is not *flying* downwards: he is making no use of his wings as a means of direct downward progression, but is simply pitching groundwards by the force of gravity, maintaining a certain angle and a certain curve with the earth by means of the set of his tail and wings.

To produce the drumming, even a minimum of sound, from the mounted feather, you must drive it through the air at a much greater rate than the Snipe ever uses, or indeed is able to use, in his downward pitch, and, when all is said and done, you produce a sound infinitely less resonant than the natural drumming which can be heard at ten times the distance.

Both Hancock and Harting point out that other birds besides Snipe make a vibratory sound of an analogous character, especially instancing the Lapwing in the breeding season.

In this case of this latter bird, it is certain that the noise is produced by wings, and wings alone. The tail feathers are closed, and the two outer feathers are entirely unlike the "sonorous" feathers of the Snipe, and quite unfitted to produce any sound at all.

Finally, Hancock* refers to the *distance* at which the sound can be heard, and asks whether it is conceivable that the vibration of two small tail feathers can produce a sound audible at half-a-mile or more, when the bird itself is out of sight.

The *volume* of sound alone would seem to him sufficient ground for negating the "pure tail" theory.

3. Like the tail theory, the "pure wing" theory is exceedingly hard to disprove.

I believe myself that the wings are part-producers of the sound—the main agents if you choose—but there are more arguments than one against their being the *sole* originators of the sound.

While it is true that some other birds do make noises with their wings of a somewhat analogous character, in none of these is the sound produced exactly similar to the drumming of the Snipe: and the number of birds instanced, which do make any such sound, is comparatively small; whereas, one might expect, if wings were

* "Birds of Northumberland and Durham," vi., pp. 105-113.

the sole cause, that analogous noises would not be uncommon throughout the class. The poise of a hovering Kestrel, for example, motionless with rapidly vibrating wings, is unattended by any sound whatever that is audible to our ears.

As regards the primary quills themselves, I am not aware that any one, so far, by any experimental process has extracted the drumming noise from them, as has been done with the outside feathers of the Snipe's tail. That the isolated outside feathers can be caused to make the drumming noise has already been mentioned ; and I should have added that these particular feathers are peculiarly constructed—the shaft stiff and sabre-shaped, the rays of the web

FIG. 7

long and strongly bound together. No other bird (outside this family) appears to possess tail feathers of the same shape and structure.

The characteristic out-spreading of the tail in the drumming Snipe suggests most strongly that the tail has some relation to the sound, and is not merely expanded for the purpose of guiding the flight (Fig. 7).

4. Wing and Tail.—Everything I have said so far points, I think, to the sound being caused by the combined effect of wings and tail.* The rapidly beating wings, whether they themselves hum or not, throw a strong current of air onto the outermost feathers of the tail, and set them in vibration.

The position of the wings in relation to the tail is of importance ; the wings are half closed, and the tail fully expanded, and this is

* H. Gadthumer ("Naumannia," 1853, p. 411) urged that both wings and tail are factors in the sound production. Colonel Legge ("Birds of Ceylon," 1880, p. 1,219) considered that the sound is *primarily* caused by the rapid wing-beats, assisted by the downward rush, but that the wind driven by the wings across the tail-feathers (which are spread fan-wise, with the outer rectrices standing out at right angles to the central feather) produces a *secondary* sound. A. Thorburn, "British Birds," 1918, iv., p. 28) says that the sound is apparently caused by the vibration of the outer tail-feathers, though the wings may also be concerned. He gives a beautiful illustration of a "drumming" Snipe (pl. 65), which nearly resembles Bahr's figure. Another similar figure occurs in "The Home-life of some Marsh-birds," by E. L. Turner and P. H. Bahr, 1907, p. 23—EDITOR.

the only position in which the full current of air from the wings could be played upon the two outer feathers.

The angle at which the bird is descending is also of importance.

A Snipe is never heard to "drum" with a closed tail, a strong point in favour of the tail taking some part in the production of the sound. Nor is the Snipe ever heard to "drum" with fully-opened wings as in ordinary flight; for the movement of air caused by the wings is not then directed on to the tail, even if the latter be fully expanded, but *outside* it.

But "drumming" is heard with half closed wings and fully expanded tail, and it is a reasonable supposition that these latter positions are a necessity in the generation of the sound, each taking its respective share, the wings, perhaps, being the originators of the vibratory waves, and the tail the instrument whereby they are converted into sound.

I regret having been compelled to spend so much time over the sounds, vocal and otherwise, which a Snipe makes; but the "drumming" noise is so peculiar and so characteristic, that I felt justified in making an effort to explain the action of the bird during the "drumming" flight, and in discussing at some length the theories of the mechanism whereby the sound is produced.

Now for the Snipe and his life history. If you wish to study the Snipe, you must visit him in his *summer* quarters.

It is in the spring and summer that the snipe can be studied best.

In the winter you may shoot him, but you learn little or nothing of his ways; a wild "sceap" from the side of a ditch, a zig-zagging whirl of feathers, and you fire. If you kill, you have the satisfaction of adding him to your bag, or if you miss, you have the small consolation of watching his powerful flight as he betakes himself to some less disturbed spot. He flashes into sight and out of sight in a moment, and that is all you see of his habits or learn of his economy.

Very different is the Snipe in spring. Man appears then to have but little terror for him. His natural shyness has gone, fear is thrown to the winds, and you may watch the bird hour by hour from sunrise to sunset courting, flirting, and indulging in those wonderful musical flights from which so many of his provincial names have been derived.

We will suppose that it is the month of May, and that you have decided to make an early start for the snipe-marsh. Choose a bright, sunshiny morning, for all birds are at their best under favourable conditions of weather, and not least the Snipe. In cold, dull weather, in wind and rain, they are but little in evidence; most of them are squatting and silent on the ground, or skulking in the rough herbage, and you may spend the whole morning on the marsh and hardly hear or see a bird.

The dew, this morning, is hanging heavily on the marsh grasses

and foliage ; a cloudless sun is rising in the sky ; a distant clock is striking five, as you pass off the uplands and pause at a gate that leads into the rich expanse of flat marshes, which is your goal.

The air is full of musical sounds—two or three pairs of Lapwings are swooping close round your head, calling vociferously. These birds have their nests on the higher ground, which you have just left, and they are anxious to see you further removed from their home. So long as you remain within the danger zone, they will continue to flap round you with their wailing cry, and use every artifice they know of to decoy you further and further away. A Ringed-Plover has her eggs on this same rough upland, and the male joins with the Peewits in the combined effort to drive you out of their compound, flying uneasily to and fro, uttering his shrill piping whistle.

Above the lap of the waves on the shingly beach close by, you can hear the occasional harsh scream of a Lesser Tern, as he fishes along the shore for the small fry which are to form his breakfast.

A pair of Redshanks, warned by the clamour of the Plover, spring from a distant part of the marsh and make straight for the supposed danger. They, too, circle round your head, scolding and crying uneasily, until the whole marsh is echoing with their complaints. They are perhaps hardly as bold as the Peewits in their approach, and after much noisy inspection, appear to be more or less satisfied with your intentions, and depart, still loudly protesting. One you lose sight of in the distance ; but the other, still doubtful, settles on a gate post not far away, as if to the manner born. Here he stops on sentry go, uttering from time to time his resonant cry, and nodding backwards and forwards with sharp, jerky bows.

Wagtails, as yellow as the kingcups among which they are flirting, are everywhere around you ; Sedge-warblers are chattering in every clump of sedge or reed. Larks are trilling above your head, and Cuckoos calling in the neighbouring belts.

And there is yet one other musical sound which you hear—to my ear, the sweetest of them all—the *drumming of the Snipe*.

Half-a-mile away, on this still morning, as you came over the hill, you heard a faint dithering buzz, like a droning bumble-bee, and wondered what it was ; but here, on the fringe of the marsh, the sound has grown in volume, and you can now see from whence it proceeds. At no great distance, high in the air, flies a Snipe. He has just finished a downward stoop, and it was the drumming of that particular stoop that attracted your eye to him.

He is now soaring up again : then with a sudden change, he turns his course, and plunges headlong towards the earth, his wings half closed, his tail fully expanded, his body rigid and tense, every fibre strained to the course that is set before him.

The plunge is not vertical, but at an angle of 45° , or something less ; and even then it is not in a hard, straight line, but follows a graceful curve.

With the commencement of the downward flight, the drumming begins. After a moment's delay, for the sound to travel, the vibratory hum reaches your ears, seems to swell and shake, then to lessen and finally cease with an almost startling abruptness as the Snipe turns and recommences its upward flight.

So may you watch him, alternately falling and drumming, climbing and silent, until your patience comes to an end or until his energy is exhausted, and he drops down to the ground.

But he is merely one musician among many : far and near you hear the same weird drumming ; faint and tremulous, or loud and resonant, as the birds plunge in their aerial flights up and down the marsh land.

The drumming flight consists of two distinct phases : the upward climb, when, commonly speaking, no sound is heard, and the downward fall, when the drumming becomes audible ; the whole cycle occupying, on the average, eight to nine seconds.

I have made a good many observations on the point with a stop watch, and I found that the downward drum rarely lasted more than two seconds at the outside ; the interval taking about seven seconds. One bird I watched for over an hour, and he kept with extraordinary exactitude to these times, two for the drumming, and seven for the interval.

I was lucky enough in this observation to see a most remarkable aerial display, quite apart from the drumming.

The bird had been drumming regularly for perhaps half-an-hour, always at a great height, so that the bottom of the downward stoop must have been 70-80 feet from the ground. He had been keeping at nearly the same average level throughout the flight.

He was just finishing a downward stoop, fortunately fairly close to me, when he was joined by a second Snipe, which I took to be the female. Where the bird came from, I don't know, but I imagine that she had risen from the nest in compliment to the musical display of her husband.

The effect on the drumming Snipe was immediate and most strange. The bottom of his "stoop" had carried him to within, say, 80 feet of the ground ; he now slowly fell from that level to within 10 feet of the ground, the whole of the intervening distance being occupied by the most extraordinary acrobatic evolutions I have ever seen a bird go through in the air.

He first fully opened his wings, and raised them over his back with his legs extended, as though about to alight in mid-air. In this manner, he gently floated downwards ; then he turned over first on one side and then on the other, making his line of flight at right angles to the earth, resuming after each turn the old position of walking on the air.

The final exhibition surpassed anything that had gone before : when he was within 15 feet of the ground (and not more than 20 yards from where I was standing), he turned right over, so that his

breast was directed to the sky, and his back to the ground. He then made a sudden recovery, and flew upwards again to resume his drumming flight, while the other Snipe, who had been a silent, though, I hope, admiring spectator, separated from him, and dropped down again into a distant patch of rushes.

I watched the first bird for another half-an-hour, and he drummed continually, and was still drumming when I left, but he gave no further acrobatic display.

To return to the drumming. Sometimes the two phases of the cycle occupy less time—one-and-a-half seconds for the drumming to five for the interval. As far as my observations went, the *ratio* between the drumming and the interval was always about the same, namely 1-3 or a little more.

Tired at last of standing on the threshold, you walk into the precincts. The drumming is everywhere, to right, to left, over your head, and behind you. A bird on its downward stoop, passes within 30 or 40 feet of you, giving a perfect opportunity for noting the stiff body turned a little sideways, and the tremulous quiver of the half-closed wings.

On a notice-board close by, threatening trespassers with direst punishment, another Snipe is standing jerking its body backwards and forwards, much in the way of the Redshank, and monotonously calling "jick-jack"—"jick-jack." He appears to be quite as much at home on the sign-board as on the ground, despite the fact that his toes do not seem particularly well adapted for perching.

As if to show you, however, that he can rise to greater heights than mere sign-boards, he "jick-jacks" himself off the board, and commences to ascend, still monotonously calling.

Perhaps he has already done his aerial turn and is tired: anyway, he does not for the moment join the drumming division, but flies in the direction of a narrow belt of trees bordering the marsh on the west. Here is a tall poplar, killed like most of the larger timber by the inrush of seawater in 1897.

Selecting a small cross branch within a few feet of the top, he complacently settles on it, and resumes his quaint bows and bi-syllabic song.

This particular tree is 70 feet high or more, but the Snipe is as well content with his present lofty position, as he was with the notice-board or with the ground itself.

The so-called arboreal habits of the Snipe were hotly disputed at one time, but in these days, the unbelievers are few.*

Many Waders whose feet are constructed on similar lines to those of the Snipe are exceedingly fond of perching on some elevated position—a habit which is entirely confined to the breeding season.

Redshanks, for instance, are partial to perching on bar-ways, gate-posts and even the sails of a windmill at rest. On the Thorpe

* Stevenson, "Birds of Norfolk," 1890, ii., p. 329, asserts definitely that Snipe perch on trees, but that this habit is confined to the breeding-season.—EDITOR.

Mere I have often seen a Redshank perched on telegraph wires, keeping a secure foothold without difficulty.

So it is with the Snipe, and more so ; in these particular marshes I have seen them, not once or twice, but continually, perch on trees, and those selected are always the tallest in the neighbourhood.

But, and it is an important *but*, they always select a bare, leafless tree, and best of all, I think, they like one that is dead and sapless.

Ten years ago there were hardly any dead trees near the marsh but there was one that had been struck by lightning. All the top had been killed, while the lower part made a feeble effort to put forth a few stunted branches, and in those days this was the only tree I ever saw the Snipe perch on.

When the sea broke through, the trees were killed by scores ; and now you may see a dozen Snipe perching on one or other of them, in the course of an hour's observation.

The object to be gained, the instinct which induces them to choose these elevated positions, is not far to seek.

The Passerine bird seeks the shelter in the leafy tree for safety and concealment, to see and not be seen. The Snipe selects the bare lofty tree for exactly converse reasons. He is on outpost duty, and his business is to see all that can be seen ; to obtain a better view of the marsh and surroundings where his nest lies, and to give the earliest warning of any danger threatening. He is not concerned with his own safety, which lies in flight, not in concealment.

Snipe, however, at this season of the year seem to change their character, and in a large measure to lose their natural fear of man. Their thoughts are bent on courtship, and little they care for anything else when the love-fever is at its height.

The Hare is naturally a timid and fearful animal, but he throws most of his fear away in the spring ; and you may see, as you stand on a piece of bare, open common, two bucks in pursuit of a doe, apparently blind to everything but the object they have in view.

It may be, if you remain motionless, they will pursue the doe right up to your feet, and round and round in circles about you. Even if you call out with the deliberate object of scaring them, they only alter their course a little, move 20 or 30 yards further away and continue their amatory dallyings.

They are blind and deaf to everything but the one all-powerful instinct which drives them towards the reproduction of their kind.

And so it is with the Snipe. Here is an extract from my diary, 7th April, 1892. "Thorpe Fen. Many Snipe drumming and "uttering the jick-jack note. Three, presumably two males and a "female, suddenly pitched down quite close to my feet on an "absolutely bare patch of ground. They were perfectly careless "of my presence, though they must have seen me unless they were "blind. The males, or the two birds I supposed to be males, were "amorously displaying themselves before the female ; she, on her

“part, was ostentatiously indifferent as they strutted up and down before her with drooping wings and outspread tails. This continued for perhaps half a minute ; and then the lady, becoming bored, I suppose, with their advances, rose and flew another 80 yards into the Fen, hotly pursued by both the males, and all three dropped into some rushy cover, where I could no longer see them.”

Fear had no part in the actions of these birds ; they settled within a few yards of me on the bare open ground, so that I could almost knock them over with the walking stick I had in my hand : and for half-a-minute they paid no more attention to me than if I had been a gate-post. When at last they did fly off, it was still clear that fear was not the exciting cause, for they dropped again on the marsh not more than a couple of gun shots away.

To return, however, to our expedition on the Snipe marsh. Most of the birds we have seen or heard so far are undoubtedly males. For an hour or so after sunrise, the females would have left their nests for a few short aerial flights, but now they are all down on their eggs or tending their downy chicks.

Extend your walk a little further, and you pass from the marsh meadows, which are standing for hay, on to some rougher marshes covered with a thick crop of rushes. It is here you will find the nest or the nestlings.

The nest is of the simplest construction, rather more elaborate than that of the Lapwing, and that is about as much as can be said of it.

A shallow depression scraped in the ground, often placed in the cut stumps of a clump of rushes that was mown the previous autumn, and sparsely lined with a few blades of dead grass or other coarse vegetation that lies near at hand. That is a description that applies fairly well to the majority of nests. Approaching it from one or other side, you will almost always find a narrow, beaten track or run, two or three yards in length, by which the female approaches the nest. She never drops directly on to her eggs, nor ever flies directly off them, even when sitting hard, if she has any warning of an approaching danger. She alights on the ground six feet or more away, and steals up to the nest by this narrow track, and, conversely, when leaving, she quietly sneaks down this pathway before she takes wing. She always appears to follow the same course, day after day, going or coming, and the result of these constant journeyings is to wear a distinct track which is always plainly visible to anyone who troubles to look for it, before incubation has proceeded very long.

I have seen, on occasions, Snipe nests placed in the middle of a growing clump of rushes and very artfully concealed—the nest completely hidden from view, with an entrance at one side, over which the rushes form a natural curtain which the bird adjusts each time she approaches or leaves the nest. Nests of this kind are often made, or, perhaps, I should say, such sites are chosen, by the Redshank, but they are exceptional with Snipe.

The eggs are four in number, pyriform, and arranged in the nest with their small ends pointing inwards. There is rather a wide variation in colour in different clutches, and even in the individual eggs forming a single clutch, though these usually resemble each other closely.

The eggs are very *large* for the size of the bird; the average weight of a Snipe at the time of the year may be taken at 4 ounces. A single egg weighs $\frac{1}{3}$ oz. or the least fraction over, the whole clutch weighing, say, $2\frac{1}{8}$ – $2\frac{1}{4}$ oz.*

The four eggs are laid as a rule in five or six days, and as they represent fully half the body weight of the bird, the strain of ovulation in the case of the Snipe must be very great.

It is difficult for the bird to cover these four large eggs satisfactorily during the period of incubation, and it is with a view to their occupying as little space as possible, that they are all arranged with their small ends pointing to the centre, a habit which prevails with all the Limicoline birds.

Incubation lasts 19 or $19\frac{1}{2}$ days, I think, on the average; certainly longer than most authors are inclined to allow.

In an *incubator*, I found that two single eggs from two separate nests (by single, I mean that no other egg had been laid in the nest up to the time I took them) hatched out in exactly 19 days 12 hours.

In a third instance, I put three eggs (one clutch) into the incubator on April 16th p.m., and these hatched on May 4th a.m., giving $17\frac{1}{2}$ days. But I am inclined to suppose in the latter case that three might have been the full clutch and that they were partially incubated naturally before I started them artificially.

Four is, of course, the ordinary full clutch, but the Plover-like birds often lay short, after they have been robbed, and, on occasion, may possibly lay less than the full complement of four at the first laying.

Accepting the incubator time as $19\frac{1}{2}$ days, I should take it as a fair inference that any variation in the time of natural incubation would be in the direction of lengthening that period. For natural incubation, however superior it may be in other ways, can hardly be so perfect and regular as regards *temperature* as the mechanical substitute.

Probably, the Snipe hatches its eggs sometime during the 20th day.

The nestling Snipe is one of the prettiest objects imaginable when newly hatched—a ball of brown fluff of varying shades, from red-brown to a brown so dark as to be almost black. The down feathers are tipped with white, as if lightly sprinkled with snow.

The bill is very short, as compared with that of an adult bird, being less than two-thirds the length of the head, whereas the bill

* See a short paper in the *Ibis* (Jan. 1909) ix. series, vol. iii., p. 137, "On the Decrease in Weight of Bird's Eggs during Incubation," the upshot of which goes to show that there is a loss of 14 per cent. to 15 per cent. in weight between the fresh egg and that on the point of hatching.

of the adult is considerably more than twice the length of the head. (*Chick*—Head, $\frac{6}{8}$ in.; bill, $\frac{4}{8}$ in.; *Adult*—Head, $\frac{11}{8}$ in.; bill, $\frac{26}{8}$ in.) The colour of the nestling down is almost perfectly protective among the dead brown and decaying herbage where they nestle. They can run as soon as they are out of the shell—or, perhaps I should say, stagger unsteadily on their legs; they cannot run like a gallinaceous chick, and seek safety, when danger threatens, by squatting silent and motionless on the rush-strewn ground.

One other small point in the economy of the Snipe; the adult bird on the nest is protectively coloured; so are the eggs, and so are the nestlings; but there is a moment when protection fails, and that is when the eggs are *hatching*.

I have often watched a nest of Snipe eggs hatching, and have wondered at the length of time that nature forces the chick to spend in the shell after the eggs are fairly sprung. I do not think that they ever chip their way out under 24 hours—it often takes them 36 hours—and, in exceptional cases, I have known a chick over 48 hours in clearing the shell. What the object of the long and exhausting delay may be I do not know; possibly it may be of service in hardening the chick off before he steps out into the world.

In a matter of this kind, it is not fair to take a mechanical incubator as a guide; the artificial surroundings may easily result in the development of a chick less robust than one hatched by natural means, and, therefore, physically less fit to hammer his way out of the calcareous envelope. But an incubator does show the prolonged retention in the shell very markedly.

Speaking of natural incubation only, one finds this delay is very common with many of the Plover-like birds.

It is certain, I think, that the parents offer no assistance to the still-unhatched chicks. In the case of most of the Limicoline birds, the shape and structure of their bills render it impossible that they could be used with any success for enlarging the opening in the egg shell. Take, for example, the long, soft, flexible bill of the Snipe, or the still longer, curved bill of the Curlew.

Even a game bird, like the Partridge, which has a bill constructed on reasonably convenient lines for chipping purposes, never, as far as I know, uses it to help the chick out. If the chick cannot cut its way out, it must die; that seems to be the rule.

The embryos, however—this is true of all birds—are furnished with a special instrument for effecting their release from the egg shell, the so-called "*egg-tooth*." This "*egg-tooth*" consists of a pointed, whitish protuberance at the tip of the upper bill, formed of calcareous salts deposited between the layers of the skin. This is cast off after hatching, leaving no sign of its former presence.

I imagine that, in many cases, where the shell is unusually thick and hard, the "*egg-tooth*" is lost before the shell is efficiently opened, and the chick is then deprived of the chief instrument for securing its release.

When a Snipe's eggs are hatching, it is, therefore, no uncommon thing to find a considerable difference in time between the hatching of the four eggs ; three may hatch out during the course of one day, and the remaining one not until 18-24 hours later.

If you watch such a nest you will see that as each chick hatches, the broken fragments of shell are removed at once, and removed to a considerable distance by the parent bird. For the broken egg-shell, with its glistening white inner surface and the remains of the blood-stained membranes, is now very noticeable among the surroundings, and is a source of danger. The chicks that are hatched, leave the nest, and there remains in it only the one unhatched egg with its inmate assiduously hammering away at the confining walls.

The point I want especially to draw attention to is the removal of the tell-tale fragments of broken shell, which would almost infallibly catch the eye of any passer by, if they were left in or about the nest.

Snipe are rather early breeders. Eggs have been found in the last days of March ; and I have myself taken a full clutch by the 10th April. The majority breed in the latter half of that month. Fresh eggs may be found much later than this, and are not uncommon even in June. These late nests are, no doubt, second laying, and frequently consist of three instead of four to the clutch.

I do not believe, in favourable circumstances, that a Snipe does raise two broods in the year. If she hatches and rears her first brood in safety, she does not lay again that season. But the percentage of accidents of one kind and another to the first nests is very high.

On the wet commons, such as the Thorpe Fen, they are continually robbed by people looking for Plovers' eggs ; they are sometimes frosted, and often spoilt by rooks, late-staying hoodie-crows or other vermin. In some seasons, unexpected floods drown them out in numbers. In such cases, a second nest is invariably made, and it is not a very uncommon thing to shoot a Snipe with the remains of the nestling down still adhering to the feathers, in the second or third week in August.

Their food consists of insects, water-snails of various kinds, and worms, especially the small red worm abounding in the muddy ooze where they love to feed ; a quantity of grit is also found in their stomachs, ingested for purposes of digestion.*

In summer, the insect diet rather preponderates, and this is probably the reason why the Snipe shot in the early part of the shooting season, are such poor-flavoured birds as compared with the winter Snipe, whose staple diet has been worms. It is a fact that an August Snipe, like an August Woodcock, is a wretched bird for the table ; that this is a question of *diet* and not of

* Gilbert White (letter xxix) remarks on the difficulty of ascertaining the diet of Snipe and Woodcock : "All that I could ever find was a soft mucus, among which lay many pellucid small gravels."

age, is proved by the fact that old and young alike are equally unpalatable.

A Snipe's bill is one of the most striking examples of Nature fitting a special organ for a special purpose. It is very long for the size of the bird—2.5 to 3 inches; the upper half of the beak (maxillary) is larger than the lower half (mandibular) and ends in a terminal knob. It is grooved on its under surface about $\frac{1}{6}$ inch from the tip to receive the lower half. The bill as a whole is soft and pliable, especially its terminal portion, the extreme tip being hard. Its *length* shows that it is intended for use at some depth below the surface, and its *pliability* that the material in which it is employed must be soft.

But the length and pliability are not in themselves sufficient. As the search for food has to be carried on out of sight, it is necessary to supply another sense, that of *touch*; and, as a matter of fact, a Snipe's or a Woodcock's bill is exquisitely sensitive.

If you take a freshly-killed Snipe in your hands, the terminal one-third of the bill appears rather bulbous and swollen, but perfectly

FIG. 8.

smooth (Fig. 8). In a few days, the bill dries and shrinks, and you will then see that its distal one-third becomes pitted with a number of minute depressions. Macerate the bill in water, and you may easily remove the outer skin, when the meaning of those depressions is revealed. The bill is honeycombed with an infinity of hexagonal cells, in which the terminal filaments of a sensory nerve ramify, before completing their course in the sensory or tactile corpuscles which are found in the overlying skin. Any ordinary lens will show these cells quite plainly.* These sensory fibres are derived from the superior (or ophthalmic) division of the fifth cranial nerve, the great sensory nerve of the face.

We ourselves are innervated in the same way, by the same sensory nerve, which serves the eyes, eyelids, forehead and nose. Only in the Snipe family the nasal branches are proportionately much more developed than in ourselves, this being a vital necessity in their economy.

Another morphological point of importance is the position of the eyes. If you examine the skull of a Woodcock or Snipe, the former especially, you will notice that the orbital cavities are set

* A figure showing the tip of the Snipe's bill and the cellular, hexagonal pits, was published in Yarrell's 'British Birds,' 4th edition, vol. iii., p. 346.—EDITOR.

remarkably far back in the cranium as compared with other birds. It is this position of the eyes, more than anything else, which gives the Woodcock his strikingly peculiar appearance.

The large round eyes are set at the back and upper corner of the head, directly above the ears, instead of in front of them, as in most birds. Where is the gain in such an arrangement?

Watch a bird feeding and you will see. The bill is driven into the soft mud, and buried right up to the frontal feathers. If the eyes were placed in the position in which they are found in the majority of the class, they would stand the risk of being buried too; at any rate, they would cease to be of efficient use for the purposes of sight.

A Snipe, with its eyes placed as they are, can get the very last fraction out of its bill, as it struggles for a worm half-an-inch further down in the mud, and yet see all that is going on round it, and be ready for any emergency that the fates may have in store.

The Snipe, except in the breeding season, is a very shy bird, and feeds mostly at night; it is not often, therefore, that one has an opportunity of observing one so engaged.

This, I hope, may be sufficient excuse for the following note on a Snipe I watched in the early autumn of 1892.

I had gone down to the Thorpe Mere before daylight, mainly with the object of securing some specimens of the Wood Sandpiper, which were numerous at the time, but very wild.

I met my gunner, whom I shall call A, at his fishing hut on the beach, and after consultation, we decided to try "driving" the Sandpipers as soon as there was enough light to shoot by. He was to flush the birds from the marsh, which we knew they habitually "used," while I was to lie up in some rushes near a muddy splash, for which the birds generally made when disturbed. "A" had a longish tramp round to outflank the Sandpipers, and I reached my position long before he was ready to begin the drive, so I proceeded to lie down in some thick rushes which afforded excellent cover, and were within easy shot of the splash.

Before I had been there long, I heard a sudden whizz in the air, and a Snipe dropped down on to the mud within eight or ten yards of me.

Entirely unconscious of my proximity, he started feeding unconcernedly at the edge of the water. His movements were slow and stately as he methodically probed the mud with his long bill, in marked contrast to the nervous, jerky style of the feeding Sandpiper. Sometimes he would bury the bill only half its length, at others plunge it into the ooze right up to the frontal feathers, the bill slanting slightly away from him, so that it made an angle of 75° or 80° with the ground.

Now and again he would withdraw the bill quickly, when, I supposed, he had found nothing. On other occasions, he would thrust the bill well into the mud, and hold it motionless for a second

or two—then push it in a little further with a powerful kick of his feet, as though there was something just out of his reach.

He found food, I imagine, in these latter instances; seized and swallowed it without removing his bill from the mud in which it was imbedded. At any rate, he never brought anything up to the surface and ate it; any food he obtained must have been ingested with his bill buried deep in the mud.

For quite ten minutes I watched him undisturbed, when suddenly he stopped feeding, as he caught the distant sound of "A's" steps returning from what had proved to be a useless errand.

The Snipe drew himself up to his full height, appeared to listen intently for a moment, and then hurriedly *squatted*, drawing in his neck and beak, and making himself as small as possible. He seemed to be actually resting on his breast on the mud, his legs drawn under him. Thus he remained absolutely still and motionless as the steps drew nearer, with no sign of life about him except his shining black eye.

When at last "A" had got within a few yards of me, the Snipe suddenly sprang up, as though fired out of a catapult, and made off with a nerve-shattering *sceap, sceap*.

On another occasion (Sept. 10th, 1892), this time about eleven in the morning, I watched a Snipe on the edge of a splash near the N.W. corner of the wall (Thorpe Mere).

The bird was not more than 60 yards away, and both "A" and I spent a considerable time looking at him through a telescope.

He was not engaged in feeding, but squatted right down, like the bird I have just described, seemingly sitting on his breast. His bill was tucked away in his scapular feathers, and to all outward appearance he was fast asleep; but any movements on our part caused him to open the eye nearest to us. After satisfying himself that all was well, and that we had no evil intentions, he would close it again, and resume his slumbers; but as "A" remarked, "he did not sleep very sound."

Snipe probably spend the greater part of the day in sleeping, except, of course, in the breeding season; but, as the above note shows, they literally sleep with one eye open, so that it is almost impossible to come upon them unawares.

Their tactile sense, we have seen, is very highly developed; their sight must be very perfect; so is their hearing. In one sense alone do they appear deficient, that of *smell*.

In the case of the Snipe which I watched feeding just after daylight, I had a smouldering pipe in my mouth when the bird dropped on to the mud close by, and, as I was afraid of disturbing it, if I made the slightest movement, I kept the pipe in my mouth, and let it go out there.

A deer will scent a human being down wind miles away, but my Snipe not only paid no attention to me, but disregarded as well the strong and pungent smell of the tobacco I was smoking. The sense

of *smell* as we understand it—as it is found in the dog, in deer, or many other animals—appears to be wanting in birds.

Geese, the hardest of all fowl to get on terms with, can be stalked as easily *down* as *up* wind; except that any *noise* you make is more easily conveyed down wind.

If they *hear* you, or if they *see* you, they are off in a moment, but I believe you might fry a mess of onions within ten yards of them, provided they did not *hear* the onions spitting in the pan.

It is commonly said in books that the Snipe is a resident species in the British Islands, the number being largely increased in winter by alien immigrants. This statement is more than doubtful. It is true that Snipe are always with us at any season of the year. If that is what is meant by "resident," then it may be accepted.

But if by "resident" the authors mean that birds that breed here stop throughout the winter, then I am in entire disagreement with them.

Many branches of ornithology are as yet imperfectly understood, foremost among them being *migration*. Excellent work has been done in the last decade, but many more facts are required before we can hope to understand the rules which govern the actions of the migrating birds.

It is more facts we want, and less theory. Here is one quotation from a well-known writer, brimful of unsubstantiated theory, and not in the least in accord with facts, so far as our evidence goes.

"The rule," he says, "amongst regular migrants is unquestionably that wherever the breeding-range overlaps the winter-range, the birds in the overlapping districts are residents; those breeding further north only passing through the intervening district on migration to winter further South."

Such facts as we have are in direct contradiction of this so-called "rule."

Take the Woodcock for example. In 1871, Mr. Monk of Lewis, carefully collected statistics of the number of Woodcock breeding in Sussex, and satisfied himself, after a most searching inquiry, that not less than 150 nests might be found in any average season in the eastern division of that county alone.

One hundred and fifty nests would represent 300 old birds, and 600 young birds, if accidents of all kinds were avoided, making a grand total of 900 Woodcock. Take 30 per cent. off for disaster of one sort and another, and we still have 630 left—say, in round figures, 600 birds in one part of the county alone during the early summer.

Where then are those 600 birds when the shooting season opens? In Sussex, a great many of the small coverts and shaws are shot in the first half of October, from the 1st onwards, and yet a "Cock" is hardly ever seen then, though they become plentiful again as November comes in.

What is the explanation of these facts? It seems clear enough.

The breeding birds have completed their moult and left for the South with their home-reared families long before, and the rush of foreign migrants has not yet set in.

As to *Snipe*, I have some facts of my own. It is not a very difficult matter to get a fairly accurate idea of the number of Snipe breeding on a limited acreage of ground, such as the marshes I have been describing, more especially if wide areas of marsh are separated from each other by intervening high land, as is the case with us.

The "drumming" habit of the Snipe makes it easy to get a very good idea of the number of nests. For, if a Snipe is breeding, he will drum, and if he drums, he can be heard and seen, and the number can be counted.

It will be found, under equal conditions of weather, and the same length of time being spent in watching, that a series of observations will yield about the same result.

Whether you find the nest or not is a matter of no great consequence.

On *this* group of marshes, seven or eight Snipe are generally to be heard: on *that* ten—and so on. For the "drumming" Snipe, though he covers a considerable area of ground in his flight, takes the same course day after day over the same marshes, and, probably, is never out of hearing of his mate on the nest.

Checking one day's observation with another, you will be surprised to find how close the different reckonings are; and, I think, owing to this peculiar habit, a correct estimate of the number of Snipe breeding on any definite area of ground is far easier than is the case with most other birds.

On our marshland, in round numbers, I estimate the number of nests at 100. (Thorpe Fen, 10; Leiston Abbey, 35-40; Sizewell, 15-20; Scotts Hall, 30-35.)

This would give us about 200 old birds and 400 young, making a total of 600. Allow 30 per cent. for accidents and wastage of one sort or another, we still have 420 or, say, 400 birds on the ground in early summer.

Walk these marshes carefully in the first half of July, and you will see them in great quantities: in the second half of July they are still there, but they are not so numerous; by the end of the first week in August, there are only comparatively few stragglers left; and for the rest of that month, and throughout September, it is as much as you can do to secure half-a-dozen Snipe in a whole day's tramp.

Towards the end of October, in November and December, Snipe appear again in some numbers, these being foreign migrants. But in the second half of August, and in September, hardly one is to be found.

Where are the original 400 Snipe then, if the breeders are resident birds?

Those who hold that the home-breeding Woodcock remain with

us through summer and winter, admit that he is seldom *seen* in August and September ; but he is then in full moult, they say, and lying in the closest retirement in the most remote patches of bracken or other cover.

I disagree with this view for many reasons which I need not enter into now ; but it can hardly be applied to the Snipe. For, whether they have moulted, or whether they are in moult, the marshes remain their only possible home. The food is there, and the cover is there. They cannot be supposed to retire to some silent fastness, some inaccessible haunt where the footsteps of man are never heard ; for, to be plain, such spots do not exist in the rich agricultural counties of East Anglia.

However much Snipe may wish for concealment, and however closely they may lie, if they are on the marshes at all, they can be found, moulting or otherwise.

That is merely a matter of time, attention and the assistance of sufficiently good men and dogs. On this 1,000 acres of marshland, I would guarantee to put up 75 per cent. to 80 per cent. of the total number of birds on the ground, on any day in the year, if I had twelve hours' daylight to work by.

As a matter of fact, I have for many years spent much time on these marshes, and tramped them thoroughly during August and September. The conclusion reached has always been the same ; Snipe are very plentiful in July, scarce in August, while in September the numbers are reduced almost to vanishing point.

It is certain that the great bulk of birds, at any rate with us, breed, rear their families and then leave. From all the information I have been able to obtain from neighbouring grounds, the same statement holds good.

The particular Snipe that breed with us are at the extremity of their Northern limit, and leisurely pass South at the conclusion of the breeding season, with their families ; just as the Snipe breeding in Scandinavia gradually work their way to our shores and winter there, unless driven further South by stress of weather. Our bird migrates no more and no less, in my opinion, than the more northerly breeding Snipe.

If we must have " rules," then I would say that our Snipe do certainly and regularly migrate.

Like all rules, it has its exceptions, and, no doubt, from one cause or another, *e.g.*, late-hatched birds, delayed moulting, weakness or injury, a minority do not leave our shores at the same time as the main body, possibly do not leave at all.

But these are a mere fraction of the birds bred in this country, and in no way controvert the general question of migration.

Regarding the Snipe of late autumn and winter—the sportsman's Snipe—I have not much to say of general interest. They pass out of the naturalist's diary and into the game-book.

If one writes of them now, it is rather to record " bags " that

have been made, or to discuss how the spoils should be treated by the *chef*; whether No. 8 or No. 7 is the better sized shot to use, or whether it is wiser to approach a Snipe down or up wind.

Questions in the highest degree controversial, and of perennial interest in the smoking-room after dinner, but hardly pertaining to my present paper.

There are, however, just a few points I should like to notice. As October wanes, the Snipe-grounds begin to fill up again, their numbers varying unaccountably from day to day with the temperature or wind or other atmospheric changes, for reasons which often enough we are quite unable to appreciate. One day you may obtain five or six couple without much labour, and the following day hardly see one, though you walk all day.

Snipe are at their best after a little frost. They generally lie better, fly better, and certainly *eat* better. Prolonged frost, of course, seals up the fens and ditches where they feed. In such circumstances, a good many leave the district and pass on to some less rigorous climate.

Those that remain congregate about any open water that is left—land springs, sewage-ditches and such-like spots where food is still procurable. If no such feeding-places are available, and if they have not left the country, they suffer exceedingly, often becoming a mere bag of bones, and ultimately perishing miserably unless the frost gives out.

The Snipe is a most voracious eater, and there is no bird that puts on weight so fast when food is plentiful.

Conversely, there is no bird that feels the pinch of starvation more, or loses condition faster than a Snipe under opposite conditions.

This last winter (1906), after a sharp spell of frost, almost all our Snipe-waters were frozen up; but there were two short ditches on one marsh, which received the outflow from a small and very elementary sewage-farm higher up and off our ground. The water in these ditches never freezes, partly by reason of its impurity, and partly because it is maintained at a somewhat higher temperature.

The combined length of these two ditches would not exceed 150 yards, but all the Snipe in the neighbourhood seem to gather there during a hard frost.

In open weather, it is a rare event to meet with a single bird in these ditches.

On the morning of December 27th in the height of the cold weather then prevailing, I walked round these ditches, and in 20 minutes or less I bagged four couples. I missed at least as many more, for the banks were thickly bordered on both sides with willows, and the rising Snipe never failed to put a thick trunk between themselves and the gun at the earliest possible moment.

Besides the *missed* and the *slain*, probably another twenty birds rose from the ditch out of shot.

Later in the day, I came back to the same marsh, and the Snipe were there again, and nearly as numerous as in the morning. All that I shot were in first-rate condition, showing clearly enough that hard weather is in itself not a source of injury to the Snipe, provided only they can get food. If the food is there, however severe the cold and low temperature, Snipe will exist without difficulty and even put on weight.

Snipe are most commonly flushed singly, more rarely in twos and threes; but you may on occasion meet with them in large wisps, and this most generally occurs in wet, stormy weather with a moderately high temperature. Half a gale from the S.W. with heavy rain often causes them to flock in this way. They are then exceedingly wild and unapproachable, as far as my experience goes, and any attempt at shooting on such a day commonly results in a very light bag.

The largest number of Snipe I ever saw together was towards the end of October, 1900, on the Thorpe Fen. The weather was mild at the time, with a fairly strong S.W. wind and rain. As I stepped on to the Fen, and before I had fired a shot, a flock of at least 50 rose from the bare grass towards the S.E. corner, "sceaping" wildly and circling high up in the air. After one or two turns over the Fen, they all flew off in the direction of the Aldborough River, more than two miles off at its nearest point. The alarm they raised caused four or five more flocks to get up from the same spot—flocks consisting of six to eighteen—and these, too, with much commotion, joined the main body and made off in the same direction.

When I subsequently walked over the Fen I only got three Snipe, and I believe I shot all I flushed.

I think these particular birds were migrants just arrived, but that was a mere chance. The flocking was due to the atmospheric conditions, and not to the fact of their being foreigners newly-arrived.

There is one other peculiar habit which Snipe have in the winter. They feed by night and sleep or rest by day; but at dusk they always take an aerial excursion before settling down to the serious business of the night. These flights last for some time—perhaps half an hour—when every Snipe on the marsh seems to be on the wing at once, their calls sounding in every direction. With a full moon, these flights are continued somewhat longer than on a dark night, but the hour of rising is curiously regular and certain.

When standing on the marshes for duck-fighting, as the dusk comes on, on a winter's evening, one hears night after night the same sequence of sounds. First, the Partridges "chissicking" their last song as they settle down for the night; a little later, the wail of the Lapwings as they come in from the uplands, where they have been feeding all day, to roost on the marsh at night. Later still, when both these are silent, and there is hardly any light left, the Snipe

rise up in every direction and begin "sceaping" lustily; and, last of all, you hear what you came out for, the whistling noise of Ducks' wings as the first flock comes in from the sea.

I do not know if the Snipe indulges in the same evolutions again in the grey of the morning. I am inclined to think not, but my opportunities for observation have been far fewer.

In the morning, Ducks are flying from the marsh to the sea; and the nearer to the sea the shooter can post himself the better. Consequently, we generally "flight" under the sea walls, and rather off the main Snipe-ground. I do not remember ever hearing them call unless they were disturbed, or seeing them perform a voluntary aerial flight at day-break.

When speaking of the "drumming" of the Snipe at the beginning of this paper, I said that the sound was heard in the breeding season, and *then only*. I gave as approximate dates for this country, March 20th to beginning of July. That it is a sound belonging to the breeding season, there can be no possible doubt; at the same time it is not strictly accurate to say that it is never heard outside the dates I have given.

I once heard a Woodcock utter its tremulous croak in some woods in Argyllshire on December 4th (1891), a cry which essentially belongs to the season of courtship; with that one exception, I never heard the note except in the breeding season. Many birds confine their song entirely to the breeding season, and, leaving their call or alarm note out of consideration, are silent for the rest of the year. Yet, on rare occasions one of these will burst into song at some unusual time.

And one may suppose that something—some recollection of the days that are passed, and the promise of the spring to come—forces the song out of him as it does in the nesting time.

So it is with the Snipe. On rare, very rare occasions, the Snipe may "drum" out of the usual season.

Stevenson,* quoting Mr. Blofeld of Hoveton as his authority, states that this gentleman "once heard a snipe drumming in the "depth of winter, and on drawing the attention of his marshman, "William Hewitt, to what he considered a very strange occurrence, "the old man assured him that he had remarked the same thing "on several occasions."

My own notes record two rather exceptional dates on which I heard Snipe "drumming."

On August 1st (1891) on the Thorpe Fen, I heard a Snipe continually "drumming" backwards and forwards over the marsh, and often passing close to my head. The hour was about noon.

I have never before nor since heard a Snipe "drum" so late in the season; but this instance can probably be readily explained by the assumption of a very *late* nest—possibly the first

* "Birds of Norfolk," 1870, ii., p. 316.

and second has been taken, for the Fen suffers very severely from eggers.*

The other occasion was more noteworthy, and the date was February 28th (1893). I had just returned from a fowling cruise on the Aldborough river (Feb. 2nd to 27th). During that period, I had "flighted" night after night on the saltings and sea-walls of the river. I had seen and heard many Snipe on most nights as the dusk deepened into dark; they behaved as Snipe always do in the winter, "sceaping" loudly for some twenty minutes while the half-light lasted, but making no other noise of any kind. The last night's "fighting," which I had on the river was on February 25th; I saw several Snipe, and they "sceaped" as usual, without making other sound.

My river trip ended on February 26th. On the 28th, I walked over to Scotts Hall (the northern extremity of the ground) in the late afternoon, and reached the centre of the marshes at dusk. Being anxious to see or hear what birds were about, I decided to wait for the Duck flight.

I saw six or eight pair of Snipe while standing in the position I had selected—probably there were more that I could not see in the insufficient light. *Every one* of these birds was *drumming* as though April had come in, and calling the "jick-jack" note of spring.

During the time while I listened—and I did not leave the marsh before 7 o'clock—I never heard a single "sceap, sceap." They were still "drumming" and singing when I walked off the marsh, and seemed like keeping it up till daylight. I should add, however, that it was a very light night, with the moon nearly at the full.

This is the earliest date on which I have myself heard birds "drumming"; it is especially noteworthy that all through this month not one Snipe was heard "drumming" on the river, though I was out practically every night.

I believe these particular "drumming" Snipe were newly-arrived migrants—the first of our home-breeding birds to return to their summer haunts after the winter's absence; and that their "drumming" and singing were the outward expression of their

*The following additional notes from field diaries were added after the lecture had been delivered:—

1907, August 5th, 6 a.m., Scotts Hall, Suffolk:

"A Snipe was 'drumming' high up in the air (60 or 70 ft.) in the neighbourhood of the Scotts Hall decoy. I had a shot, but failed to get him. This is the latest 'drumming' Snipe I have a note of."

But on September 7th 1907, "sitting in the rushes at the top of the Thorpe Fen (3.30 p.m.), while two guns walked the Snipe, I heard another 'drumming' over Wentworth's Warren."

And again in the same year—

"October 2nd, 1907.—G. Norman Ogilvie shot a full Snipe, 'drumming' loudly at the time it was shot, when Partridge driving; the 'drumming' was heard by most of the guns. This was at the 'Valley Drive' (the Valley 'reverse' in actual fact) on the Westleton Walks, Scotts Hall."

passionate joy at finding themselves once again at their nesting ground.*

There is far more variation among Snipe than is the case with most species. They vary in *size*, in *colour* and in *weight*; also in the markings of the feathers, especially the barring of the axillaries, and the spotting of the breast; and, lastly, in the *number* of tail feathers.

In Snipe, the *sexes* are alike. The female, on the average, is a slightly larger bird than the male, but it is impossible to tell one from the other with any certainty. If six couple of Snipe were turned out of a game bag at the end of a day's shooting, I doubt if anyone would guess the sex correctly in every case, even with the help of a weighing-machine. Trusting to evidence of weight alone, perhaps nine out of twelve answers would be free from error.

There is but little *seasonal* variation in the plumage; the Snipe in summer differs in no marked way from the Snipe in winter. The clean-moulted autumn birds are brighter in colour, with the longitudinal stripes more sharply defined; the summer birds are somewhat paler, as though the feathers had faded in the eight or nine months since the moult. But when all is said and done, the difference is very slight.

In *size* and *weight* they vary enormously. Four to four-and-a-quarter ounces may be taken as a fair average weight; anything over five ounces is unusual.

Much heavier Snipe than this are occasionally obtained. Lubbock records a specimen which "weighed very nearly eight ounces." and there are many instances of specimens weighing six to seven ounces being shot.†

Gould, on the ground of size, weight, and somewhat more ruddy colouring of these large birds, was doubtfully inclined to raise them to specific rank under the title *Scolopax russata*, but they are now universally admitted to be a mere variety of the Common Snipe.

As these large birds fully equal, and often exceed, the Great or Solitary Snipe (*Gallinago major*) in weight, a good deal of confusion

* Note added later—Snipe "drumming" and "calling" in early February, 1911:

I was over in Ireland (Clare-Galway, Co. Galway) from February 10th to February 18th, my chief object being the pursuit of the Wild Geese (White-fronted) of these parts. To that end I was "flying" (6-7.30) on the Waterdale river almost every night, and some nights was out again after dinner, between 9 p.m. and 1 a.m. Full moon was on February 13th, so that there was a good moon during the whole of my stay.

There were dozens of Snipe "drumming" all round there every night, and calling the monotonous "jick-jack" note. They began first at dusk, and went on as long as I remained on the marsh. They were "drumming" quite as freely at midnight as at 6 o'clock in the evening, and, I judge, continued to drum as long as the moon was up.

I spoke to the local fowler I had with me on the subject. He didn't seem to think there was anything remarkable in their "drumming," or that the date was very early. He said he had heard a few in December and plenty in January, and added that he believed you might hear an occasional bird "drum" in any month in the year!

† R. C. Haldane wrote in Ann. of Scottish Nat. Hist., 1906, p. 53: "It is well known to residents in Shetland that Woodcock and Snipe obtained there are exceptionally heavy. . . . I have the weights of ninety Snipe, which average 5.78 oz. . . . I have killed Snipe up to 7 oz., and remember one day getting three of 7, 7 and 6 oz. I have been told of birds of 8 oz."

has arisen : the large Common Snipe being mistaken for, and recorded as the Solitary Snipe. The differences between the two species are clear and distinct. The so-called *S. russata* is really a giant Common Snipe—the measurements being in proper proportion to the increased size and weight. The tail feathers are *fourteen* in number, the belly white, and the bird commonly utters the usual “sceap, sceap” when flushed.

The Great Snipe, on the other hand, measures but little more than the Common Snipe, as regards its wings, bill, etc., notwithstanding its larger body and increased weight. It is a short-winged, short-billed bird in proportion to its body weight. The tail consists of *sixteen* feathers, and the belly is freely spotted right down to the vent. The flight is very heavy and slow compared with that of a Common Snipe, and the bird always rises *silently*.

Our own Snipe has fourteen tail feathers, and the *number* of tail feathers has been made use of by some writers as a specific distinction.

Kaup, for instance, received a Snipe with sixteen tail feathers and on that character proceeded to create a new species, *Scolopax Brehmii*, which is universally discredited at the present time. I have myself shot a Snipe with sixteen tail feathers, differing in no other way from the Common Snipe. I believe the number of tail feathers to be a very inconstant character ; not 1 per cent. of the Snipe shot ever have their tail feathers counted, and I would hazard the conjecture that, if all the Snipe shot in the country had the number of tail feathers accurately ascertained, many would be found with sixteen rectrices ; perhaps 5 per cent. or more.

Passing now to the extreme *colour* variations : white, pied, and cream-coloured birds are not very uncommon, and most of them are very beautiful.

In the very light forms, the normal over-markings of the Snipe's plumage are often delicately indicated by darker buff pencillings on the white or cream-coloured ground.

There is, however, a very remarkable dark variety—the so-called *Sabine's Snipe*—which is especially deserving of notice, for, as Thompson said, “it is one of the greatest puzzles in ornithology.”

The first specimen on record was shot on August 21st, 1822, at Portarlington, Queens Co., and forwarded to Vigors. Regarding it as a distinct species for reasons given below, he named it *Scolopax Sabini*, in honour of a distinguished contemporary.

The specified distinctions, according to Vigors, were :—

1. The *uniform brown colouring*.
2. The *number* of tail feathers (12 against 14 in the Common Snipe).
3. The shorter and stouter *tarsus*.
4. The two outer *toes* being united at the base for a short distance.

By 1850, when Thompson published his *Natural History of Ireland*, he knew of at least ten more examples, but was himself very doubtful respecting its distinction as a species from the Common Snipe.

He was unable to corroborate Vigors' description of the structural characters. He found that the tail commonly consisted of fourteen feathers, the tarsus, on the average, resembling that of the Common Snipe; nor could he find that the toes were united at their base. The *colour* alone remained; of that he said, "in colour, Sabine's Snipe is constant and peculiar."

In 1895, bringing our information up to comparatively recent times, G. E. H. Barrett-Hamilton published a paper * on Sabine's Snipe, recording a total of 55 specimens seen and obtained up to date. Of these, Ireland claimed 31, England 22, Scotland 1, and from the Continent one bird only was recorded. The Continental bird was said to have been obtained in 1854 near Paris. It is now in the British Museum, but it may be said at once that the history of this bird is not above suspicion, and that it is by no means certain that the specimen really was procured on the Continent.

With this one exception, *every* Sabine's Snipe recorded so far has been obtained in the *British Islands*. This is not the least remarkable fact about this puzzling variety; since Vigors' original description in 1822, an enormous number of Snipe, amounting to many millions, must have been shot in different parts of the old world, and yet not one of these melanisms has ever been obtained outside Great Britain, while our own Islands have yielded something like 100 specimens.

It is now generally admitted that Sabine's Snipe is not a good species, but is merely a melanistic variety of the Common Snipe. Even the *colour*, the chief character on which Vigors based his description, and which Thompson 30 years later described as being "constant and peculiar," is now known to be very variable.

There is the "type" colour, a very dark brown all over, and the majority of specimens conform with this type; but it would seem likely that a sufficiently large series placed together would show an almost complete gradation in colour, from the dark type to varieties only a little darker than the Common Snipe.

The question of *sex* does not appear to have any influence in the matter; the melanism has been found in birds of either sex.

Age is of importance; it is probable that all the specimens obtained so far are "birds of the year." Prof. Newton has never seen a Sabine's Snipe having the appearance of an adult bird. That is in accord with our experience of albino or coloured varieties among birds generally—they are mostly "birds of the year."

In the twelve years succeeding Barrett-Hamilton's paper, a number of other specimens have been obtained or observed. I

* *Irish Naturalist*, 1895, pp. 1-8.

have no note of the exact numbers, but it is probably not less than 40—making a total, in rough figures, of 100 birds up to date.

In December, 1906, Williams, the Dublin taxidermist, had three Sabine's Snipe through his hands in less than a fortnight.

1. Shot on December 10th, 1906.—Ballina, Co. Mayo.
2. Shot on December 15th, „ —Co. Leitrim.
3. Shot on December 20th, „ —Co. Clare.

Of these, two conformed with the dark "type," but the third was altogether an intermediate form between the typical Sabine and the Common Snipe.

My own experience of Sabine's Snipe extends to two birds only. One I flushed in the Scotts Hall marshes (Suffolk). It rose out of shot, and passed off our ground. I never heard of it again, but I was quite near enough to be positive of my diagnosis.

The other I met with on one of the Northern Islands (Papa Westray) of the Orkney group, and I had ample opportunities for making his acquaintance very thoroughly. Even now, this bird comes back to me in my unquiet dreams, and I hear again the derisive "sceap, sceap," as he wings his phantom way unscathed through hailstorms of misdirected shot.

I first raised him from a little drain at my feet on November 30th, 1889; I had just emptied both barrels at a Grey Plover, a rare bird in Orkney, and I was anxious to obtain the specimen for the late Mr. Buckley, who was engaged at the time on the fauna of these islands.

The Plover dropped and the Snipe rose. He dashed over an adjoining brae-face and disappeared, nor could I find him again after a prolonged search. Snipe, however, if they like a place, generally come back to it before long, and, reckoning on the habit, I sallied forth the following morning, determined, if I were lucky enough to flush him again, that nothing short of a miracle should save him.

It was a lovely morning, with a glorious sun shining full overhead, and I approached the spot full of confidence. At first, I drew the drain blank, working it carefully from end to end with the sun at my back. I then tried one or two other likely places with an equally unsatisfactory result; and, finally, as a last resort, decided to try the drain again. This time being a little disheartened, and thoroughly convinced that the Snipe was not at home, I plodded along on the opposite side of the ditch, with the sun shining full in my eyes. From the same spot as before, under my very feet, a sudden commotion, a loud "sceap, sceap," and off went the animated bottle of ink, straight into the sun. I fired both barrels into the blaze of light, seeing nothing, but hoping some fortunate pellet might find its way home. A moment's silence followed; and then, somewhere in the distance beyond the dazzling rays, there came back the mocking "sceap" of my departing friend.

Sabine's Snipe

We met again more than once, but always with the same result. If it was not the sun, it was something else ; when the crisis came, I was always found wanting, in everything except excuses. For any injury I was likely to do that wretched Snipe, I might as well have been armed with a tin tube and some peas.

I tell this story because it does illustrate two points about the Sabine's Snipe :

1. That the bird uses the alarm note, "sceap, sceap," in just the same way as the Common Snipe
2. That the flight is quite typically Snipe-like.

Some observers have said that the bird rises *silently*, and that its flight is *slow and heavy* with dragging legs, so that it has been mistaken for a Water Rail.

There was nothing of the Water Rail about *my* bird ; nor do I think anyone familiar with the Common Snipe, and seeing this variety on the wing for the first time, could possibly have the smallest doubt as to its being a Snipe—and a "snipey" Snipe at that !

30th May, 1907.

V.—Some Characteristic Birds of the Suffolk Moorlands.

SKETCH-MAP OF THE SUFFOLK COAST BETWEEN ALDEBURGH & DUNWICH

V.—SOME CHARACTERISTIC BIRDS OF THE SUFFOLK MOORLANDS.

INTRODUCTORY.

A GLANCE at any good map of the County of Suffolk will show that much of the land in the vicinity of the coast consists, to a greater or less extent, of rough, heathy moorlands, intermixed with arable and marsh lands.

On some of these commons, gorse and bracken predominate ; others are almost entirely covered with heather and little else, and are more suggestive of a Yorkshire grouse-moor than a Suffolk *Partridge-ground*. In size, they vary from patches of a few acres to large areas some miles in width or length. The surface is generally flat or gently undulating ; but in some cases, *e.g.*, the Dunwich or Westleton "walks," the ground becomes much more irregular and hilly.

Of trees there are none, and with the exception of a few stray thorn-bushes, there is nothing to be seen over the wide expanse of greater elevation except a bramble or furze, which may reach a height of six or eight feet.

Much of the land fringing the moor was at one time broken up by the plough, and brought under cultivation.

The soil, however, was so poor, consisting only of light sand and innumerable stones, that the experiment, in many cases, proved far from successful, and much of the reclaimed land was allowed to fall back into its primitive condition.

In some cases, this became quickly reclothed with furze and heather, and hardly recognizable from the surrounding common, except, perhaps, for the remains of the old banks which marked the boundaries of former fields ; in others again, the reclaimed patches have remained naked and stony wastes, bare of any vegetation, except coarse grass or an occasional bracken. This condition is accounted for by the continual scouring of the light, sandy soil by winds, and consequent removal of any seeds lying on the surface.

Here and there a patch of this kind, 40 or 50 acres in extent

may be found in the centre of one of the big commons, remaining but little altered since the plough was last over it.

In other parts of Norfolk and Suffolk, these lands are called "brecks" (*i.e.*, land which has been at some time broken by the plough), *cf.*, the Newmarket, Thetford and Swaffham districts.

Stevenson, in the preface to his "Birds of Norfolk," divides that county into six districts which represent fairly distinct faunal areas. One of these he terms "the Breck district," and the moorlands I am dealing with here possess an avifauna very similar to his "Breck" region.

The birds of a region such as this are characteristic, well-defined, and in some cases restricted to the common-lands, and found nowhere else. The ornithology is peculiar, not only in the birds that *are* found within the area, but also in those that are wanting. For, since there are no woods or trees or hedgerows, a vast number of the Passerine birds, Warblers and so forth, are absent. As there is no water, wading and aquatic birds are missing; and as there is no grain, the game birds are not found here in any quantity, except on the edge of the moor, where the arable land meets the heathery waste.

On the other side of the ledger, we find a number of birds that are more or less characteristic of the district. They are such as breed *on* the ground; or, as in the case of the Wheatear and Stockdove, *under* the ground; or at the most, content themselves with low bushes.

Of the *Passerine birds*, Larks, Buntings (especially the Corn-bunting), and Pipits breed in abundance. The moorlands are the stronghold of our three British Chats—the Wheatear, Stone-chat, and Whin-chat. It is here only that the rare and generally retiring Dartford Warbler can be observed. Nightjars are numerous, and form a very characteristic feature in the bird life.

Raptors, of one sort or another, are not uncommon, owing to the abundant supply of food in the shape of rabbits. In the winter, Peregrine Falcons and Rough-legged Buzzards are sometimes plentiful; while on rare occasions a White-tailed Eagle puts in an appearance.

In the summer, the Hen Harrier and Montagu's Harrier are not very infrequent visitors; the latter bird has nested with us on more than one occasion in recent times.

The Short-eared Owl is very abundant in most years from October to February, and these commons may be looked upon as their headquarters. In the summer, a pair or two may sometimes still be found breeding.

Lapwings lay in large numbers on some of the more open parts of the Warrens. Here, too, a stray pair of Redshank or Ringed Plover may deposit their eggs; both species rather out of place, for the Redshank is naturally a denizen of the marsh-lands, and the Ringed Plover of the sea-shore.

But the glory of the Breck district has departed with the extermination of the Bustard; this took place in Suffolk about

1832.* The Stone Curlew, a humble relation, is all that is left to us to keep his memory green.

The extermination of the Bustard was due to man, of course, but only indirectly. The introduction of the machine-drill and the horse-hoe led to the destruction of their eggs, while the extensive planting of coniferous trees on many of these waste lands rendered the district less suited to their requirements, and greatly restricted the area formerly occupied by this bird.

In these introductory pages, I have endeavoured to give some very rough idea of the bird life on these commons. It remains to choose certain of these birds which are both interesting and characteristic, for more detailed discussion. From the list of birds enumerated, I have selected (1) The Stone Curlew, *Edicnemus crepitans* (Limicolæ); (2) the Night-jar, *Caprimulgus europæus* (Picariæ); (3) the Stone-chat, *Pratincola rubicola* (Passeres); (4) the Short-eared Owl, *Asio brachyotus* (Striges).

There is, at any rate, ample variation in this bill of fare, for no two of the four examples belong to the same *Order*.

FIG. 9.

THE STONE CURLEW, *Edicnemus crepitans*.

The Stone Curlews belong to the order *Limicolæ*, and form a clearly-defined genus, sharply separated from their nearest allies. In their habits, and in some points of their structure, they come very

* Howard Saunders ("Manual of British Birds," 1899, p. 523) says, "In Norfolk and Suffolk the last fertile eggs were taken about 1838, though a few birds lingered to a somewhat later date."

The Chief districts frequented by the Great Bustard in East Anglia, appear to have been : (1) Swaffham district in Norfolk ; (2) Thetford district in Norfolk and Suffolk ; (3) Newmarket district, and Cambridgeshire and Suffolk. *vide*, Babbington's "Birds of Suffolk."—EDITOR.

near to the Bustard ; they have other affinities with the true Plovers between whom and the Bustards they form a connecting link.

Of species there are nine in all, but of these only one (our own bird, *Æ. crepitans*) is Palearctic, the remainder being widely distributed over the remaining zoographical regions of the world, with the exception of the Nearctic.

They are essentially birds of the Steppe—like the Bustard, frequenting open, treeless wastes. In this genus, the large, prominent, yellow eyes are very characteristic, evidencing their crepuscular habits. They feed mostly at night and remain hidden or at rest during the day. At the same time, if disturbed, they seem but little inconvenienced by the brightest sunshine, and their vision by day is remarkably acute, at least that observation is true of our own bird.

The Stone Curlew is, to my mind, one of the most interesting British birds, and it is unhappily one of those species which is in some danger of extinction at no distant date. The generic name, *Edicnemus* is derived from the Greek *οἶδημα*, “a swelling,” and *κνήμη*, “a leg,” and thus furnishes one of the vulgar names in use in this country : the *Thick-knee* or *Thick-kneed Plover*.

In the eastern counties, it is commonly called the *Norfolk Plover* ; Great Plover, Stone Plover, and Thick-kneed Bustard are less familiar names. Of local dialect names, I know only two ; in Norfolk, Stevenson says the bird is locally known as “Culoo” (this seems to be a mere mispronunciation of Curlew), while in my own part of Suffolk, the bird is frequently called the “Shriek Owl.”

The Stone Curlew is one of the earliest spring migrants to arrive on our coasts. My notes for the last 20 years show that it commonly makes its appearance in the last days of March. The first summer visitor is the Wheatear ; it can generally be met with about March 20th, and during the following ten days, one may expect to see or hear the Wryneck, Redstart, Chiff Chaff, Willow Wren and Stone Curlew ; the earliest date I have for the latter bird is March 25th (1893).

The first arrivals are generally solitary, and are, I should conclude, males, but as I have never shot at them at that time, I have had no means of verifying the supposition. They very soon make their presence known by their loud nocturnal cries. It is commonly said that they only call after sundown, but this is by no means an absolute rule ; a bird disturbed in the day at this time of the year will often fly off uttering the most dismal noises. Later in the year, they cry much less in the day, even if disturbed.

The newly-arrived solitary bird is naturally anxious to find others of its own kind. If he is a male, as I believe to be the case, he is even more anxious to find a mate. These are probably the reasons for the frequency of the call note at this time of the year. Once the business of nesting has begun, they are remarkably silent by day.

It is only on these moorland wastes that the Stone Curlews are found, and not only are they very regular in the time of their arrival, but also quite extraordinarily constant in the locality where they first appear. Thus, for five or six years consecutively, when I had the opportunity of making personal observation of the fact, I noticed the first bird of the year within 150 yards of the same spot. This was an old disused rifle-range on the Crown Farm Common, Sizewell. They are equally conservative in their choice of a nesting site—a pair of birds for four years in succession deposited their eggs close to an old bank between these rifle-butts and the “square covert.” I found the eggs in three separate years myself, and in the fourth one of the keepers told me that he found them in the same place. I believe a four-yard circle, or less, would have covered the four nests of the four different years.

Spring is very sluggish on the Suffolk coast, the biting East winds keeping the vegetation back; the whins and heather look black and burnt, the grass is short and yellow, and there is little cover on the ground even in April—beyond a few dead bracken of last year. Notwithstanding this, the Stone Curlew is often enough a very difficult bird to see, unless you stumble on him by chance. The general effect of the streaky yellow-brown plumage is remarkably protective, and the bird almost always trusts to crouching motionless on the ground, rather than seeking safety by running or by flight. Indeed, on the wing, the bird is exceptionally conspicuous by reason of the markings on the secondary quills. Their vision, as I have mentioned before, is very acute, though one might expect from the size and appearance of the eyes that they would be dazzled and confused in bright daylight.

The *Owls*—the common British Owls I mean—are, with the exception of the Short-eared Owl, very stupid and helpless if flushed from their hiding-places in the daytime and driven out into the bright sunshine; but I never could observe that the strongest sunshine caused the Stone Curlew any inconvenience whatever.

This may be largely a question of the sudden increase in the illumination. The three Owls instanced above habitually roost during the day in the darkest holes and recesses they can find, or in the densest shade of the thickest tree available. If they are suddenly driven out of the semi-darkness into bright daylight, the retina for a time is unable to deal with the excess of light—just as we ourselves are unable to see clearly for a moment if taken from a dark room into full daylight.

The eyes of the Stone Curlew, of the Nightjar, and of the Short-eared Owl, were all primarily made for nocturnal purposes. All three birds rest by day, but more or less in the open, where there is plenty of diffused daylight around them; never in the dark and gloomy situations selected by the Barn Owl, for instance. None of the three birds mentioned above seems seriously inconvenienced by being flushed in the daylight. At times, they actually convert day

into night, and pursue their usually nocturnal avocations on their own account by day as by night.

Although the Stone Curlew is one of our earliest arrivals, he is not a very early breeder. I do not think I have a note of finding any eggs before the early days of May. The eggs are *two* in number. (Books say two, rarely three: I must have seen a great number of nests in my life, but I have never seen more than two in a clutch.)

The eggs themselves are very characteristic, and are quite unlike those of any other British Bird, the nearest approach being the eggs of the Oyster-catcher, which sometimes bear a superficial resemblance.

They vary, however, very widely in ground colour; in the colour and arrangement of the overlying spots and streaks; in shape and in size. In fact, no two clutches are alike, and a large series exhibiting these diverse forms would be of great interest. As I have always considered the continued existence of the bird of more importance than a large collection of its eggs in a cabinet, I have only taken three clutches.

The ground-colour is stoney-buff, with blotches, spots and streaks of various shades of brown irregularly scattered over the surface. Some are large, and some are small; some pyriform, some oval, and it is difficult to find eggs from different nests that will match each other.

Of nest proper there is none. The eggs are deposited on the bare ground. The position chosen is always a very open one, and there is seldom cover of any sort near at hand. The birds are thus able to sneak away at the first sign of danger, leaving the eggs, which are protectively coloured to take care of themselves. The selected site is generally bare, brown, peaty earth with little or no vegetation growing on it; a number of irregular grey and brown flints are often scattered in the neighbourhood, adding greatly to the difficulty of seeing the eggs.

Heather is never burnt systematically on these commons, as is the case in Scotland, but patches are occasionally dug right up and used for litter, drainage and other purposes. These patches are not simply cut with a scythe, but the top spit is bodily removed with the heather and underlying peat. For the next two or three years, these areas remain bare, and then slowly become reclothed with heather unless prevented by the sheep.

These are favourite situations for a nest. I have also found the eggs on a spot where a whin has been cut down. Here the black earth shows through in places about the cut stubbs of the whin bush, but the surface is in the main formed by the dead brown gorse needles which have fallen and covered the ground below the bush.

In the year 1891 (May 23rd—June 1st), I had an excellent opportunity of watching a pair of these birds which laid in their usually exposed situation on the common, but within about 70 yards of a large whin-bush. I constantly tried to observe them by

stalking the birds behind the bush, but always failed, till at last the idea occurred to me of walking boldly up, disturbing them, and then lying up in the whin-bush. This proved successful. After waiting about half-an-hour, I had the satisfaction of seeing the female bird steal up to the nest and settle on the eggs. The male bird appeared at the same time, and stood on a raised knoll at some distance from the nest, evidently on sentry duty and watching for danger from every quarter.

While I was looking at them, I unfortunately broke a small twig of gorse in trying to shift myself into a more comfortable position. In a moment I was detected, both the birds turned their heads sharply in my direction; the male disappeared over the side of the knoll, the female cautiously raised herself off the eggs, and stole away with head lowered, and neck extended at a fast crouching kind of a run. I waited for another half-hour, but nothing would induce them to return, though I occasionally caught a glimpse of the head of the male, just showing over the top of the knoll, and evidently prospecting to see if the ground was clear. Not wanting to disturb the birds, I left my hiding-place, but I never had another opportunity of watching them, for they would not again approach the nest without first carefully scanning the gorse bush, and making sure that no one was concealed there.

Both these eggs were sprung on May 31st. On the morning of June 1st the eggs had two little holes in them, and the beaks of the nestlings were showing inside. At 6 p.m. on that day the first bird hatched, and, at that hour, was half out of the shell and still wet, the egg having only just broken. At 8 p.m. I again examined the nest, and found the first bird quite dry, and the still remaining egg not yet broken, though clearly on the point of being so. But the *egg-shell* which I had seen in the nest at 6 p.m. was now nowhere to be seen. It was unquestionably removed by the parent birds as soon as the young one was hatched and clear of the egg, and this must have been done immediately after my visit at 6 p.m. This is only another instance of the fact that birds laying their eggs on the open ground, remove the broken egg-shells at the earliest possible moment. The *egg* is protectively coloured, so is the *nestling*; the *broken* egg-shell, with its glistening white interior, is a source of danger, and is removed the moment the chick is free of the shell.

The downy nestling is exceedingly pretty. The general colour of the upper parts—and it is only the upper parts which have any bearing on the question of protective colouration—is a sandy stone-colour. There is a short mesial black stripe on the crown. Two other stripes run through the eye, and are continued over the back of the head, and down the whole length of the back, on either side of the spine, to the tail, where they meet two shorter lateral bands over the hips. There is a small black patch over each shoulder. The under-parts are pale-grey, almost white.

The down itself is peculiar in texture—*short, close and woolly*.

Stone Curlew

and very unlike the fine, hair-like down, consisting of short and long "hairs," which is found in most charadriine birds—a nestling snipe, for example.

In fact, a nestling Stone Curlew has rather an artificial appearance, and to my mind, is somewhat suggestive of a toy-shop.

The legs are thick and somewhat clumsy-looking. The newly-hatched chick does not appear to me to be capable of making much use of its legs for the first twenty-four hours or so of its independent existence. In this respect they are worse off than the nestlings of the game birds, Rails, or Plovers, which are active from the very first moment they are out of the shell.

I believe that it is the rule that the offspring of birds that lay only two eggs are *male* and *female*. It is the case with the various Pigeons, with the Nightjar and the Stone Curlew, and as far as I am aware, with every other monogamous species laying only two eggs. For if it were a mere question of chance what the sexes were going to be, sometimes there would be an excess of males, and sometimes of females, and in either case the excess is waste material, since they would necessarily remain unpaired.

The Stone Curlew is strictly monogamous, mating for life. The male is a very dutiful and attentive spouse throughout the period of incubation. Exactly how long this incubation lasts I have never ascertained with the artificial incubator, as I never take their eggs. It is not less than three weeks, I know, and more probably 24 or 25 days.

The male certainly takes some share in sitting, and when the female is on the eggs, he is always close at hand, watchful and quick to warn her of any approaching danger. At the earliest alarm, both birds steal rapidly away to a considerable distance, and then commonly take flight. They *never* rise near the nest.

Like other birds breeding on the ground with uncovered nests, safety compels them to be off the eggs for a good many hours most days. Keepers, warreners, shepherds, stockmen, farm hands and so forth, are continually passing to and fro on the Common; so long as any of these are in the neighbourhood of the nest, the birds have to keep away. This seems to me to be one of the reasons for their somewhat late nesting, compared with the time of their arrival. Stone Curlews commonly deposit their eggs early in May, they might lay nearly a month earlier. But the average temperature of April is much lower than May; frosts are less rare and more severe. Frequent and prolonged absence from the eggs during April would, it may be assumed, be fraught with greater danger to the embryo chicks than intervals of the same period in the warmer month of May.

A further reason for their delay in nesting is probably the amount of cover on the ground. The commons, which look bleak and bare enough until the latter half of May, then become suddenly clothed, with bracken. These ferns, as everyone knows, grow up rapidly

and a few days are long enough to convert the open, naked ground into a miniature forest of young bracken stems. This is the cover beyond all others chosen by the Stone Curlew in which to conceal and rear their young, from the time they leave the egg-shell until they are big enough to fly and fend for themselves. The appearance of the bracken above the ground coincides in point of time pretty closely with the *hatching* of the chicks.

Stone Curlews are single-brooded, never laying more than two eggs in the season, unless the first nest is destroyed. In that case, they lay again, and thus one occasionally finds eggs in July or even August, but it is very doubtful if the young, from these late eggs, are successfully reared.

In Suffolk, the Stone Curlew leaves us sometime in *October*, generally in the second or third week. If a nestling were not hatched before the middle or end of August, it would be impossible for this youngster of six or eight weeks to undertake the long migratory journey with the rest of the flock in October. He would perforce be left behind, and would perish miserably with the first severe frost.

While on the subject of the emigration of these birds, I may say that I have never seen one in Suffolk myself after October 26th, but I have one trustworthy record of a bird seen on January 23rd (1904). One of my nephews, who is a fairly competent field observer, wrote (25-1-1904). "There was a solitary Norfolk Plover on the common near to Cliff House yesterday, seemingly very tired after a journey. I did not recognise it at first, and sent for Staff" (a keeper and a good naturalist). "We flushed it again, and both of us identified it quite clearly, so of course I didn't shoot it. Surely it's a queer time of the year for the bird to be about?"

When the Stone Curlew first comes over, he speedily makes his presence known by his well-known cry. This cry is quite characteristic, and is entirely unlike any other bird's note that I am familiar with. It has been called a "whistle," even a "melodious whistle"; to me, this is not a very happy description. It is a weird, discordant clamour, with something uncanny and blood-curdling about it, as though an inferno had suddenly been let loose on earth. We call them "shriek owls" on this account, and it is not a bad name. Their wild cries ringing out loud and clear, then suddenly ceasing and intensifying the silence of the still summer night, are something suggestive of murder and sudden death. Many superstitions have grown up round the nocturnal cries of birds, mostly of evil omen. For example, the "Gabriel Hounds" (Wild Geese migrating on a dark night) passing over a house foretell, if I remember rightly, death or disaster to the occupants. I wonder that no legend is connected with the cry of the Stone Curlew. I know of none.

It is by night that the birds are mostly heard; in April they occasionally call by day. In May and June, during incubation, they are silent by day, and even after sundown are much less vociferous than in the earlier or later months. By about the middle of

July the young are getting well grown, and from then onwards to the time of their departure, they keep up an intermittent clamour through the night, from dusk to sunrise. The Stone Curlews are now gathered into flocks: on one common perhaps four pairs of birds have nested, often at some distance from each other, but as soon as the young are able to fly, all the families habitually collect into one flock, resting together by day and departing together at night for their chosen feeding grounds.

In August it is a very rare occurrence to find one or two birds alone; sometimes they are in the root-fields adjoining the commons, especially where the crop is thin and patchy, sometimes on some selected part of the common, but always in *flocks*, and these flocks are generally to be found in the same spot day after day, unless they are excessively disturbed.

When Partridge-driving at the latter end of September, small flocks of Stone Curlew—comprising eight to twenty individuals—are frequently put over the guns. They are, of course, not molested.

Here is a brief extract from my note book:—

“1898.—Norfolk Plover unusually numerous at Sizewell this season—September 1 to October 1. Flocks of 15–18 seen several different nights on the ‘Black Heth,’ calling loudly after sundown and occasionally by day. During first week’s Partridge-driving (September 20–23) a flock of 10 frequently came over the guns.

“1899.—July 29th: put up a flock of 10 Norfolk Plover on the ‘Black Heth’ off some bare ground; this is the spot where last year’s flock mostly congregated. Frequently seen throughout August.

“September 1st.—A gunner on the Thorpe Mere told me that this flock, or one of about the same size, is in the habit of coming down to the mere every evening about ‘flight time,’ and stopping there till morning. He said he could have shot several when he was waiting for Ducks almost any night after August 1st.

“1901.—Flock of about 12 passed over guns off ‘Grimstones,’ Scotts Hall, September 25th.

“1906.—Partridge-driving: 11 passed over guns off Pottsbrigg, Scotts Hall, September 25th.

“1907.—Partridge-driving, September 25 to October 1.—Flock of 14, Thorpe Vent, Sizewell (this is close to the ‘Black Heth’ previously mentioned).

“1908.—Norfolk Plover unusually numerous; flocks of 15–20, Scotts Hall; others on the Leiston Abbey grounds; and at Sizewell on the Broom Cover and Crown Farm Commons.

“October 24th.—Partridge-driving; flock of 5 off ‘Pottsbrigg,’ Scotts Hall (a very late date).”

I have intentionally left to the end the question of the food of these birds, and I may say at once that my practical knowledge is small. The only efficient way of ascertaining the *food* of any given

species is to examine a series of specimens obtained at different seasons of the year, and to tabulate the contents of their gullet, crop or stomach.

It has always been our endeavour to protect these birds in every possible way ; they are never shot intentionally, either by ourselves or by our guests, and, in consequence, only six birds have passed through my hands in the last 30 years. This number is quite insufficient to draw any definite conclusions from.

The Stone Curlew is principally a night feeder, and as *insects* (large *coleoptera*, etc.) form their staple diet, those captured are mostly such as move about by night. *Slugs* they are certainly very fond of ; these and the *earth worms* are plentiful in the root fields, and are, I imagine, the chief inducement to the birds to visit these places. Finally, they undoubtedly go down in some cases to feed on " the mud " at night. Here one would suppose their food to be much the same as that of the ordinary wading bird—crustaceans, snails, small red worms, and so forth. Books state that they devour small mammals, especially field mice, and also reptiles. A bird trapped on the Thetford Warren ejected a frog.

One thing is certain : they are *perfectly harmless* to game, and I have never heard the most vindictive keeper or preserver frame any indictment against them on this score.

I must make one exception to this statement, as the evidence seems to be reliable. G. S. O., in a letter, July 1st, 1911, writes :—

" The following report from John Staff may or may not be considered of value by you. He has been suffering from the loss of coop Pheasant chicks, which at first he thought was caused by a sitting wild Pheasant. While watching with his brother, George Staff, he saw a Norfolk Plover descend in a corner by the ' Rickin Pits,' run through the undergrowth, weeds, etc., and kill a young Pheasant. The bird was but 15 yards from him. He hurried to get his gun, leaving his brother still watching. As he returned, he saw the bird fly away out of range with a small Pheasant in its bill. He was very much astonished ; but, like his brother, is positive the bird was a Norfolk Plover, or ' Thick-knee.' "

The exact date and time of day were not given. John Staff is a good observer, and very familiar with *Æ. crepitans*.

Finally, I should like to say a word about the position of this bird in East Anglia at the present day. Lubbock, writing in the late sixties says : " In my vicinity " (Attleburgh, Norfolk) " the great Plover is following the Bustard. Twenty years back I could hear them every summer evening from my parlour when the window was open. I have only seen *one* in the parish for the last *four* years."

Stevenson, writing in 1870, speaks of the steady decrease of this bird on the eastern side of the county of Norfolk ; on the western boundary—always the headquarters of the Stone Curlew—he finds that they still remained in large though diminished numbers.

In the 40 years that have elapsed, since then a considerable further reduction has certainly taken place.

In 1891, I wrote a short paper* on this bird, dealing with my own part of Suffolk only (the coast line between Aldeburgh and Dunwich), and I then prophesied that the days of the Stone Curlew in that district were numbered, and their ultimate extermination merely a question of time. Eighteen years have elapsed, and I am rejoiced to think that so far my forebodings show no sign of fulfilment. I even venture to hope that their numbers are on the increase, for in this last season (1908) I believe there were more Plovers on our ground than has been the case for many years. But here they have been most strictly protected, eggs and birds alike, and, I repeat, unless such protection is afforded them, the species will certainly be exterminated.

In the 18th, and beginning of the 19th centuries, *Bustards* were a familiar sight in many parts of England; their size and strength rendered them secure from most enemies, but they possessed the fatal habit of depositing their eggs in the young corn. This was sown broadcast, and little more was done until the time came to harvest the crop. Here the Bustards hatched their young, and reared them successfully. Presently changes took place in the practice of farming. New methods were introduced to prevent waste in the sowing of the seed, and to afford protection to the growing crop; the mechanical drill and the horse-hoe were brought into common use.

These innovations sounded the knell of the Bustards. They continued to lay their eggs in the corn as before, but the corn now lay in straight, regular drills, and up and down these drills travelled the horse-hoe. Every egg on the field was either smashed by the machine or taken by the labourers in attendance. This simple invention, in the course of a few years, exterminated the Bustards, which had flourished in the country, we *know*, since 1527, and probably for centuries before that.

The case of the Stone Curlew is somewhat different. He has, like most ground-breeding birds, many enemies against whom he must ever be on the watch. All egg-eating vermin are a constant source of danger. Necessity continually compels him to leave the eggs unattended; the passing rook pounces down and speedily spoils the nest; stoats, weasels, rats, and hedgehogs are partial to an egg omelette. The eggs have a certain market value, and are constantly taken by shepherds' boys and farm-labourers, unless strict watch is kept.

From their position they are very liable to be trampled on accidentally by sheep and cattle grazing on "the walks," or may easily be spoilt by a late frost. On occasion, too, they deposit their eggs on arable land, and in that case, their eggs are frequently smashed when the roller passes over the field in spring.

The egg is the dominant factor in the survival of the Stone

* The Zoologist, December, 1891, p. 441.

Curlew ; a bird that fails to rear its young must necessarily die out. It is the destruction, in one way or another, of the eggs that has led to the diminution of these birds, and may some day lead to their extermination.

FIG. 10.

THE NIGHTJAR (*Caprimulgus europæus*, Linn.).

The NIGHTJAR is a member of the large and well-defined family *Caprimulgidae*, which ranges over most parts of the world. The genus *Caprimulgus* alone contains some 70 species.

Our own bird—which, for all practical purposes, we may consider to be the only Nightjar which visits this country—has a large number of vulgar and provincial names ; most of these have an evil significance, entirely unjustified by the habits of the bird.

The generic name, *Caprimulgus* signifies a “goat-milker” ; hence, “Goat-sucker.” Aristotle’s αἰγο-θήλας has a like meaning.*

“Night-hawk” is another common name which has from time immemorial brought the bird into disrepute with ignorant keepers. Again, “Fern-owl” and “Churn-owl” are popular names, though there is nothing of the Owl about the bird, except its crepuscular habits and soft plumage.

Finally, “Dor-hawk,” or, as we say in Suffolk, “Doy-hawk,” may be mentioned. This is a fair name, so far as it goes, for the bird pursues the dor-beetle (*Geotrupes stercorarius*) among other insects ! But if all insect-eating birds are to be labelled *hawks*, who shall escape a whipping ?

* “History of Animals,” ix. 30-2 : “It flies to the goats and sucks them, whence its name, αἰγοθήλας. They say that when the udder has been sucked, it gives no more milk, and that the goat becomes blind.”—EDITOR.

I do not think I need waste time with any elaborate description of the plumage. The bird is probably well-known to all. There are, however, one or two points to which I should like to draw attention.

As regards the general colouration, the plumage is made up of various shades of grey and brown, and the protective effect of this combination of neutral tints is so remarkably perfect, that the bird is invisible at the distance of a few feet, when sitting motionless on the ground of its choice. It is, without any exception, the most perfect example of protective colouration in an *adult* bird with which I am familiar.

The eyes are large, dark and rather prominent ; the feathers are peculiarly soft and owl-like, ensuring the necessary silence when pursuing its prey ; both features being common to many nocturnal birds. The mouth is split far back, and the gape very wide. The upper mandible is beset on each side with a row of long, rather stiff, movable bristles directed forwards and downwards. These bristles are of service in directing the prey, which is always taken on the wing, into the widely-opened mouth.

The legs are short and weak ; three toes in front and one behind. The claw of the middle toe is long and pectinated on the inner edge only. The purpose of this serration has been much debated by naturalists, but the solution is still to seek.

Several theories have been put forward, but none of them appear very convincing :—

1. It has been thought that the bird makes use of the pectination as a comb, to comb the scales of moths and other insect remains off the rectal bristles.
2. Others believe that it is used to disengage the clinging, hooked feet of beetles from the bill, so enabling the prey to be swallowed.
3. A third group suppose that it is of service as a prehensile organ, enabling the bird to seize and hold its prey firmly with the foot.
4. And lastly, the pectination is associated by some with the habit of perching lengthways on a bough, instead of across it ; they suppose that it gives the bird a more secure footing, acting as a sort of patent non-skidding toe.

It is hardly worth while pointing out the objections to these four theories ; they are varied and cogent. I believe that to arrive at the real meaning of the serrated claw, we should have to go back to the archaic stock from which the present Nightjars were evolved ; to some primitive branch of the avian tree, lost in the countless centuries which have elapsed since the differentiation of the modern *Caprimulgus*. For it must be remembered that this genus contains

some 70 species, widely spread over the old and new worlds, and yet the pectinated claw is found in all. Their surroundings, their habits, and their food may vary, but the serration is always present. To me, this seems strong evidence in favour of the claw being a vestigial remnant from some bygone ancestor, which has long since lost its original function, and is now, perhaps, of little service to these latter day descendants.

Pectination of the claw is *not confined* to the Nightjars, but is found in many widely separated birds, *e.g.*, the Bittern, Gannet, Heron and Courser. The wildest flight of imagination cannot lead one to suppose that the purpose of the serration is the same in *all* these birds.*

There is not much difference in the plumage of male and female Nightjars, but the male has a large, white spot on each of the first three primary quills, and has the two outer tail feathers on each side broadly margined with white. In the female, these white markings are absent.

The Nightjar is rather a late arrival, seldom appearing before the third week in April, and in some years not before the first days of May. The bulk of them take their departure between the 20th and 30th of September, but I have seen an occasional bird as late as the middle of October.

Visitors, like the Nightjar, which arrive late and leave rather early, are probably governed in their actions by the all-important question of food supply. In this particular instance, the food consists of large insects *captured on the wing*, especially nocturnal moths and beetles. Nightjars are very voracious, though the body is so small and light, and if food is not obtainable in sufficient quantity, they will necessarily perish.

The supply is uncertain in April, and again diminishes rapidly towards the end of September; the migratory movements are dependent on this fact.

By the middle of May, Nightjars are numerous on all the commons and moorlands I have been speaking of. As the sun dips in the west, their presence is manifested by the well-known jarring or churring noise so familiar to every one. This sound, it is said, is uttered by the male alone; I have only shot two birds in the act of churring, and both these were males. At first, one hears only one or two birds, but as the twilight deepens, the concert becomes general, and the loud whirring noise is heard from all quarters of the common.

If you will watch a bird—they are very amenable to observation in the dusk—you see him perched, generally lengthways, but by no means always so, on a branch of gorse or a thorn bush, or even on a gate-post or convenient railing, churring loudly and almost

*Against this "vestigial" theory is the fact that the pectination is not found in the nestling, but develops later. Ancestral vestiges do the reverse, they appear in the embryo and disappear in the perfect animal; *cf.* the branchial arches in the mammalian embryo.

Nightjar

continuously for perhaps three or four minutes on end. Then he flits noiselessly off, glides away into the gathering darkness, and is lost to sight. That he is not very far away, you can tell by the occasional sounds which reach you. The churring note is no longer audible; that is emitted only when the bird is at rest; but from time to time, he gives vent to a curious whistling kind of note on the wing—this, of course, is vocal—and also make a snapping sound by striking the wings together over the back. These noises are often heard together, and the sound made by the meeting of the wings is clearly under the bird's control, for it is only intermittently heard, and is not a necessary adjunct to flight. Presently, like a Flycatcher, he returns to his perch, settles himself to rest, and then starts the churring note again. Here he may sit for some time churring, silent, and then churring again until the spirit moves him to be off on the hunt once more.

In the garden of my old home, petunias used to be grown in rather large quantities round several of the borders. Whether petunias are particularly rich in honey, I don't know, but they always seem exceedingly attractive to insects of many kinds, more especially the night-flying moths.

Just outside lies a common, which is a favourite locality of the Nightjars. These birds seemed to know when the petunias came into flower, much as a wading-bird seems to know at what hour the tide will have ebbed sufficiently to expose the feeding-ground. Throughout May and June I hardly ever saw a Nightjar come into the garden; outside there were plenty; they could be seen and heard in numbers any night after dusk. But in July and August they would come stealing silently in one after the other, when the light had quite died out, and hunt up and down these petunia beds hour after hour, until the first sign of daylight sent them back to the common again.

The Nightjar is a late breeder,* and it is seldom one finds eggs before the beginning of June. The eggs, two in number, are somewhat peculiar in shape—elliptical and tapering equally at both ends. In colour they are very distinctive. The ground colour is white, spotted or blotched with purple, lilac, and stone colour of varying shades of intensity; the range of colour-variation is very large, but the eggs are quite unlike those of any other British bird.

Of nest proper there is absolutely none. The eggs are laid on the flat ground without the smallest attempt at concealment. There is no evidence even of a depression or hollow. They are just deposited on the surface chosen by the birds for that purpose, without any further preparation whatever. That this surface is chosen with

*The only six clutches I have in my collection are dated as follows:—

1. "Square Covert," Sizewell, Suffolk, July 4th, 1893.
2. Barcaldine, Argyllshire, June 9th, 1897.
3. Scotts Hall, Suffolk, June 2nd, 1892.
4. Crown Farm Common, Sizewell, Suffolk, June 6th, 1892.
5. Scotts Hall, Suffolk, June (day not given), 1891.
6. Scotts Hall, Suffolk, June 2nd, 1892.

particular care, no one can doubt who knows anything of the bird. With us the choice commonly falls on the sepia-brown needles of the gorse.

In the lambing season, gorse is in great requisition for "fencing" the hurdles, as a protection against the cold winds of spring. A clump is often half cut down for this purpose, and when enough has been collected, the remainder of the bush is left standing. In such a case, a bare, semi-circular area is left thickly carpeted with the fallen gorse needles and the "stubbs" of the cut gorse branches projecting a few inches above the ground. The remaining half of the gorse-bush forms a background four or five feet high, affording an admirable shelter against wind from most quarters.

Around and, in some cases, through the barren area, the young shoots of the bracken are just beginning to burst forth. These will supply protection later on, when the young are hatched.

Another site sometimes chosen is on the rich brown fronds of the dead bracken of the previous year, which are still lying thickly on the ground. Here we have the brown ground-colouration again, and the certainty that in due course, cover will be afforded by the new growths of this year's bracken bursting through the ground.

Yet a third selection may be the dead brown needles of the Scottish Fir, Austrian Pine or other coniferous tree. On some of these commons, firs of one sort or another have been planted in small clumps and plantations. These, especially while the trees remain small, are rather a favourite resort of the Nightjar.

Of all the "nests" I have seen, I never found an egg which was not on one or other of these *brown* surfaces, gorse or fir or bracken; three different shades of brown, but each and all eminently calculated to render the sitting bird invisible.

It is sometimes said that the eggs of this species are protectively coloured. The late Professor Newton, in a footnote to the fourth edition of Yarrell (vol. ii., p. 383), writes: "No reasonable person can doubt the protective nature of the colouring of these eggs, exposed as they are to innumerable dangers."

The late Mr. Seeborn, in the introduction to the second volume of his "British Birds" (p. xxv.) says: "The true Goat-suckers, of which our Common Nightjar may be taken as an example, lay eggs on the bare ground of protective tints, as well as depending on the sober colours of their plumage for safety."

Both these authorities are agreed that the eggs of our European Nightjar are in themselves protectively coloured. If they are protected at all, it must be from their resemblance to rounded stones, and I can quite believe that it might be very difficult to discover them if they were deposited on a pebbly beach, like the eggs of the Terns and Ringed Plovers. Even then, I think that the shining, white surface would be more than likely to betray them. But, as a matter of fact, they are laid on a brown surface; sometimes a

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warm brown, and sometimes a dead brown, but always a brown of some tint. Stones of any kind are seldom found about the "nest"; if they were originally in evidence they would have been covered over by the falling leaves of the previous autumn (gorse, bracken or fir).

Any stone which does show through will probably be a flint—jagged in shape and dirty in colour—in no way comparable with the shining egg of the Nightjar.

I can conceive no egg, laid in such conditions, which is so entirely *unprotected* as regards the colour surroundings.

The Nightjars—which, after all, must be considered the best judges of the matter, or else they wouldn't have survived—answer the question for themselves. It is the rarest thing in the world to find a Nightjar's "nest" without at the same time flushing the bird off the eggs. I believe that, from the time the first egg is laid, they remain on the nest, and never leave the eggs exposed for any length of time, until the young are hatched.

They sit so closely that one may almost tread upon them before they will rise, showing how clearly they appreciate the danger of uncovering the eggs. If you pace up and down these commons with the deliberate intention of robbing the Nightjar, you hardly ever see the bird until you accidentally walk within a few feet of the nest, and she reluctantly flutters off the eggs.

In 1891, I watched a nest of this species—really to ascertain the time of incubation, but the occasion serves to illustrate my present point. This nest lay in the middle of the Crown Farm Common, and I had "marks," which served to bring me within four or five yards of the spot with speed and certainty. I watched the nest for nearly a fortnight; the sitting bird always allowed me to come within a few feet's distance without moving. Now, although I knew exactly where the Nightjar ought to be, I had the greatest difficulty in differentiating her brown body from the brown surroundings. I paid many visits, but always had the same difficulty. She sat on a patch of dead gorse-needles, such as I have described, out of which projected a thick gorse stump, cut off six or seven inches above the ground, and making a slanting angle of about 45° with the surface. Against this she sat, her tail resting lengthways on the old stump, her head lower than her body, and her large black eyes closed as though asleep. The effect produced was that the old stump had a lateral branch just above the ground, and that this had been cut off like the main stem. This "lateral branch" was formed by the head and shoulders of the sitting Nightjar!

Time after time I came to the spot, but could see nothing of the bird at first, and made up my mind that the nest must have been robbed since my last visit, and that I was only looking at the bare patch of gorse needles and dead stumps; and then, after an interval as my eyes got used to the surroundings, I re-discovered her in the

old place. It was the most perfect instance of protection I have ever seen.

On the only occasion when I put her off the nest, she left with the greatest reluctance, and did all in her power to distract my attention from the eggs, by feigning to be wounded, dropping one wing as if broken, limping and rolling over on one side after the manner of a Partridge, Dotterel, or Wild Duck that has young. And yet, at this time the eggs were only incubated seven days. I know of no bird except the Nightjar that will use every wile it knows to decoy you away from its eggs when these have been but little sat on. Hosts of birds exercise this instinct in defence of their young. The eggs they leave to look after themselves, and where these are protectively coloured (*e.g.*, the Plovers), the eggs will frequently escape notice. In the case of the Nightjar, the bird itself is eminently protected, and the eggs are the exact reverse. This the bird knows, and will almost allow you to take her in your hand before she will expose the underlying eggs.

The Nightjar is an aberrant bird in many respects ; the newly-hatched young form a case in point. In their peculiar surroundings it would be fatal to them to be born naked and helpless, as happens with most of the birds in this polymorphic Order (*Picariæ*). On the contrary, they make their appearance in the world clothed in down, and the colour is nearly as protective as is the mottled plumage of the parents. The newly-hatched nestlings that I have seen, did not appear to be endowed with much power of voluntary locomotion at first, and seemed to be rather helpless. But one observer states that he picked up two newly-hatched young and set them side by side on his hand ; one of these remained quiet, but the other jumped off and ran like a chicken to the roots of a bush near by, where it squatted.

I have known the position of young birds shifted—perhaps only two or three feet, sometimes much further—after the nest had been discovered. But I always attributed this to the parents and not to any active movement on the part of the chicks. At any rate, I have never induced any newly-hatched nestlings to use their legs at all when disturbed. For the first few days they appeared perfectly helpless.

Nightjars, like the Stone Curlew, do not seem seriously bothered by bright daylight. They evidently dislike being disturbed, but once on the wing, their flight is swift and active, and they may travel a considerable distance before again seeking cover.

Sheppard and Whitear, in their catalogue of Norfolk and Suffolk birds, published in 1825 (*Trans. Linn. Soc.*, *xxv.*) observe : “ We have twice seen a Goat-sucker hawking about in search of food in the middle of the day ; and upon one of these occasions the sun was shining very bright.” I have seen them myself hunting before sun-down, but never in full daylight.

Booth, in his “ Rough Notes ” under Nightjar (Part iii.) gives

some interesting notes on the species when engaged in migrating (crossing the Channel) :

“ Every other migrant I am acquainted with pursues its course with but slight deviation from the point for which it is making ; these species, however, may frequently be observed hawking about over salt water in much the same manner as a Swallow or Martin over a pond or river. On one occasion I carefully noted the movements of a party of two or three of these birds skimming round the steamboat from which I was watching them. The sea was without a ripple ; and every action, as they rose and fell in the air or darted over the surface, was plainly visible ; and I was easily able to keep them in view for at least a quarter of an hour, though now and then at a distance of three or four hundred yards. To the best of my recollection I have never noticed one of these birds at sea after eight or nine o'clock in the morning ; and I believe they generally reach the coast at a still earlier hour. It is a singular fact that, although they by no means hasten their journey over the Channel, and remain (as previously described) for a considerable time either searching for food or sweeping in a sportive manner over the surface, I have never noticed one so engaged over any of the inland waters in the neighbourhood of their summer haunts. I have studied their habits in the vicinity of the highland lochs and the larger broads in the eastern counties, and have been unable to record a single instance where they followed their prey over the surface of either loch or broad.”

A Thorpe gunner—and a very good observer too—told me that he saw a Nightjar “ fishing ” on the mere about sunset, September 6th (1898). He watched the performance for a quarter of an hour or more. The bird seemed to plunge into the water “ like a little owd Tern,” as he expressed it. In this case, I make no doubt that there were a number of moths, or other suitable prey, flying just over the surface of the water, or actually fluttering in the water, and, in order to seize them in its flight, the Nightjar “ stooped ” at the insects like a hawk, on each occasion the body of the bird touching the water, and raising a small cloud of spray, and so giving rise to the idea that it was actually engaged in fishing.

Nightjars possess the habit of casting up the indigestible parts of their food in the form of long pellets. These are frequently found on the ground about their diurnal resting places, and afford clear evidence of their presence in the neighbourhood.

One last word : despite all the suggestive names which have been lavished on this bird, it is *absolutely harmless* ; indeed, not many are more beneficial. It is a voracious feeder, and its diet is not only purely insectivorous, but it is mainly of insects which are actively noxious, like the cockchafer.

The game-preserve has no cause of complaint against the Nightjar, which deserves protection at the hands of sportsmen, farmers and naturalists alike.

A bird of great beauty and exceptional interest ; one can only express the pious wish that the " buzzing Dorhawk " * may long flourish in our land.

FIG. 11.

THE STONE-CHAT (*Pratincola rubicola*, Linn.).

The name " Stone-chat " is not a very happy one ; Macgillivray long ago (1839) pointed out that of our common Chats, the *Wheatear* was the true Stone-chat, while the so-called Stone-chat, and its close ally the Whin-chat, should more properly be called *Bush-chats*. On these grounds, he describes our Stone-chat under the name *Black-headed Bush-chat*, and this is certainly a far more suitable one than that in common use to-day ; but in the matter of names, we are a very conservative people ; once a name, good or bad, has taken root and becomes firmly established among us, it takes something more than a pinch of common sense to eradicate it. *Stone-chat* it was and *Stone-chat* it will be to the end of time !

*'Tis spent—this burning day of June !
 Soft darkness o'er its latest gleams is stealing ;
 The buzzing dor-hawk, round and round, is wheeling,—
 That solitary bird
 Is all that can be heard
 In silence deeper far than that of deepest noon,
 —WORDSWORTH, " The Waggoner," canto i., lines 1-6.

The " Bush-chats " differ from the other Chats, in having streaky upper tail-coverts in place of *white*, and in their shorter tails. In their habits, they are more suggestive of Fly-catchers. Both genera are included in the sub-family *Turdinæ* (our Thrushes, Red-starts, Nightingale, Robins, etc.), in which the young differ from the parents in having their first plumage *spotted*.

Of the three Chats which visit this country, the Wheatear and Whin-chat are summer visitants only : the Stone-chat is a *resident* species, or, to speak more correctly, is to be found in most of its favourite localities all the year round. As our knowledge of migration has increased, and evidence accumulated, it is more and more brought home to us that few, if any, birds are really " resident." The Robin which breeds in a garden in the Western Highlands, shifts his quarters further South as the winter approaches, and his place is taken in the same garden by a Robin that bred further North.

With very few exceptions, I believe that every bird does migrate, or indulge in local movements to some extent, with the change of the seasons, and I certainly think this is true of the Stone-chat, which can be seen on these Suffolk moorlands, more especially such as actually border the coast, with certainty and regularity any day in the year. The *species* is constantly in evidence ; but the *individual* birds frequenting the commons in summer are not the same Stone-chats that we found in the same localities in winter.

I have selected this interesting and most charming little bird in preference to the Whin-chat or Wheat-ear, because it is to be found on our coast all the year through, winter and summer alike, facing the coldest weather with imperturable cheerfulness, and enlivening many a wintry day, when little else is to be seen, with its bright-coloured presence, busy, bustling movements, and pleasant—if monotonous—cry.

By rights, the Stone-chat is a soft-billed insect-eating bird. How they can eke out a subsistence during some of the prolonged frosts our uncertain climate occasionally indulges in, is very remarkable. Take, for instance, the winter of 1890-91, when the ground was frozen hard for a period of seven or eight weeks without a break ; or the winter of 1894-95, when the frost lasted even longer, and the northern Thrushes, hard-billed Finches and other birds, were dying in all directions literally by hundreds. Yet, among the victims I never found a single Stone-chat. They, to all appearance, were untouched by the desolation which encompassed them. A walk along the " Bentlings " fringing the coast would reveal five or six pairs, serenely happy in their wintry surroundings ; full of life and movement, boldly following the intruder from bush to bush, flirting their short tails over their backs, and scolding incessantly, until they had driven him out of their " compound."

The Stone-chat is so common a bird that probably everyone is familiar with its general appearance ; the black head, incomplete

white collar, rich chestnut breast and rather stumpy tail, which in life is hardly still for a moment. In the autumn, the male loses something of his beauty; the sharpness of definition between the black, white and chestnut becomes blurred owing to the feathers being edged with reddish-brown; and the actual colouration of the throat and breast is duller.

The sexes are, of course, very different in plumage; the female is much more sombrely clad, and is more or less protectively coloured for nesting purposes.

The Stone-chat makes his headquarters on the commons where there are plenty of gorse-bushes; they spend the whole year round in the proximity of gorse; whether on the heather moorland, or the warren, or the sandy cliffs facing the sea, gorse-bushes seem a necessity—if they are wanting, so is the Stone-chat.

The birds are, moreover, curiously selective in the sites they choose for their homes. Of the commons they seem to love best the “poor” commons, *i.e.*, those on which there are poor “rights,” and which are, in consequence, rather closely cropped by the common-holders for litter, kindling and so forth. Best of all, they love the rough “Bentlings” bordering the sea-shore. On the larger moorlands they may be seen, if gorse-bushes are present, but not in the same numbers as on the “Bentlings” or poor commons. If the moor consists of heather and nothing else, the Stone-chat is rarely present.

They are a very determined and pugnacious species, and once they have selected a home, they do not willingly permit any other bird to encroach on their property. Thus, you may know of six or seven pairs of birds along these particular “Bentlings,” but each pair claims ownership of a certain district, and allows no other Stone-chat to trespass over the boundary. They treat human intruders much as they do their own kind.

When such an one appears on the scene, both birds—unless the female is sitting—fly out to give battle, and scold and storm until he is over their “march.” If you walk along this coastline path you will frequently fall in with these birds, and each successive pair behave in much the same way. As you approach within some 50 yards of their favourite spot, they appear, perched on a bramble-bush or some convenient twig, or on the prickly wire-fence or railings bordering the path, uttering their “u-tick, tick” note and cocking their tails in fury. As you draw dangerously near, they drop under the bank and out of sight for a moment, only to reappear a few yards further on and repeat the same scolding. So they will follow you with intermittent abuse until you have passed beyond their jurisdiction. A hundred yards further on you will meet a second pair, and they will treat you with the same contumely.

Unlike the Wheat-ears, the bush-chats are essentially perching-birds, and one rarely or never sees them on the ground. On some gorse-bush on their own compound—or any railing or fence that is

handy—they take up their position, and from here they make excursions after insects, much in the manner of a Fly-catcher, capturing the prey in the air, and returning after each expedition to the same perch.

In the *summer*, the food consists almost entirely of insects taken on the wing.

In the *winter*, larvæ, insects, especially beetles, lying dormant under the bark or in the crevices of the gorse-stubbs, form a small portion of their diet ; but in the main they depend on seeds of one kind or another to keep them from starvation. I have even seen them in the stack-yards with the sparrows.

The necessity of obtaining a supply of seed through the winter is, I think, one of the reasons which causes them to favour these "Bentlings" so much with their company. Below on the sea-shore grows the mat-grass or sea-reed (*Psamma arenaria*) which we call "bent-grass" (hence our "Bentlings") and people in Norfolk "marram-grass." This plant fruits rather late in autumn, and the seed appears to remain a remarkably long time "in the ear." I have noticed all kinds of birds feeding on these rushes, notably the Reed- and Snow-bunting. Where it abounds, I believe this seed forms the staple diet of the Stone-chat in winter, though no doubt they secure many other varieties of seed in addition.

It is an interesting instance of an aerial-insectivorous bird adopting ground-feeding habits out of necessity. Either the bird must *migrate*, like the other Chats, or, if it is to stay and live, it must evolve an entirely new form of catering. This, as it seems to me, is what the Stone-chat has done.

The song is short and rather insignificant, but it is pleasing so far as it goes, the more so as but few birds are in song by March. It is a very incomplete song, generally uttered in the air, sometimes from the topmost twig of a gorse-bush or other perch, but in either case it stops short just as you think the theme is going to develop itself. It never seems to get beyond the first few bars of the introduction.

The Stone-chat is a very early breeder, much earlier than most books would lead one to suppose. The nest is well concealed, and is considered rather difficult to find. It is curious that this should be so, for they are quite extraordinarily sociable birds, always appearing to choose a position where they can see a good deal of life, and where something or someone is continually passing.

Moreover, having chosen a site for the nest, they are never far away from the spot. Day after day you pass, and day after day you see the same pair of birds in much the same place. They scold you out of their neighbourhood as quickly as possible, and use a good many wiles to indicate exactly where the nest is *not* ; but you know that if they are breeding, the nest must be at no great distance from the gorse-bush where you habitually see them. As the nest will certainly be made in a gorse-bush, and that probably a

low-stunted one of $\frac{1}{2}$ –2 feet in height, the position of the nest in a 20–30 yard circle becomes, by a process of elimination, rather narrowed down. I do not think, using ordinary intelligence, and knowing *when* to look for them and *where*, that the nests are as hard to find as is generally supposed.

A full clutch of eggs varies in number from four to six. The earlier clutches seldom exceed four or five : I have never found six eggs before the latter end of April or beginning of May, and it is probable that the increased fertility at that time has some relation to the more abundant supply of food, and to the higher average temperature. In colour, when fresh and unblown, they are a delicate Cambridge-blue with an almost pinkish tinge from the contained yolk. This blue ground is lightly freckled with pale rust-coloured spots, especially towards the larger ends. After being blown, and particularly after being kept in a cabinet for some time, they fade and lose a great deal of their beauty.

The nest, as far as my experience goes, is *invariably* placed in a small, stunted whin-bush ; always close to the ground, and often enough built up from the ground. In structure, it varies a good deal according to the bush chosen, for in some cases the nest is built up in the whin to reach some required level, and is then exceedingly bulky owing to the large foundation ; while in others, where the whin is very small, the nest rests directly on the ground. It is not one of the best examples of avian architecture, being rather loosely constructed of coarse grass and moss, and other oddments, gathered in the neighbourhood, and finished with finer grasses, rootlets, rarely a few feathers, and an occasional horsehair.

The Stone-chat, I am sure, is one of those birds which regularly raise two broods in the year, whether the first nest be destroyed or not.

By way of an appendix, I tack on some notes from my diary on the nesting of this bird in 1892 and 1893, which serve to emphasize three of the points I have mentioned, *viz.*, that they are early breeders, choose low whin-bushes, and have a preference for the proximity of a public road. The examples are not *selected* in any way ; it is a record of *all* the nests I found in these two years.

1. Nest and five eggs ; small whin-bush ; “ Bentlings,” Size-well, April 1st, 1893. There is a public footway running along these bentlings, and people are continually passing to and fro. In this case, the nest must have been begun not later than the middle of March.

2. Nest and five eggs ; small flat whin ; “ Bentlings,” “ Tea House,” April 7th, 1893 ; *bird sitting hard*. On blowing the eggs, I found embryos of what I took to be about the fifth day, the lens and iris being plainly recognisable. I saw the cock bird with a

feather in his bill on March 23rd, showing that the finishing touches were then being made to the interior of the nest.

3. Nest and four eggs ; very small whin ; Aldringham common, April 21st, 1892. Eggs *much incubated*. This nest was close to the "Aldringham Square," not more than a couple of yards from the public road and a footpath (a "poor" common).

4. Nest and four nestlings ; small squat whin-bush ; "poor" common, near the second Thorpe railway-crossing, April 23rd, 1892 ; within five yards of the path, and twenty yards of every passing train.

These nestlings were then about two days old. They all remained in the nest till May 6th. On May 5th I took one out, and found it almost fully-fledged and able to fly a little. It seemed quite as big as the parents. It is remarkable that four birds of such a size could have remained in so small a nest. Had there been five or six nestlings, it seems certain that they must have been turned out earlier, unless the internal dimensions of the nest were greatly enlarged. Possibly the future expansion is allowed for by the builders, but the difference in the space required for six small eggs and six full-grown birds as large as their parents, is enormous. It is a fresh proof of the skill of the architect that the walls should be sufficiently elastic to bear the strain. On May 7th there were only two birds in the nest, and one of these fluttered out and down to the bottom of the whin-bush, at my approach. Supposing these eggs were hatched on April 21st, and the young remained in the nest till May 6th, that would give fifteen days as the period during which they stayed in the nest and depended entirely on their parents for food. Probably the parents would continue to contribute the larger portion of their food for another ten days, after they were out of the nest, bringing the date to May 16th. Subsequently, the young birds could look after themselves, and the parents would be free to build a fresh nest.

5. Nest and five eggs ; small whin-bush ; Sizewell Common (a "poor" common), April 23rd, 1892 ; eggs *fresh*. The whin-bush was in a corner between two roads, one a public one and much frequented.

6. Nest and four nestlings ; small whin-bush ; "Parsons Common," Aldringham (a "poor" common), April 26th, 1892. Bush not far from road.

7. Nest and four eggs ; small whin-bush ; Dunwich Common, April 29th, 1892. Eggs *much incubated*. Nest close to road.

8. Nest with two nestlings and three eggs ; a rather larger whin-bush, and not very close to any public path ; Westleton Common, April 29th, 1892.

9. Nest and six eggs ; small whin-bush ; Aldringham Common (a "poor" common) ; eggs *fresh*, May 5th, 1892. I have every

reason to believe that these eggs were laid by the pair robbed on April 21st, 1892 (No. 3 in this list). The number of eggs is rather remarkable for a second laying.

FIG. 12.

THE SHORT-EARED OWL (*Asio accipitrinus*, Pallas).

Of the four common British Owls, the Tawny, Long-eared, and Barn Owls are resident species in suitable localities—that is to say, they can be found at any time of the year ; that is all I mean to convey by the term resident.

The remaining Owl is in the main a winter migrant to Great Britain. In the north of England, Scotland, and the Orkneys, nests of the Short-eared Owl are not very rare ; while in a few favoured localities further south—notably in Norfolk and Suffolk—this bird is still found breeding in small and ever-decreasing numbers. Prior to the reclamation of the great fen districts in the eastern counties, there is every reason to believe that the species was by no means uncommon in the breeding season.

The Short-eared Owl reaches our coasts in autumn, the first arrivals alighting on our shores in the last days of September or early in October. From thence onwards to the close of November, or even later, the numbers gradually increase. In the early spring

they take their departure.* These movements correspond very closely with the migration of the Woodcock. Indeed, the vulgar name for this Owl in Suffolk (and many other parts of England), the *Woodcock Owl*, is founded upon the close association of the two species in their journeyings to and from the country. The first Owls generally appear—like the Woodcock—early in October, travelling by night, and dropping on our shores while it is still dark. With gales from the east and north-east, which probably baffle and delay them considerably, I have seen birds coming in from the sea during the hours of daylight. They are then generally greatly exhausted, and tumble into the nearest cover that presents itself—the rushes fringing the shore, or the “Bentlings” a few yards further inland.

On one occasion, I saw an Owl and a Woodcock “make” the land at the same time, and drop on to a rough, grassy bank within twenty yards of each other. As a rule, however, one sees little or nothing of the migration; one only knows that it has taken place by finding the Owls in abundance on the moorlands, rushy marshes or root-fields, where none were present the previous day.

The Owls I have actually seen on migration have been single birds or at most a pair; but there is little doubt that ordinarily they migrate in small parties of ten or a dozen together. Their headquarters are either big, heathery commons, or rough, ill-kept marshes overgrown with coarse vegetation. Here they usually stop for some months, unless they are grievously persecuted, or the food supply gives out. The largest flocks reach our coast in November; from thence onwards the Owls may be found generally distributed, and are frequently flushed by the guns from the root-fields.

This Owl is essentially a bird of the *open* moor and marsh differing markedly from its congeners in this and many other respects. Like the other Owls, it is by rights a nocturnal feeder, lying hid in some bracken-thicket, furze-bush or patch of rushes during the day and emerging at night to satisfy its hunger. But, while the other Owls are peculiarly helpless and stupid, and tumble into the first shelter they can find, if driven out of their gloomy resting-places into the daylight, the Short-eared Owl does not seem inconvenienced at all by the brightest sunshine, but skims off in front of the guns with rapid easy flight, for perhaps a couple of hundred yards before again seeking cover. One may even see them on the wing when there has been nothing to disturb them, quartering the ground in

*E. T. Booth’s “Rough Notes,” under *Short-eared Owl*, says:—

“We are also visited in the spring by a few stragglers that have passed the winter on the Continent. On several occasions, usually soon after daylight, I have met with single birds in advanced breeding-plumage within a short distance of the English Channel, both in Kent and Sussex, the date of their appearance being from the middle to the latter end of April. I particularly noticed that these birds seemed lighter in plumage than those that passed the winter on our shores.”

[This note has reference to the point I raised elsewhere (p. 126) that very few birds are really *resident*. The Owls that migrate to our shores in winter, head further north. Those that breed with us have wintered further south. The breeding birds are *not* residents.]

broad daylight with the regularity of a setter. In the breeding-season they are constantly seen soaring high in the air over the marsh or moor where the nest lies.

The second and more remarkable difference between the habits of this Owl and the remaining three, lies in its choice of a nesting site. The Tawny Owl breeds in hollow trees, the Barn Owl in disused buildings, ruins and often enough in hollow trees like the Tawny, while the Long-eared Owl selects the densest part of the thickest conifers.

The Short-eared Owl makes her nest *on the bare ground*, either in the heather or on the roughest marshes. Of actual nest there is none; the peaty earth is scratched bare and exposed, and on this the eggs are laid. A few blades of grass, twigs of heather or feathers may be dragged round the eggs to give it the semblance of a nest, and that is all.

The nest is well concealed, as a rule, by the heather bush or clump of rushes in which it is built, but the nest itself is entirely open, and the eggs are uncovered. The plumage of the sitting bird is fairly protective amongst the surroundings of the nest—more especially the marsh nests—but I have not found, in the few instances in which I have been fortunate enough to be able to make personal observations, that the Owl trusts very much to these tints to escape notice. She generally leaves the nest while the intruder is still far away.

On the mainland of Orkney, which is the only place where I have found the Short-eared Owl at all common as a breeding species, I have come across more than one nest on the moors, but never with the bird upon the eggs. One or both parents were usually in the air, and it was generally the “castings,” which are numerous, that guided me in the discovery of the nest.

Returning to the Short-eared Owl in *autumn*. Their numbers vary greatly in different years—plentiful in some, and comparatively scarce in others. Their migrations are governed to a large extent, it may be assumed, by the abundance of the food supply. In the years when they are extra numerous here, the presence of these Owls indicates *either* an abnormally prolific year among the small rodents—field-mice, short-tailed voles, etc.—in Great Britain, *or* an equal dearth of proper food in the northern home.*

There are many instances in this country and abroad, where a plague of small rodents has been followed by the appearance of Short-eared Owls in great numbers, to the manifest discomfort of the mice and the eradication of these pests from the affected districts.

In 1907, they were unusually numerous in our part of Suffolk, making their appearance in about the middle of November. Two of my nephews Snipe shooting on a small fen (November 9th), a

**cf.* 1892.—The great vole plague in Tweedsmuir, Scotland.

See also Ann. Scot. Nat. Hist., 1893, pp. 129-145, *Report of Commission*; and 1893, 202, *Disappearance of Voles* (Adair).

coarse, rushy marsh of only fifty acres, put up ten Short-eared Owls in the course of an hour. At the same time, the keepers told me that the commons at Sizewell and Scotts Hall were full of Owls. A correspondent, Mr. W. A. Pain, in the *Field* (1st February, 1908) wrote: "When in Suffolk about the middle of November last, I was walking along the banks of the river [Alde] at Orford Haven, and in the space of a hundred yards, out of the grass growing on the banks, I counted thirty Short-eared Owls fly up; they rose in twos and threes every step I took, and continued flying over the river for several minutes like a flock of sea-gulls."

The food of the species consists, as I have already indicated, to a large extent of rodents, especially field-mice and short-tailed voles—half-grown rats are sometimes taken. The late Prof. Newton describes finding portions of a *bat* in the stomach of one he examined. Small Passerine birds, more especially the Larks and Pipits, which frequent the open moorland and roost there, are common victims of the Short-eared Owl, while the remains of large coleopterous insects are generally found in their castings. They are said to capture various species of *surface-feeding* fish! This is a statement for which I could never find the smallest verification, and which I entirely disbelieve.

The Short-eared Owl deserves all the protection we can give it. With us it is never shot, and the keepers are forbidden to injure the birds in any way. It is a pre-eminently useful bird, and the good that it does, bulks so large in its life history, that one may fairly draw a veil over an infrequent lapse from the path of rectitude. This Owl is so rare a breeder in the eastern counties, that almost every description has been based upon its habits in the autumn and winter months. It is, of course, quite harmless to game then, and of incalculable service to the farmers. It is the breeding-bird which on rare occasions brings discredit upon the race.

In Norfolk, I personally only know of one place where this Owl breeds; that is on some rough, rushy marshes in the "Broad" district. The Fenmen call the bird "the *Marsh Owl*," a very appropriate name; *c.f.* "Wood Owl" for the Tawny species. No game-rearing is going on anywhere near these marshes, and there is, consequently, no inducement for these birds to offend the game-preserve. But in Suffolk, oddly enough, I don't know of a single *marsh* where this Owl breeds, but there are several *moorland commons* where they nest almost every year. Some of these heathery moors run right up to the Pheasant covers, and are at no great distance from the rearing-fields. It then happens occasionally that a Short-eared Owl will discover the rearing-ground in the course of his nocturnal wanderings, and, in a misguided moment, snatch a young Pheasant.

"*Facilis descensus Averni!*" It is the story of the Kestrel over again. Once they have discovered how easy it is to obtain

a plentiful supply of food from the coops, they prey upon the chicks from the time these are hatched until they reach the size of young Thrushes. No doubt, the first visit they pay to the rearing-field is in the legitimate way of business, in search of rodents. These are often plentiful, owing to the lavish supply of grain scattered about the coops. Once they have taken a Pheasant chick, the game is up; this particular bird and his family will subsist mainly on Pheasants for the next three or four weeks.

Of actual nests on our commons I have seen but two—in 1896 and 1897—both placed in heather-bushes on the extensive Dunwich “walks.” Both were found by the keepers, when searching for Pheasants’ eggs, and were left *in situ* for me to inspect. I believe, however, that the nests are frequently missed, and that a year rarely passes without a pair breeding on these moors.

The eggs vary from four to seven in number.* In two clutches in my collection, the one from Orkney and the other from Suffolk, the former contained four eggs and the latter five. The fertility is said to increase in direct ratio with the abundance of food.

The Short-eared Owl is a very silent bird at all times, and I have never heard it utter a note of any kind except in the breeding season. This note is a short, barking cry, and I have heard it among the Orcadian hills. In Suffolk, I have never heard any sound proceed from this Owl, which I look upon as far the most silent of the four common British Owls.

A keeper, on the ground adjoining ours at Thorpe, told me (1891) that “several pairs” annually bred on the commons on his side. He killed all he came across, as he considered them most destructive to game. Although I tried to combat this view, he continued to shoot them down without mercy. On May 19th (1892), he killed an adult male with incubation spots on the breast, and very large testes, undoubtedly one of a breeding pair. This bird came into my hands through my Thorpe gunner.

On the Crown Farm Common, Sizewell, in 1899, the keeper of that beat told me that he had seen a pair of Short-eared Owls continually in the neighbourhood of the “Square Covert” (a thick patch of whin and broom) throughout May, June and July. He had not found the nest, but he had no doubt they bred there.

In 1891, on September 7th and 8th, I saw a male Short-eared Owl on the evenings of both these days in the same “Square Covert.” The Owl was flushed by a rough-haired terrier I had with me, who was, of course, rabbiting, and was quite uninterested in the Owl.

* Oswin Lee, “Among British Birds,” iv., p. 132, writes: “The Short-eared Owl lays from four to eight eggs; occasionally as many as nine are found. They are deposited at considerable intervals, as it is not uncommon to find half-fledged young and fresh eggs in the same nest.” He describes a nest from Kirkwall. See also “The Zoologist,” December 15, 1908 (iv. ser., vol. xii., p. 467), where J. Whitaker describes finding a nest with eight eggs.

P. Adair, in “Ann. of Scottish Nat. His.,” 1892, p. 222—“The average number may safely be taken at eight to ten, and the number of young reared at seven.” He mentions a nest which contained ten young birds. In the schedule appended to the paper the recorded clutches vary from five to thirteen, and the author gives eleven as a common number.—EDITOR.

The latter was greatly disturbed, hovering close over the dog in evident anxiety. The behaviour suggested young birds unable to fly. Of *me*, the Owl took no notice, often coming within a few yards, his whole attention being given up to the dog. I had, therefore, an ample opportunity of examining it carefully at close quarters, and I have not the least doubt, from its small size and very pale colour, that it was an adult male in summer or breeding plumage.

This brings me to a point which I should like to emphasize. I don't know of any English writer who recognizes that there is a very distinct difference between the summer and winter plumage of these Owls, except that best of all field-naturalists, the late Mr. E. T. Booth.

Professor Newton (Yarrell, 4th Edition) maintains a silence on the question. Mr. Seebohm alludes to various pale and rufous "phases" or geographical-races of the Short-eared Owl, but is evidently unaware that our own bird is rufous in the autumn, and pale, almost sandy-coloured, in the spring.

Mr. Dresser figures an adult female in what he calls "the ordinary dress" (really *autumn* plumage), and "an old male in pale plumage," the latter being the ordinary *breeding* dress of the bird.

Mr. Booth figures an adult male in summer (the so-called "pale form" of other authors) with two nestlings; and on a second plate, a bird in ordinary winter plumage. The sex is not stated, but I imagine, from the size, that it is a female. In the letter press, he draws particular attention to the very marked difference between the summer and the winter dress.

In conclusion, I would remind you that the terms "*long-eared*" and "*short-eared*" are entirely misleading. The so-called ears are simply tufts of elongated feathers springing from either side of the crown of the head above the facial discs—for purposes of expression, they are somewhat analogous to our eyebrows—and have nothing whatever to do with the organ of hearing. In the Short-eared Owl, these tufts are about three-quarters of an inch long, and consist of only four or five feathers. As these "ears" can be raised or depressed at will, the tufts are, presumably, operated on by a pair of symmetrical cutaneous muscles.

4th February, 1909.

VI.—Loose Leaves from a Shooter's Diary.

VI.—LOOSE LEAVES FROM A SHOOTER'S DIARY.

I. INTRODUCTORY.

You will remember in "Alice thro' the looking-glass" the various subjects that the Walrus offered for debate to the party of Oysters accompanying the Carpenter and himself. It was at the end of the walk and before the final tragedy :

"The time has come," the Walrus said,

"To talk of many things :

"Of shoes and ships and sealing wax,

"Of cabbages and kings,

"And why the sea is boiling hot,

"And whether pigs have wings."

I am a little alarmed lest you may fail to find any connecting thread running through the notes I propose submitting to you in this chapter. You may feel that these natural history notes are a jumble of independent subjects, dragged together without care, and without cohesion, much as the topics chosen by the Walrus appear at first sight to lack that relevancy which the Oysters had every right to expect.

The defence of the Walrus does not lie with me, but I think it would be wise, before I go any further, that I should explain the plan of my own paper, and indicate, as far as I may, the connecting links.

The *food* of birds is a matter of great economic importance. It is also a matter which has been very imperfectly investigated so far in any country. Hungary and Germany are far in front of us, but the Hungarian Minister of Agriculture admitted as recently as 1907, "that even to-day we have practically no detailed knowledge concerning the food of birds."

Our own Board of Agriculture is far behind either of the above.

Birds from an economic point of view may be divided into three classes :—

1. Those that are entirely useful.
2. Those that are entirely injurious.
3. Those that have a mixed record, doing both good and evil.

All three groups, but especially the last, need the collection of a vast amount of material obtained by dissection, and by the examination of the contents of the crops and stomachs. These would have to be tabulated and analysed, in order that a proper balance sheet could be drawn up, with a profit and loss account made out for each individual species.

In the majority of cases, the account would show items on the *Dr.* and *Cr.* sides, and a study of these items would enable an observer to say: "in this species the good preponderates over the evil and the bird is *useful*, in that species the reverse condition obtains and the bird is *harmful*."

Until we have acquired a much wider and more accurate knowledge of the food of birds, it is a mere waste of time to discuss their different economic values.

Mine is a very small contribution towards this neglected subject. I deal with the food of the three Scotch Grouse—the Red Grouse, the Black-game, and the Ptarmigan—and incidentally of the Cuckoo.

Of the three game birds, I have upwards of 100 skins of each species in my collection: every skin has a label attached to it, giving in detail the contents of the crop, gullet and gizzard found in that particular specimen, together with other particulars with which we have no present concern.

The bulk of these Grouse were collected during the different months of the shooting season from August to December, and a pair in each month of the close season, so that a digest of the total results in over 100 examples gives reasonably accurate data for constructing a diet table throughout the year, as applying to the particular ground where the birds were shot.

These grouse were obtained at Barcaldine, an Argyllshire moor about 10 miles as the crow flies N.N.E. of Oban on the shores of Loch Crearan.

Barcaldine is well furnished with moor, woods and hills, these latter reaching an altitude of upwards of 2,500 feet. The ground, therefore, presents the necessary requirements for the Red Grouse, for Black-game and for the Ptarmigan, and all three species are found there in some numbers.

As to the arrangement of the paper, I have

Firstly, dealt with the contents of the crops of a few Black-game shot in the latter half of October. These notes are of rather exceptional interest, as will be seen later on.

Secondly, I have dealt with the chief food plants themselves.

Thirdly, I have made some remarks on Hairy Caterpillars, which are generally numerous on the moor in summer and autumn, and this has led me to speak of the Cuckoo and its diet; and

PLATE II

F. M. OGILVIE
ON THE MOORS, BARCADDINE, ARGYLLSHIRE.

Finally, I have touched upon a Hairy Caterpillar which does not occur in this country, but is common in parts of Europe, and which in the locality where I observed them, seemed likely to destroy all the coniferous trees within reach.

The greater part of this chapter is therefore concerned with plants or insects, and only indirectly with birds. Of the two former subjects, I must confess at once that I have no claim to speak with any authority. My acquaintance with the sciences of Botany and Entomology is of the slightest. So that, while I must ask you to accept my observations as facts, I would caution you that any theories I may deduce from their consideration should be viewed with suspicion.

II. BLACK-GAME—CROPS.

October, 1907.

In the latter half of October, 1907, I was shooting at Barcaldine with four other guns, and amongst the game obtained were a number of Black-game, male and female.

I examined the contents of the crops of all the birds shot, and carefully recorded them.

At this season of the year, very few of the Black-cock had come into the woods and birch patches; at least we seldom found them there. They were mostly out on the open moor or in the brackens covering the lower slopes of the hill.

Over the entire moor, from one end to the other, wherever we went, we found the large, hairy larvæ of the Fox Moth (*Bombyx rubi*) in quite extraordinary abundance. It was difficult to avoid treading on them as we walked, and I believe we could have gathered thousands in the day, had we set about collecting them. Their food is the heather, and it is probable that the quantities of larvæ observed by us must have taken rather a heavy toll of the valuable plant.

These hairy caterpillars were not eaten by the game birds. Out of a large number of Black-game, Grouse and Ptarmigan examined, I never found a solitary example in any one of their crops, though an occasional smooth-skinned larva was present. The Grouse and the Black-game must have been moving about all day long among these hosts of hairy caterpillars, yet never a one would they touch. The Ptarmigan living above the level of the heather growth would probably not come in contact with them; at any rate, none of the crops I opened contained an example.

The abundance of these larvæ, and their immunity from attack by birds—at least by game birds—led me to wonder what natural enemies they had to face, which would keep their numbers in check and prevent their overrunning the land like an Egyptian plague.

Professor Poulton, to whom I applied for information, very kindly wrote: “. . . but their real enemies are insect parasites, both hymenopterous and dipterous, laying their eggs in the living larvæ.”

I cannot help extending my sympathy to the caterpillars. The trade of the Ichneumon, however necessary it may be for Nature's purposes, seems a peculiarly nasty one.

The female deposits her egg in the living larva. This hatches and feeds upon its host, carefully avoiding vital parts, so that the unfortunate animal goes on assimilating food for the benefit of the parasite dwelling within him.

It is pleasant to think that the parasite is sometimes preyed upon by another parasite. “Wheels within wheels,” as Mr. Sam Weller sagely remarked on one occasion. The first Ichneumon deposits its eggs in the caterpillar; the second Ichneumon, coming along and noticing, perhaps, the abnormal rotundity of the unwilling host, pierces both the host and the contained parasite with her ovipositor, and deposits her egg in the body of the latter. The primary host does not benefit at all by the proceeding, but one imagines that a thoughtful caterpillar must feel a certain amount of satisfaction at the educational process parasite number one is undergoing.

Returning to the Black-game and the food they *did* eat; we found a very considerable variety of plants—blæberry, heather, plantain, berries of the mountain ash, etc., etc. I won't bother you with a detailed list, but only draw your attention to the two articles of food which were found in practically every crop in large numbers:

1. A small dark brown beetle.
2. White wafer-like bodies, which I took to be some kind of seed. This “seed” was ivory white in colour, circular in shape, and in size very comparable to the confetti used at weddings. Further, they were plano-convex, one side flat and the other swollen or bulging.

I was quite ignorant as to the plant to which the “seeds” belonged, and equally ignorant of the name and habits of the beetle. I therefore sent the “seeds” on to Kew, and the beetles I bottled in formaline, and in due course forwarded them to Commander Walker for identification. Pending the arrival of the Kew report, I indulged in some deductive logic, and evolved a theory!

Since all the crops of the Black-game contained numbers of “seed” and beetles, both these must exist in quantity; and it seemed a reasonable inference that the one was in close proximity to the other; and that both were gathered at the same time.

An umbelliferous plant with its long, hollow stem and crown of radiating seed-vessels, would exactly fill my requirements.

The beetles would have taken up their winter quarters in the

dried stem, and the ripe seed on the top would be awaiting the advent of the harvester.

The hungry Black-cock would, first of all, tap the stem in various places, and extract the beetle, and finally level the plant and eat the seed.

I described the kind of plant that had occurred to me in my dreams to the keepers and gillies. They knew nothing of it. I looked for it myself with an entire lack of success. I still have a sneaking fondness for my theory, but I am bound to admit that no such plant existed, and that the foundations on which I built were laid in sand!

Before I received the Kew report, my views suffered a rude shock.

Walking out onto the moor one day, we had to pass along a road overhung with oak trees. There had been a heavy wind during the

FIG. 13.

night, and the ground was strewn with fallen oak leaves, but this was not the particular feature which arrested my attention. The road was besprinkled for its whole length with minute white confetti, looking as though a bridal party had just passed over it; and when I picked up the confetti, and examined them, I discovered that they were identical with my "seed." On the fallen oak leaves we found numbers of these bodies attached to their under surface, and a plentiful crop on the living leaves still attached to the tree (Fig. 13).

The secret of my supposed "seed" was now revealed; they were common "Spangle Galls," produced by "Gall-wasps" (*Neuroterus lenticularis*).^{*} This was confirmed by the authorities of Kew.

^{*}Hymenopterous insects of the family *Cynipidæ*, whose favourite plant-home is the oak, and whose reproduction follows an alternation of generations (parthenogenetic and sexual alternately). In the species referred to here, the *Neuroterus* generation is parthenogenetic and produces larvæ, which develop into the *Spathogaster* (sexual) generation, from whose eggs, again the *Neuroterus* form is reproduced—and so on in a repeated cycle of alternations of sexual and asexual generations.—EDITOR.

My next enquiry concerned the effect the spangle-galls produced on the oak tree. I asked a distinguished professor of agriculture, who was also much interested in arboriculture, whether the galls were injurious to the trees. To my astonishment, he replied that they did little or no harm, and he did not consider them of any economic importance.

I cannot believe that this view is correct. A single oak-leaf will have the under-surface studded with some 40 to 50 of these galls. I could not find a tree that was unaffected; practically every leaf had these galls attached in quantity.

The physiological functions which leaves perform are, of course, a vital necessity to the plant, and it seems to me impossible to believe that a leaf covered with galls is able to carry on its chemical processes as well as a leaf which is perfectly free from these products of insects. The leaves are really affected with a parasitic disease, which must in the end damage the growth of the timber.

The destruction of these galls in large numbers by the Black-game should be counted to them for righteousness.

There remains for consideration the small dark brown beetle, which, like the spangle galls, was present in quantity in every crop examined.

I am greatly indebted to Commander Walker not only for their identification, but for many other facts which he gave me concerning their life history.

The beetle proved to be *Lochmæa suturalis*, belonging to the plant-feeding section of the *Coleoptera*.

The Black-game, male and female alike, were loaded with these beetles: on a very rough estimate, I calculated an average of about 300 beetles to each crop examined. I multiplied the probable number of Black-game on the estate by this figure, and arrived at the sum of 90,000 beetles as the daily ration eaten by this one species of bird.

In reply to my question, Commander Walker wrote: "As far as I know, *Lochmæa suturalis* has never been regarded as a destructive insect."

Some months later, I wanted to find a bird paper in a back volume of the "Annals of Scottish Natural History." There are nineteen volumes and no general index, so that a search must be conducted volume by volume. While so engaged, I stumbled quite accidentally on a paper by Mr. Percy H. Grimshaw with this title: "Note on the life history of *Lochmæa suturalis*, a beetle destructive to heather."*

I will deal with this naturalist's view in the next section, under the heading of food plants.

* 1898, p. 27. See also E. B. Poulton, Journ. Entomological Soc., 1908, "Insects and other Foods of Black-game."

III. FOOD PLANTS. GROUSE, BLACK-GAME, PTARMIGAN.

With regard to game, the heather or ling (*Calluna vulgaris*) is by far the most important food-plant in Scotland. This, together with *Erica cinerea*, and some other species of heath, forms the staple diet of the Red-Grouse all the year round. It is eaten in some quantity by the Ptarmigan, and is entirely neglected by the Black-game, especially in the summer time. Thus, of the three Scotch Grouse, the Red Grouse depends for its existence on a plentiful supply of heather, while the other two benefit by its presence, but can find a living in its absence.

Heather is also the main food of the black-faced highland sheep, affords grazing for cattle, and is a vital adjunct of "forested" ground, more especially in the snow of winter, when it may be the only food the red-deer has between himself and starvation.

I don't think that here in the South we quite realise the importance of heather. If it were possible, by some miraculous process to destroy suddenly the whole of the heather in Scotland, the two most essential rural industries—*sheep*-farming and *grouse*-farming—would automatically come to an end, at any rate in the Highlands. The abundance of heather on the moor, the health and proper cultivation of the plant, are matters of first-class importance to the farmer and to the game-keeper. Both are actuated in the main by the same object, but, unfortunately, they do not always see eye to eye in minor details in the execution of the purpose they have in view. That purpose is to keep a constant growth of young heather coming on year by year, in order to supply a sufficiency of food for their respective charges. They achieve their end by systematically burning regulated strips or patches of heather each spring, so that, on a well-managed farm, every part of the moor should come round for burning about once in ten years. The burnt ground of the year is valueless as regards food; that of the second and third years yields a fine crop of young, juicy heather shoots; of the fourth and fifth years coarser food and fair cover; while the "big" heather of seven or ten years is of service as a refuge from birds-of-prey and very stormy weather. In winter, when the snow lies deep upon the ground, this big, rank growth may be the only heather that bird or beast can get access to until the snow disappears.

Now, there is at the present time a considerable amount of heather in Scotland, at any rate on the western side, which is *diseased*. I do not know of a single moor in the neighbourhood of Barcaldine which does not suffer more or less, and I imagine that the disease is common all over Scotland, and, further, it is tending to increase. This diseased heather is often spoken of by sportsmen and keepers as *frosted* heather; in outward appearance there is some justification for the name. A well-defined patch of previously

healthy heather turns brown and withered, much as though it had been nipped by a severe frost. But a further inspection will show that this result could not be due to either wind or frost, for the heather surrounding the rotten area, which must have been subjected to exactly the same climatic conditions, is green and healthy. It is not due to age or omission to burn, for the disease may appear in heather of any age, and as a matter of fact is least common in very old, rank heather. As far as I am aware, the cause of this disease remained a mystery until the appearance of Mr. Grimshaw's paper, to which I have already referred, published in the "Annals of Scottish Natural History" for 1898, and I do not know that even now his conclusions are universally accepted. Mr. Grimshaw is on the entomological staff of the Natural History department of the Royal Scottish Museum, Edinburgh. He is also the entomologist, or one of the entomologists, on the Grouse disease inquiry, and will be responsible for the twenty-second chapter of the report of the committee, when the long-expected volume appears. This chapter is devoted to the life-history of the heather-beetle and the damage it causes. Mr. Grimshaw may, therefore, be considered a very high authority on this subject to which he has devoted so much attention. The "Report of the Committee" has not yet issued from the press, so I do not know his latest views, but I will summarize very briefly his original paper of 1898.

In August, 1897, Mr. Grimshaw received from a correspondent in Ayrshire a root of heather infested with a small whitish grub. The correspondent further stated that this grub had destroyed many acres of good young heather in his district, causing the shoots to become quite withered and brown. As the material sent was rather scanty, Mr. Grimshaw applied for more, and received three large patches cut from the moor, two of them badly "frosted" and the third unaffected. From the two infested pieces he picked every day for a week or so, freshly emerged specimens which he identified as *Lochmæa suturalis*; and, as a vast number of examples of this insect, in all stages between that of the full-grown larva and the perfect insect, were found buried amongst the roots of the heather, he was enabled satisfactorily to refer the damage to this species.

If we could total up the acreage of this "frosted" heather over the whole of Scotland, we should run into very large figures, certainly thousands of acres, all apparently the work of this pernicious little beetle.

It is unlikely that the Black-game can keep pace with them, but their efforts in that direction must be highly beneficial, and farmers and game-preservers alike should shower blessings on their heads.

Next to the heather, perhaps the most important food plant is the Blæberry (*Vaccinium myrtillus*), known in England as the Bilberry or Whortleberry. It is widely distributed on the moors—

it exists in quantity at Barcaldine on the summit of the two big hills (2,324 feet and 2,687 feet), and is found in the woods right down to the loch side. The fruit is ripe in September, but so eagerly is the plant sought after by sheep and cattle, Black-game, Grouse and Ptarmigan, that it is quite difficult to find a specimen that is allowed to grow to fruiting size, except in some steep, rocky ravine where it escapes the attention of both quadrupeds and birds.

At 2,500 feet, the plant is quite plentiful, and it is seldom one shoots a Ptarmigan at any time of the year (unless there be deep snow) without finding a fair proportion of the leaves and stunted stems of the blæberry in the crop. But it is only leaves that the Ptarmigan secure, as the scour of the wind on the hill-top and the constant attention of the sheep and the birds keep the plant close trimmed, and never allow it to grow to its normal size and fruit. Down in the woods clothing the lower slope of the hill, fallow-deer, cattle and Black-game hunt after it, but, owing to protection from the surrounding trees and undergrowth, the plant holds its own to some extent, and may bear fruit. Next to the buds of the birch, it is the most important winter food for Black-game, and I have shot more than one Black-cock in December with a fully distended crop, the contents of which, on examination, were found to consist of nearly equal proportions of the green but leafless stems of the blæberry, cut up into half-inch lengths, and birch buds with a certain amount of twigs pulled off with the bud.

The food plant that comes next in importance is the Crowberry (*Empetrum nigrum*). [The Gaelic name of this plant, or rather the English rendering of the Gaelic name, is *Ravensberry*, and it seems a little difficult to account for the association of the crow tribe with this particular berry.]

It is a dwarf spreading shrub, which fruits freely in the autumn, and the shoots are eaten by the game all the year round.

It is essentially the plant of the Ptarmigan. At Barcaldine, I do not think the crowberry grows much under 1,500 feet; from 1,500 feet to 2,600 feet, which is our highest top, it is plentiful on most parts of the hills; where it is absent, it is noticeable that the Ptarmigan are generally absent too. In fact, the Ptarmigan-ground commences at about the same level as the crowberry, and the distribution of the one appears to be dependent on the presence of the other.

In the autumn, when the dark blue berries are ripe, they are greedily devoured by the Ptarmigan. The droppings of the birds are stained a deep purple, and the crops of those shot will be found loaded with the fruit and leaves of the plant, together with blæberry and perhaps a twig or two of heather.

But the real importance of the Crowberry as a food-plant makes itself evident later on, when the "tops," which the Ptarmigan frequent, are covered with snow. This sturdy creeping plant cares little for wintry cold. It stands sufficiently high to be seldom

entirely buried ; at any rate in the more sheltered places, *e.g.*, the lee-sides of rocks, and so on. Here one finds the footmarks of numerous Ptarmigan that have been scratching their dinner out of the snow. Of course, the weather may become so severe, and the fall of snow on the hills so heavy, that the Ptarmigan are driven down below the crowberry limit, and on to the heather-ground, in order to find any subsistence at all. But it is very evident that they are uncomfortable in their new quarters, and they will return to the higher slopes at the earliest possible opportunity. It is probable that their white winter coats are rather a source of danger than protection to them at the lower level. What the heather is to the Grouse, the crowberry is to the Ptarmigan.

Of the other edible fruits that grow on the low moor, we have the Cranberry (*Oxycoccus palustris*), the Bearberry (*Arctostaphylos uva ursi*) and the Cloudberry (*Rubus chamamorus*). None of these are of prime importance as food-plants, but the fruits are all eaten by the Grouse, so that a knowledge of their whereabouts is often of service to the shooter pottering about after Grouse in the autumn.

The Birch (*Betula alba*), as I have already indicated, is a most important food plant. From the end of November to the close of February, the buds of this tree are the chief food of the Black-game. On any moor that carries a head of Black-game, these birds will be found in small packs in the birch patches at this season, clinging to the rather slender branches and diligently picking off the buds, and often a good deal of twig along with the bud. The majority of birds shot in December and January will have their crops fully distended with birch buds and twigs and nothing else.

If for any reason the supply of birch buds fails, the Black-game fall back on the buds of coniferous trees, more especially of the larch, the most valuable timber-tree in the north, and of the Scotch pines.

The winters of 1909-1910 and 1910-1911 were exceptionally severe on the west coast of Scotland. The early and very severe frosts killed the buds of all the birch trees which were on exposed ground on the open moor.

The Black-game, deprived of their normal food supply, attacked the coniferous trees. Foresters all over Argyllshire, on Lochaweside, Inverliever, Achnacloch, on Loch Etive side, and even at Taymouth in Perthshire, complained bitterly of their ravages. The very young larch plantations suffered most, in some cases the whole of the trees being irretrievably damaged by the loss of the terminal buds on the leading and lateral shoots.

Corsican Pines appeared to have escaped entirely. Where the Japanese larch was grown, this was taken in preference to the native larch, but the total damage was very great. On many estates the experience was entirely new. Black-game had always been on the ground, but the coniferous trees had heretofore escaped their serious attention.

Experienced foresters attribute the attack on the coniferous

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trees entirely to the lack of their normal food-supply at this time of the year, the birch-bud. The absence of this food was in the main due to the severe frost which killed the buds, and they, therefore, believe that a recurrence of this very extensive damage is not likely to take place, as long as the birch supply is sufficiently plentiful: that supply is not likely to fail, except under such entirely abnormal conditions as prevailed in the two winters.

IV. HAIRY CATERPILLARS. CUCKOOS AND THEIR FOOD.

It is a well recognised fact that hairy or spiny caterpillars are, in the great majority of cases, distasteful to birds, and are untouched. The same is true of some of the smooth-skinned caterpillars, which, though smooth, are highly and gaudily ornamented.

But the bulk of the plain smooth-skinned larvæ—green, brown, or otherwise protectively coloured—are eagerly sought after and greedily devoured.

It may, I think, be fairly assumed that the body of the hairy larva is as valuable a food as the body of the smooth larva. The sole reason that they escape attack from birds is the protection they acquire by their hairy covering. I am not dealing with the highly-coloured, smooth-skinned larvæ, only with hairy ones.

The hairs of some of these caterpillars are exceedingly irritating to human beings, others may be handled with impunity: but birds do not discriminate between the irritating and non-irritating larvæ, they leave them both alone.

It seems a fair deduction that their dislike of these hairy larvæ is due to the fact that the body is partly or entirely clothed with hair, and does not depend on whether the hairs themselves are poisonous or not.

I imagine that in the case of most birds, the efficient digestion of these larvæ is difficult or impossible, either because the hairy covering prevents the gastric juices of the bird reaching the body of the caterpillar, or because the larval hairs, as they are shed in the process of digestion, adhere to the mucous lining of the stomach, hindering the glandular secretion, and at the same time forming a mechanical covering which prevents the food in the stomach being brought into direct contact with the mucous membrane.

This latter theory seems to me the probable explanation of the distaste birds evince for hairy caterpillars. I can picture a bird starving in the midst of plenty, after a full meal of hairy caterpillars. The hairs would be left in the stomach, matted over the mucous surface; these in themselves might lead to mechanical obstruction. They would certainly interfere very greatly with the normal process of digestion.

Take, for example, an ordinary game-bird, such as the Red Grouse. The diet consists, to a large extent, of young heather-

shoots, and in order to obtain sufficient nitrogenous material from this rather low-grade food—low, I mean, in the percentage of nitrogen—it is necessary to ingest it in very large quantity, and to deal with it very rapidly after ingestion.

There is, therefore, a large crop in which food can be rapidly gathered and stored; a very powerful, muscular gizzard, in which the heather is thoroughly ground between a number of hard quartzite pebbles, before being passed on into the duodenum; and, finally, you notice the exceedingly long paired cæca, for retaining and absorbing the intestinal contents, and effectively extracting the nutritive properties before evacuating the useless residue.

A Grouse, like a grass-fed cow or sheep, has to spend the best part of the day in gathering food and digesting it, and that because of its low nutritive value. Similarly, an Irish peasant living on potatoes has to eat a vast quantity, in order to obtain sufficient nitrogen (proteid), and, incidentally, gets more starchy food (carbohydrates) than he requires, and no fat at all. Half-a-pound of beef-steak would be worth a whole kettle-full of potatoes.

For the purposes of my argument, I have taken heather as the only food of the Grouse, and that is true in a general sense, but, of course, they often secure food of a much higher dietetic value at certain seasons of the year, *e.g.*, grain, ripe fruit, insects of various kinds and their larvæ.

There is one article of diet which is present on the moors in quantity from summer to late autumn—hairy caterpillars of various kinds, more especially the larvæ of the Fox moth (*Bombyx rubi*)—but the birds—game birds I mean—won't look at them.

I have seen the moor literally swarming with hairy caterpillars, and yet I have never found one in a single example of the rather numerous Red- and Black-Grouse I have examined.

The food value of these larvæ is high; the Grouse could have gathered a full meal in a very few minutes, but never a one was touched.

Smooth larvæ I have found on dissection, but these were never sufficiently abundant on the open moor to form any considerable item of their bill of fare.

To the general rule that birds leave hairy caterpillars severely alone, there is one marked exception—the Cuckoo—there may be other exceptions, but I do not know of them.

It is probable that, under sufficient stress, other species might overcome their distaste for this diet, and in the absence of anything else, eat the hairy larvæ.

I remember a boy bringing me a live Land-rail which he had picked up on a common in Suffolk; the bird had struck some prickly wire in its migratory flight, and was sorely crippled. One leg was broken, and also the wing at the wrist (carpal) joint. It couldn't fly, and could only move very slowly and distressfully with the aid of the sound wing and leg. The accident must have taken

place some days before, as the skin-wound was nearly healed. The bird was very emaciated, and in evident pain, so I killed it. In the stomach I found a full-grown larva of the Fox moth—the only instance in which I have met with this caterpillar inside a bird.

The cause is obvious enough. Starvation was staring the poor bird in the face ; its crippled condition prevented its searching for its ordinary food ; the caterpillars were plentiful, and close at hand ; it had no choice in the matter ; it was the case of caterpillar or nothing.

I have the dissection notes of a considerable number of Land-rails killed at different times, but none of these contained hairy larvæ.

It is altogether different with the Cuckoo. From the cradle to the grave almost every circumstance in the life history of the bird is out of the common. The young are, in a sense, orphans before they are born, and their education depends entirely on what they pick up from their foster-parents. These dupes, no doubt, do their best to impart to the juvenile Cuckoo the knowledge that would be serviceable to their own children. But the needs of the grown-up Cuckoo are so different from those of the Pipits, Wagtails, Hedge-Sparrows, Reed-Warblers, etc., that one cannot suppose that the parental schooling is very successful, and the Cuckoo really goes out into the world very poorly equipped with the experience which a legitimate offspring would possess. He is conscious of an insatiable hunger, and a determination to satisfy his cravings in the fullest manner with the smallest expenditure of labour. He is, in fact, both a glutton and a sluggard. The blame for these failings rests with his own parents, who neglected him from the outset, and then with the foster-parents, who spoil the monstrous child from the hour he broke the shell.

The efforts of foster-parents, however well-intentioned, are seldom entirely successful. I remember a number of wild Ducks that were hatched under hens, the coops being placed near a small pond in the middle of a large heather-common. The Ducklings, of course, took to the water, the hens protesting. Not far away were a number of bee-hives placed in the heather, and the bees frequented the pond in large numbers for drinking purposes. To the Ducklings, the bees seemed as though they should be good to eat, and they snapped at them whenever they got opportunity. The bees resented this treatment, and stung the Ducks that were wishful to swallow them, in the throat. The honours rested entirely with the bees. I forget the total number of Ducklings we started with, but I remember that from 75 to 80 per cent. met their end in this way.

The Ducklings had not had sufficient experience of life to discriminate between the things they might eat with impunity and the things they might not eat. These tragic happenings would have been entirely prevented, had their real mother been with them ; a word from her, and they would have understood that bees were

a forbidden food. But the domestic hen spoke a language they couldn't understand, and her fussy cluckings conveyed no warning.

To return to the Cuckoo. The adults arrive in this country about the middle of April, and are practically all gone before July is out. Their diet for some time after their arrival consists of insects; later on they appear to acquire the habit of eating hairy caterpillars to some extent. But it is, I think, rather uncommon to find an *old* bird distended with hairy larvæ; with the young birds it is the rule.

The Cuckoo's egg takes only 13 days to hatch, and the female Cuckoos commence laying their eggs very soon after their arrival, so that nestling Cuckoos are plentiful by the first week in May. These nestlings will be able to fend for themselves by the end of the month, and they at once start feeding on hairy caterpillars.

Cuckoos shot from the end of July to the beginning of October are *all* young birds. During this period, a very large percentage of birds examined will be found loaded with hairy caterpillars. They eat smooth-skinned larvæ too, but, as they are probably more difficult to find, and do not generally exist in such large colonies as the protected caterpillars, their choice commonly falls upon the latter.

I do not know that there is any direct evidence on the point, but it seems certain that Cuckoos must have the power of ejecting from their stomachs the hairy residue, left after digestion of the caterpillar, in the form of balls or pellets. It is inconceivable that these bulky and valueless remains should be passed through the whole length of the alimentary canal before being got rid of.

Accepting the view that they cast out the hair in pellets, the matter does not end there. In a large minority of birds examined, the mucous membrane of the stomach is found to be lined with hairs, not merely hairs that are lying in loose contact with the wall, but actually embedded in the substance from which they can be drawn out by a pair of forceps. Casual observers have supposed that the Cuckoo's stomach was naturally lined with hair, but the microscope proves that these embedded hairs are derived from the caterpillar.

The rhythmical movements of the stomach during digestion cause the contents to move in certain definite lines, pressing the hairy bolus against particular areas of the mucous wall. The hairs, or a number of them, penetrate the epithelium and become arranged in a regular spiral form over the interior, and we have the appearance of a stomach growing a thick crop of hair.

This subject, even now, is very imperfectly understood, I think. Numerous questions present themselves which cannot be answered with our present knowledge.

What, for instance, is the ultimate fate of these embedded hairs? Are they shed after a time, leaving the bird with a clean, mucous surface? How far does the hairy lining interfere with the normal process of digestion? Do the implanted hairs actually take root and grow in their new situation? Finally, is it not probable that

this hairy diet is responsible for a large mortality among the immature Cuckoos?

Most books emphasize the fact that the Cuckoo, during the latter half of its stay in this country, subsists to a large extent on a diet of hairy caterpillars. They do not, as a rule, give particulars of the larvæ and other contents of the stomach found by direct examination of individual specimens.

I have, therefore, collected the notes of a dozen examples, obtained in Suffolk, Norfolk and Argyllshire, giving the stomach-contents in some detail. They are not in any way selected examples: the skins, for the most part, are in my own collection, and they are all the skins I have, except one or two where digestion had proceeded so far as to make the correct identification of the material found in the stomach impossible.

1. May; Norfolk.

A few larvæ, including those of the Tiger moth, remains of small beetles, stones and grit.

2. August; Norfolk.

Larvæ (not identified), beetles etc.; in addition to the ordinary food, the stomach contains a piece of knotted cord of medium size, and almost four inches in length. It was doubtless swallowed by the bird for a crushed and disfigured larva, to which it bore some rough resemblance.

3. June; male, adult, Norfolk.

Numerous remains of the Cockchafer (*Melolontha vulgaris*): two or three larvæ skins not identified.

4. August; male, immature, Norfolk.

A single larva of the Buff-tipped moth.

5. September; male, imm., Norfolk.

An extraordinarily large number of the larvæ of the Buff-tipped moth. I counted as many as 34, most of which were fully grown.

6. July; male, imm., Norfolk (River Bure, Ranworth).

A considerable number of the larvæ of the Swallow-tailed butterfly.

7. May; male, ad., Norfolk.

Gullet and stomach filled with the skins of the larvæ of the Oak-egger and Drinker moths.

8. September; female, imm., Suffolk.

Thirty full-sized larvæ of the Buff-tipped moth.

9. October; male, imm., Suffolk.

Crammed-full of the heads and empty skins of the larvæ of the Buff-tipped moth.

10. Argyllshire ; male, imm.

A mass of insect remains, consisting of one small spider, one centipede, five empty skins of a small smooth larva (not identified), the remains of a beetle and an entire beetle.

11. August ; female, imm., Suffolk.

Filled with the skins of the larvæ of one of the Noctuæ—I counted just 40—and a few smooth green larvæ.

12. May ; male, ad., Argyllshire.

A semi-digested mass of insects, including a fragment of a black beetle.

To draw any reliable data concerning the food of the Cuckoo, it would be necessary to collect a large number of specimens from various parts of the country, at least 100 for each of the six months during which they are more or less abundant. My dozen skins are of no service for general conclusions.

An analysis of the twelve examples tabulated above shows that they were obtained in the following months :—

May (3), June (2), July (1), August (3), September (2), October (1).

Those shot at the end of August, throughout September, and early in October, all contained hairy larvæ ; with one exception, the larvæ chosen were of the Buff-tipped moth, whereas those obtained in May, June, July contained principally coleopterous insects.

One bird (July 27th, Ranworth) contained a number of larvæ of the Swallow-tailed butterfly. This is worth specially noting, for the Norfolk Broads are one of the few remaining strongholds of this fine butterfly ; they are particularly plentiful about the Ranworth marshes bordering the river Bure. In this ornithological paradise I have seen Garganey Teal, Bearded Tits and Swallow-tailed butterflies on the wing at the same time. The range of all three species (so far as their British status is concerned) is being reduced year by year, and I don't know that even in the Broad district you would often see the three in one day, except at Ranworth.

Cuckoos are exceedingly plentiful here. They are distributed in greater numbers over the Broad district than in any other locality with which I am acquainted. Here one finds acre upon acre of reedy swamp. The great reed-beds are full of reed warblers, and it is their nest that the Cuckoo selects, in almost every instance, for introducing its own egg.

The larva of the Swallow-tailed butterfly is probably distasteful to most insectivorous birds. It is naked, it is true, and green, but it is ornamented with velvety black rings spotted with red, and has a fork-like tentacle on the neck of a red colour. When alarmed, the beast is said to emit a strongly-scented fluid, which keeps off the ichneumon flies (Westwood). But no diet seems to come amiss to the Cuckoo, and no larvæ appear to be immune from their attack.

I have little doubt that the Cuckoo "of the Broad" lays a heavy toll on the Swallow-tailed larvæ when they are in season. It may well be that the progressive diminution of this—our handsomest British butterfly—is, in some measure, due to the quantity of Cuckoos in the district, and their insatiable appetites.

There is a negative point of some interest with regard to these diet-tables. In no Cuckoo was there found a larva of the Fox moth. I daresay they eat them, but I have no evidence to that effect. In the autumn, this caterpillar is plentiful on heathery moorlands from Lands End to John o' Groats. It is very large and very hairy: it may be that even the Cuckoo will not face it, so long as other larvæ can be got; or it may be that the larvæ are not in season soon enough. The great mass of immature Cuckoos leave our shores by or before the first week in September, while the larvæ are not much in evidence until the middle of that month.

V. PROCESSIONARY CATERPILLARS.

Having made some general remarks on the hairy caterpillars found in Great Britain, and their immunity from attack by almost every species of bird, I should like to conclude with a short account of another hairy caterpillar which I accidentally fell in with on the Riviera last year (1910).

I refer to *Cnethocampa pityocampa*, one of the two species of processionary caterpillars. Probably, many of my audience are familiar with the extraordinary animal, but it was quite new to me. Its remarkable habits were so interesting, that I would crave your indulgence to tell my story for the benefit of those who have not made this caterpillar's acquaintance.

We were stopping at Monte Carlo. On the 18th of April we took a long motor-drive into the interior, to obtain a closer view of the mountainous country which lies at the back of the coast line.

From Mentone we turned directly inland, passing through a pretty valley with vineyards and olive groves fringing the sides. Our road was uphill all the way, at first a gradual and then a rather abrupt rise, until we reached the ruined village of Castillon. This was almost entirely destroyed, with heavy loss of life, by a severe earthquake.

From here, we proceeded to Sospel, some twelve miles of downhill on a nice easy gradient. After lunching, we motored on by a fine though rather narrow military road, which zig-zagged up the side of the mountain like a staircase, and finally reached the highest point of our drive, the Col de Brause. The metalled road did not quite reach the extreme summit of the mountain, and we had to walk some 150 yards or so to obtain from the top a view of the valley we had just left. We strolled up a rough road with rather a

soft surface, which took us on to the very summit of the hill and ended in a large, circular expansion protected by a low stone parapet. A battery mounted here would command the whole valley in which Sospel lies, and the adjoining Italian frontier. The ground was lightly covered with snow and it was bitterly cold, but we were fully repaid for our discomfort by the unspeakably beautiful panorama that lay unfolded below us. The fertile valley stretched away for mile after mile, bathed in brilliant sunshine, and the mountains appeared heavy and dark against a background of leaden snow-clouds.

It was here that we met with our hairy caterpillars. On this high ground, firs—Austrian pines I think—were the only trees to be seen. They were small trees from 10 to 30 feet in height, and one noticed at once that the great majority were in very bad health; some nearly dead, others showing irregular patches of brown amid the green foliage, and hardly one that seemed to be in vigorous health. Almost all these trees had one or more enormous grey cocoons attached to their branches—attached is perhaps not a good word, for the cocoons were built right round the terminal or lateral shoots of a branch so as to include entirely the shoot in the web. In colour they were dirty grey, and in size from that of an orange to that of a coco-nut, and even larger. They were remarkably conspicuous. Neither insect, bird, mammal, nor even the unintelligent human being could fail to see them from afar. The large, pale, smoke-coloured web stood out in marked contrast to the green foliage of the fir, or to the brown colour of the dead fir needles where the cocoon-selected branch had died.

These enormous cocoons are, I believe, made obvious *intentionally*. They are intended as warning signs—notice-boards that trespassers will be prosecuted. They are danger-signals, which are perfectly well understood by all would-be spoilers, and they are left alone.

We hadn't walked far up the soft road before we fell in with what to me was a most extraordinary sight. A long line of caterpillars moving slowly along, head to tail, in Indian file. The first procession we met was about twenty feet long, but was far from complete when we found it; twenty feet of caterpillars were in line and on their travels, but there remained nearly as many again at the base, waiting to take their place in the procession.

The front of the line terminated in a single caterpillar. Tracing them backwards, we found that the other end, the base, terminated in a seething mass of caterpillars, rolling about in a saucer-like depression in the road, such as might have been made by the impression of a hoof.

Each caterpillar's movement was, I suppose, purposeful, and, possibly, each one had a certain definite place to take up in the processionary line; but to the casual observer, they looked like a basket of eels rolling over and over each other without aim or reason.

This base fed the tail of the procession continuously. Those on the march were moving very slowly (probably the unexpected cold and snow rendered them unusually sluggish), but, as I watched, I saw caterpillar after caterpillar taking his place in the line, as soon as the advance had been sufficient to allow a fresh individual to add himself to the tail. What time the procession began to form, I have no idea, but it was now well into the afternoon—say three o'clock—and at least a third of the caterpillars were still waiting to take up their places. It seemed likely that the light would fail before the procession would be complete from end to end.

I had an umbrella, and selecting somewhere about the middle of the processionary line, I gently separated the caterpillars into two divisions, pushing the broken end of the leading-half some distance to the left, and of the tail-half to the right. The effect was almost instantaneous and very remarkable. The rear caterpillar in the front line seemed to butt the next one, and so on, so that a visible wave passed forward over the line until it reached the leader. When he received the impulse he stopped, and the procession came to a standstill.

A similar but reverse process took place with the broken rear half. Directly the temporary leader lost touch with the front column, he backed on to his rear man; he again on to the next, until the message had passed backwards over the whole line, and finally reached the seething mass of caterpillars at the base. They, in their turn, evidently became aware of the mishap that had befallen the marching division. Their movements, which had been rather violent so long as the line was intact, did not entirely cease, but were reduced to a slow and tranquil roll, until they were notified that the line was open again. Meanwhile, the two broken ends began sweeping from side to side—they were only a few inches apart—until they effected a junction. Then the wave passed up and down the line as before, this time indicating "all's well," and the procession was resumed.

I have described at some length the first processionary march we observed, but we must have met at least six or seven other processions in full swing, as we continued our way up the soft road to the top of the hill. They were, in fact, so common that we ceased to bother to look for them, and had to exercise some care to avoid treading on them, their bodies being rather inconspicuous against the mottled grey surface of the road.

It is worthy of remark that of all the processions we saw, we never found one completed—finished from end to end. However long the joined-up line was, there still appeared to be a large and unfinished tail of caterpillars twisting and struggling in a depression on the road.

We never saw any marching on the rough waste land bordering the road; nor crossing on to the road from the common; nor crossing the road at right angles. All we saw were moving up the road in

its long axis, as though their goal was the extreme summit of the hill.

These caterpillars are known as Processionary Caterpillars (*Cnethocampa pityocampa*). They are something over two inches in length, covered with fine barbed hairs, bluish black above with brownish yellow projections on each segment. These hairs, and the dust from the "nests" are intensely irritating, causing a very severe inflammation of the skin in human beings. It is even said that death has been known to result from handling these caterpillars and their nests.

I suppose that, like our Fox moth larvæ, they are liable to attack by ichneumons; a text-book I have referred to says that their great enemy is a large green beetle (*Calosoma sycophanta*).

However that may be, neither the ichneumons nor the beetle in this particular case appeared to be doing their unpleasant duty very efficiently. The caterpillars swarmed over the land, and, unless something unforeseen happened, it appeared likely that they would entirely destroy every fir-tree in the district.

I have no doubt that they are noxious to birds and small mammals alike, and are severely left alone. Humans daren't go near their nests, and on the high ground, at any rate, they appeared to enjoy a complete immunity from foes of every kind except winter and rough weather.

It seemed likely to me that they would only perish in the end by starvation, having exhausted their food supply by killing every fir tree in the district.

I have already described the huge webs, or cocoons, so conspicuously built on the fir trees—sometimes several on one tree, and seldom a tree without at least one. As we came down the hill, it occurred to me that I would like to see the inside of one of these nests. I did not then know how poisonous are the dust and débris from the webs, but a previous experience with comparatively harmless hairy caterpillars in England had taught me caution.

I selected a large cocoon on a fir tree growing near the road, and approached it from the windward side, my hands being encased in gloves. Then with one hand, and the point of the umbrella, I dissected the cocoon open. The cocoon was securely fastened completely round a terminal shoot on a lateral branch, some four or five feet from the ground. The web, in fact, enclosed a considerable piece of growing fir. The covering was tough and well matted together. When at last the "nest" was opened, and its contents fully exposed, I found it crowded with caterpillars (which appeared to be half-grown editions of the same species that was processioning on the road), together with a handful of the broken-up fragments of the needles of the enclosed fir, which had been three-parts stripped by this time.

The ingenious parents of these caterpillars had, I suppose, laid their eggs in autumn, and had then not only constructed an

admirable winter residence for their young when hatched, but had built the food plant into the house at the same time. The food-supply would be calculated to last out until the larvæ were nearly fully grown, when they would leave the ancestral home and start processioning on their own account to pastures new.

6th June, 1911.

VII.—British Wild Geese.

VII.—BRITISH WILD GEESE.

ACCORDING to the list of British birds, compiled by a Committee of the British Ornithologists' Union, and published in 1883, thirteen different species of Geese have been recorded from the United Kingdom, but of these, the two African Geese, the Spur-winged and the Egyptian Goose, are regarded as "escapes." The Indian Bar-headed Goose, and the Chinese Goose have both been recorded, but there is little doubt that our Islands are far out of the line of their natural migration, and that they too have escaped from confinement. Finally, the Canadian Goose is frequently shot; it is an abundant North American species, and quantities are kept in this country, in a state of semi-confinement, notably at Kimberley, in Norfolk. There is little likelihood of this North American bird finding its way unaided to Great Britain, and it would be quite impossible to verify the occurrence of a really wild bird, even if it occurred, among the number of birds annually killed, which are undoubtedly "escapes."

These five Geese are all put in square brackets by the Ibis Committee, indicating that they do not consider any of them properly authenticated British birds, which have occurred in a wild state.

This reduces the list of British Geese from thirteen to eight. The Grey-lag, Bean, Pink-footed, White-fronted, Brent, Barnacle, Red-breasted, and Snow-Goose. The last two have undoubtedly occurred in Great Britain in a genuinely wild state, but they are extremely rare; perhaps there are five or six specimens of the former, whose history is above reproach, and ten or a dozen of the latter. Concerning these two species, I have no personal knowledge whatever. I have never seen the birds outside Museums and Zoological Gardens, and can give no information about them, except what is to be found in our leading text-books, and is accessible to everyone. I do not propose to deal with them at all, and this reduces my number to six species, all of which visit this country in large quantities between October and March, while one still remains to breed with us, though in ever-decreasing numbers. These are the Common Wild Geese of Great Britain. I have had a fairly wide personal acquaintance with all of them, and it is to these six species, alone, that I propose to direct my observations now.

It is a remarkable fact, considering the vast number of Geese that winter on our shores, spending a fair half-year with us, how little acquainted the generality of field naturalists and sportsmen are with their ways and habits. Here in the Midlands, the chances of observation are naturally small, an occasional flock passing high overhead, on its migratory flight across England; while now and then a specimen appears in the local markets, which has been shot in the water-meadows during a spell of hard weather, though these occurrences seem much fewer than in former times. In his "Birds of Oxfordshire," Aplin records local examples of the six different species from the county. Around the coast, the case is very different—there is probably not a littoral county in England or Wales, Scotland or Ireland, including of course the islands, that is not visited in considerable numbers by Geese of one kind or another, which would afford ample opportunity for observation, by those who care to put up with the necessary discomfort which the pursuit of Geese anywhere necessarily entails.

It may be well to say a few words about Geese generally, before going into details concerning the different species. The Geese which visit this country are roughly divided by wild-fowlers into two groups, "grey" and "black." Scientifically, Geese belong to the order Anseres, to the family Anatidæ, to the sub-family Anserinæ. The six common species which visit this country are included, according to most British authors, under two genera: 1. *Anser* (of which *A. cinereus* is the type), comprises the Grey-lag, White-front, Pink-foot and Bean. 2. *Bernicla* (of which *Bernicla brenta* is the type), comprises the Barnacle, Brent, Red-breasted and Canadian Goose. These two genera, *Anser* and *Bernicla*, correspond very fairly with the "grey" and "black" Geese of the wild-fowler.

All this seems very straightforward, but at the same time, there are few families of birds where confusion reigns more entirely supreme than the Palearctic Geese at the present day. Among the "grey" Geese there is a very marked distinction in the colouration of the nail of the beak. In the case of the Grey-lag and White-fronted, the nail is white; in the case of the Bean and Pink-footed, the nail is black. I shall have something to say of these distinctions when I come to my own experiences, but the white and black nails have been recognised by most authors as of the highest diagnostic value, and Buturlin, the Russian naturalist, who was followed by Sergius Alphéraky ("Gusi Rossii," 1894), established a new genus, *Melanonyx*, for the black-nailed species. Alphéraky's work was subsequently (1905) translated into English under the title of "The Geese of Europe and Asia," that is the Geese of the Old World, and was illustrated with twenty-four coloured plates, by the well-known English artist and ornithologist, Mr. F. W. Frohawk.

Melanonyx included, of course, our Bean-geese, (*segetum*) and Pink-footed Goose (*brachyrhynchus*), but adds at least one more, the Yellow-billed Bean (*arvensis*) to the species which certainly visit

this country. Alphéraky describes three other forms of Asiatic Bean Geese, which he considers as specifically distinct. These species, sub-species and local races are determined, to a very large degree, by the colouring of the soft parts, the bill with its nail, the legs, toes and membranes with the claws, and the eye-lids. I propose, in the course of this paper, to draw your attention to the colouring of the soft parts of two of the Common English Geese.

The Pink-footed Goose was only admitted by our writers as specifically distinct from the Bean Goose in 1839, when Mr. Bartlett exhibited specimens at the Zoological Society under the name of *Anser phænicopus*, a name which was subsequently changed, for reasons of priority, to *Anser brachyrhynchus*. It is held to be a good species by practically all our present-day writers, and with justice, for not only are the bill and feet peculiarly coloured, but the bill is abnormally short, a good structural character, while the shoulders are very light in colour, approximating to the Grey-lag in this respect, and clearly differentiating this Goose from the Bean. Notwithstanding these facts, both Mr. Seebohm and Mr. Cordeaux regarded this Goose as a local race or island-form of the Bean-Goose, and were unwilling to give it specific rank. If one turns back to the white-nailed Geese, the same confusion is present. There is our own White-front (*Anser albifrons*) the Lesser White-front (*Anser erythropus*), which has more white on the forehead, and is much smaller. Lastly, the American White-front (*Anser gambeli*), a Western form of larger size than the type, with more black on the under parts. Here again, the colouring of the soft parts forms the principal key to the diagnosis.

Alphéraky, in his valuable work, lays the greatest possible stress on this point. He describes the colours with exceeding minuteness, and concludes with a laudatory criticism of Mr. Frohawk's illustrations. "I can guarantee," he says, "that the bills in these drawings are presented by the artist in their *normal* colouring with extraordinary exactitude." Now, it is impossible to read Alphéraky's description of, say, the White-fronted Goose, and to find any similarity between the letter-press and Mr. Frohawk's coloured figure. Alphéraky himself describes (p. 45) the feet as orange, bill white flesh-tint, locally with a slight wash of blue; yellow edge to the *nares*, a median longitudinal streak on the *culmen*, and the basal part of the *rami* of the lower mandible of same colour. Mr. Frohawk illustrates a Goose with rosy-flesh-coloured legs, and rosy flesh-coloured bill, without a trace of yellow. Practically, as far as the soft parts are concerned, this is exactly similar to his figure of the Grey-lag, except that the toe-nails are white in the former, and dark horn in the latter. The bill of the immature White-front, where the real difficulties begin to come in, is not figured at all.

Of the Grey-lag, Alphéraky says (p. 27): "The bill is of a more or less vivid pink flesh-colour, but as a rare exception yellowish

orange." As an instance of this exceptional colouring, he quotes Cordeaux, who describes a Lincolnshire-shot Grey-lag, whose bill, with the exception of a narrow strip in front of the nail, was orange, and adds that Mr. Frohawk informs him that, in the opinion of certain competent ornithologists, in the *Scotch* representatives of this Goose the bill is regularly yellow-orange in colour.

The yellow bill of the Scotch Grey-lag is attributed by the author to their being heavy, well-fed resident birds, with a thick layer of subcutaneous fat. The Scotch birds, he considers, are entirely non-migratory, though I do not know that this conclusion is supported by any satisfactory evidence, and the more one knows about migration, the less probable does it seem that a typically migratory bird, like the Grey-lag, would remain resident in the same locality throughout the year. Even if we allow, for the sake of argument, that the breeding Geese are resident birds, it is certain that in the outer islands, the number of Grey-lag Geese is very much increased in winter by visitors from the North. There are far more Grey-lags in the Island between October and March than could possibly be accounted for by the total number of breeding-pairs with their broods. This surplus can only be made up of winter-migrants.

I quite agree that the bills of these Grey-lags, residents or migrants, are yellow-orange, and I believe that to be the colouring of this species wherever it is found. The occasional specimens of Grey-lags I have shot, or which have come into my hands in a fresh state, on the East Coast of England, have had their bills coloured in the same way, and these cannot, by any stretch of the imagination, be considered non-migratory resident birds. Alphéraky figures his Grey-lag (plate 3) with the bill of a uniform rosy flesh tinge, which he maintains is the normal colouration of the Grey-lag, except the adipose Scotch bird, whose bill, laden with fat, has turned yellow.

British writers, however, do not seem to agree that the Scotch birds have yellow bills; they one and all describe the bill as flesh-coloured, in their text and in their plates. Howard Saunders, in his invaluable and excellent manual (p. 398) says: "The distinguishing characteristics of the species are . . . the flesh-coloured bill with a white nail."

For the past two months I have had daily opportunities of examining the colour of the bills of these Geese, both when alive and immediately after death, and I never observed one whose bill was not, in the main, *yellow-orange*, the all-flesh-coloured bill was entirely absent.

The difficulty of getting correctly-coloured figures of the soft parts of any bird, more especially such birds as Geese, is very great. Colours fade, change and undergo all kinds of alterations from the moment of death. The changes are largely due to the stoppage of the circulation, and the stagnation of the venous blood, quite irrespective of extravasation from injury. Pure white becomes

washed with violet, pinks turn to livid purples, vermilion to dusky red, yellow and orange last a little better, but eventually assume a neutral horn-colour.

I shot a fine adult male Shell-duck one morning at about 10 o'clock. The bill of this bird, with its basal knob, was the most vivid scarlet-vermilion, the legs and the feet a bright rosy pink. I was waiting on a reef of rocks that ran out to sea and was only exposed at half-tide. The plan was to remain there shooting at the Ducks that flighted by until driven off by the rising water. I laid the bird down behind the rock a few feet away, so as to be out of sight of any passing Duck, and resumed my watch. Presently I was flooded out of my place by the tide, and had to gather up the bag and make for the shore. When I picked up the Shell-duck the changes were so astonishing, that I could hardly believe it was the same bird. The splendid vermilion of the bill had changed to a dusky brick-red, the rosy legs and feet to the colour of dead flesh. All this took place in two hours or less !

In a recent visit to the outer Hebrides, I took with me a large stock of painting materials, with the special object of trying to secure accurate colour-notes of the soft parts of the Ducks and Geese. I can neither paint nor draw, but I hoped to succeed in mixing colours which would furnish a true and permanent record of the bill, while still in a perfectly fresh state. I had not reckoned, however, with the extraordinarily fugitive character of these delicate tints. In the short winter days, it was necessary to leave the house before sun-rise, and the return was long after dark. So that I was unable to utilize the fresh Geese I brought in, shot, it may be, only an hour before the evening flight. By the following morning, assuming that I did not start out early, the bills had changed so much as to be scarcely recognisable, and quite valueless for keeping colour-records.

In desperation, I finally took a few coloured chalks and a sketch-book out in my pocket, and made colour-notes on the spot, immediately the bird was shot. It is from these notes that Mr. Bayzand has coloured the four diagrams of the bills of the Grey-lag and White-fronted Geese, as they appear to me when still perfectly fresh. The diagrams agree to a large extent with some of the written descriptions of authors, but are quite at variance with any coloured plate with which I am acquainted.

Wild Geese do not reach the artist's hands while the colours are still brilliant and unchanged ; he is, therefore, forced to paint the colour of the bills from such indications as the dead bill—dead possibly two or three days, probably two or three months, and dried and shrivelled—affords, assisted by any written notes the collector may have attached to the bird. The results, at any rate in these two white-nailed Geese, are entirely unsatisfactory.

But, you may say, all this might be avoided in the case of these Common Geese by painting from live birds kept in captivity. Both Grey-lags and White-fronts, for instance, are, or have been, kept at

Regents Park. This, however, does not help. The colouring of the bill depends on *natural* surroundings, *natural* food, and a maximum of health, and the fog-begrimed bill of the White-fronted Goose of Regents Park, bears no resemblance to the delicate vellum-white bill with its yellow bands seen in the adult wild bird. Even in the wild state, these colours vary to some extent, presumably with the health of the individual, quite irrespective of the very marked changes which depend on age.

GEESE IN GENERAL.

The sexes are alike (speaking, of course, of the Old World Geese) and are distinguishable only by a difference in size. They have no coloured *speculum* on the wing, and are without the bony labyrinth at the base of the *trachea* in Ducks.

They fly with great power, and without producing that rapid whistling sound characteristic of the Ducks, or the slow, rhythmical swish of the Swan. Their flight is practically silent. They walk or run on the ground with ease and grace, and swim with rapidity on the water. They never dive (immerse the whole body), unless wounded, and even then cannot keep below the surface for any considerable time, as a Duck would do in similar circumstances. They can spring from the ground with the greatest facility, but are somewhat slower in rising from the surface of water.

The annual moult is the most important and critical event in their lives. Possibly their breeding-places in the far North are determined by the necessity of their choosing a very sparsely inhabited country to sojourn in during the period when they and their young are helpless. They moult but once a year, and lose all their flight feathers at the same time; they are, in consequence, incapable of flying, and are then often killed in large quantities at their Arctic breeding-stations. Seebohm ("Siberia in Europe") records how he fell in with a large flock of Bean Geese in the valley of the Petchora on July 27th. It was composed of adults with their three-quarter grown goslings, all entirely incapable of flight, marching, as he describes it, like a regiment of soldiers, into the interior of the Tundra. Trevor Battye ("Ice-bound on Kolguev") gives an account of a Samoyed goose-drive on Kolguev, on July 18th; the total for the day's butchery, reaching three thousand three hundred Brents, thirteen Bean, and twelve White-front, all flightless birds, that were cleverly shepherded by the natives into a netted enclosure, and ruthlessly knocked on the head. It is only fair to add that this annual slaughter is a matter of immense importance to the Samoyedi, as the Geese then killed furnish their principal source of food during the winter.

Geese pair for life; the Gander, equally with the Goose, assists with the family cares. As regards the moult, the Gander is somewhat

earlier than the Goose ; this may be of some service in the preservation of the species, as it shortens the time when *both* parents are helpless as regards flight.

They feed by day, and by night as well, if there be sufficient light.

The food of the Grey-geese consists, in the main, of various kinds of grasses, but they will greedily eat corn, potatoes, clovers and many of the winter-sown farm crops. The Brent Goose is entirely a marine-feeding species, *Zostera marina*, the "Brent-" or "Wigeon-" grass, as the fowlers call it, forming their staple diet. Its hours of feeding are, of course, governed by the tide.

VOICE.—Every species of Goose with which I am acquainted has a distinct and easily-recognizable cry, but all these cries have a very marked family likeness. To me it is impossible to express any Goose's cry in words, still more to distinguish one species from the other by a different form of written letters. The familiar type of voice on which all these cries are based is that of the domesticated farm-yard Goose. This we generally speak of as a cackle, and the word connotes something definite, because experience has taught us to associate the written word with a familiar sound. The "*honk-honk*" of the Wild Goose "so beloved by writers in the evening press, is entirely unintelligible to me. I have never heard any Goose, grey, black, or other colour, which uttered a sound having any similarity to "honk" to my ears. I think it wiser to speak of the "cackle" or "gaggle" of wild Geese, at the same time pointing out that every species is quite distinct from its fellows, and can be easily recognised by those who are familiar with the note. I do not think it possible to describe the noise, the cackle of farm-yard Geese, in words. Still less is it possible to define the minute sound-distinctions which render the cry of one species easily separable from that of another. In South Uist, one of the outer Hebrides, I was in daily contact for two months with three different species of Geese, the Grey-lag, the White-front and the Barnacle, and in a very short time learnt to recognise their separate voices and to identify the species by ear, long before I could tell what Geese they were by sight ; but I am quite unable to describe these variations of tones in words, to myself, and if I succeeded in doing so, they would be meaningless to anyone who had not heard the sound, and from the sound learnt to know how my particular reading ought to be intoned.

FLIGHT.—Geese, as is well-known, fly in a peculiar and regulated manner, very commonly in the form of a wedge, or inverted V. The two limbs of the V may be, and often are, of very different length. Frequently the V is replaced by a line in Indian file, either a straight or a wavy string. Wild-fowlers speak of a "skein" (the wedge formation) or a "string" (the linear formation), or a "gaggle" of geese (the latter term referring to the sound they make). When Geese are seriously migrating, they commonly fly either in a skein or string. When they are simply moving about from place

to place in their winter-quarters in search of food, their formation is much less ordered and defined, and is constantly changing.

But whether they be migrating or merely shifting from one feeding-place to another, whether the flock be a large or a small one, the form of the flight is remarkable for its disciplined regularity. It appears to be governed by one mind, each Goose maintaining its exact distance from the next, as though chained to it by a rigid rod. The alterations which are continually taking place in the formation are perfectly and regularly executed with the precision of a well-drilled army corps (Fig. 14).

It is this regular distance at which the Geese fly, the one separated from the next by the space about equal to its own length, which makes it almost impossible to shoot more than one Goose at a time with either barrel, from a flock flying overhead. The family shot never presents itself when flying, except (1) just as they rise

FIG. 14.

from the ground, and before they have fallen into line, or (2) again just as they are settling, when the flock often pivots round the leader.

The leader of a flock, whether this be a simple string or a wedge, may maintain his position unaltered for a great length of time, or his place may be handed over to another Goose at frequent intervals, but I believe these leaders are always adult birds, and never birds of the year; at any rate, all the leading birds I shot were old birds, and mostly old Ganders.

It is often supposed that their particular method of flight, the wedge or the string, has been adopted by Geese in order to lessen the atmospheric resistance; that is, that each Goose forms a wind-screen for the one next behind it, and only the leader of the string, or the apex of the wedge, feels the full force of the air. That, it is supposed, is the reason why the headship is frequently changed, a tired bird dropping into the rear, and his place being taken by a fresh bird, that has hitherto been flying in shelter.

I am very doubtful about the correctness of this surmise; it presupposes, for one thing, that Geese always fly directly into the

wind. The leader's office, in my opinion, is merely that of a pilot and look-out. He is responsible for the party while in the air, just as the Goose told off for sentry duty is responsible for their safety on the ground. As pilot, the leader is responsible for the direction the flock is taking, and the altitude at which they are flying; as watchman, for the avoidance of enemies, or dangers of any kind lying below or in front. I do not believe that the muscular exertion he has to expend in flying directly against the wind is the least bit more or less than that put in by those behind him. Geese, as I say, fly separated from each other by certain fixed and regular intervals, as though they were chained together by an invisible rod, and all on the same plane. This interval is about a Goose's length or a little more. I cannot see, from a mechanical point of view, that A's body, which is, say, thirty inches in length, can afford much shelter to B, who is thirty inches or so behind the tail of A, even with a head-wind. B would really be getting A's wash, if one may adopt a rowing expression; he would get the force of the wind, plus any extra disturbance that the movement of A's wings had put into it.* With a beam wind, or indeed anything but a dead noser, the supposed shelter would vanish altogether. If shelter were the object of the particular formation, then with a head-wind it would be better for A, B and C to close up and blot out the interval altogether. With cross and following winds there could be no possibility of obtaining any shelter from the leader. Geese rigidly stick to their formation, whatever way the wind may be blowing—against, with, or across, or in a flat calm, with no wind at all. For that reason, I do not think the habit has originated with any idea of lessening the labour of flight by cheating the wind.

In their ordinary flights, when they are moving from one feeding-spot to another, Geese commonly fly fifty or sixty yards from the ground, rising up another twenty yards or so whenever they have to cross any dangerous spot, farm roads, etc., which might conceal an enemy, and dropping back to the old level as soon as this is passed. In order to settle with as little violence as possible, they always alight head to wind. Having determined the ground on which they wish to descend, while still at their old altitude of fifty or sixty yards, they suddenly cease all movement of their wings, switch off the engines, as it were, and slowly plane round in wide descending circles, which enables them thoroughly to inspect the ground, and see that it is clear of enemies, before they risk alighting. All this time the wings are extended and motionless. The final operation, when they are about fifty feet from the ground, is putting the brakes on, to reduce the remaining speed, while still retaining enough way to control their steering. This "braking" is accomplished by turning the hitherto extended wings sharply downwards and forwards

* "Battered" air, *i.e.*, air which has just been violently disturbed—as, for instance, by the strokes of a bird's wing, or of an aeroplane's propeller, is recognised as offering an untrustworthy support—EDITOR

in a position of semi-flexion, and locking them rigidly in that position so as to offer the greatest possible resistance to the air, while at the same time the tail is fully expanded. Each Goose is, in fact, his own parachute. The head and neck are thrown backwards, in order to bring the centre of gravity further behind, and, lastly, the legs are extended in preparation for their meeting the ground. Considering their great weight, Geese alight on the ground with very little visible shock. But this must really be greater than appears to us, as they make a considerable disturbance if they alight on water.

The force of their descent is however best seen on ice. They will circle round and round over the ice, of which they are comically apprehensive, before making their landing on the slippery surface. The ice offers no hold or resistance to their extended feet, and they slither along the surface for some distance before being able to pull up, and are, no doubt, extremely foot-sore by the time their bodies attain a position of equilibrium.

Geese dislike ice so much that they will rarely alight on it. Swans, on the other hand, though they probably dislike ice more than Geese, have no choice except that of migrating south. They hate the land more than the ice. Swans are at their best in the water, and cut a decent enough figure in the air, but on solid ground of any kind they are altogether out of place. They are big birds, with their feet set far back and all their weight in front. I watched a herd of sixty or seventy Swans settle on a frozen loch; their actions were much the same as Geese, as regards braking, but infinitely more clumsy. Their unbalanced weight drove them along the ice at great speed, and collisions and cannons were taking place in every direction with other unwilling sliders. The actual landing of these great top-heavy birds, and their subsequent efforts to recover their dignity, were comic beyond words.

In the first days of the frost, all the Swans on the island were acting as their own ice-breakers, during the day swimming in the open pools and beating the frozen edges with their wings, and then charging through it, doing their utmost to preserve open water.

SPECIAL SENSES.

From time immemorial, the Goose has been recognized as a bird with remarkably acute hearing-power. Anyone who goes through a farm-yard at night will realize the impossibility of passing without some comments from the Geese. Anyone who has ever tried to stalk wild Geese, whether by day or night, will know how fatal the smallest noise is to the success of the stalk.

SIGHT.—Their sight is extraordinarily keen and powerful. I do not think that any other British bird equals, or indeed comes near

them in this respect. They discern any strange object which may be a source of danger, at what seems to us quite impossible distances, and take measures to avoid it. But there is one qualification to be remembered as regards the excellence of their vision. They would require fairly good daylight. At dusk or at night they do not see very well; with greatly reduced illumination their visual powers are proportionately lower than those of Ducks. Geese are far harder than Ducks to approach by day; by night the positions are reversed. The same is true of fog; Geese are frequently quite stupid and helpless in fog; they seem to lose their bearings and blunder into all sorts of dangers owing to their visual deficiency, and big bags have frequently been made on land or sea in such conditions.

SMELL.—There is a good deal of disagreement as to the development of this sense in Geese, and indeed in birds generally. Some authorities hold that birds, more especially such birds as belong to the order Anseres, are very highly endowed with the power of scent, and others consider that this sense is almost a negligible quantity; to this latter opinion I am a convinced adherent. I have stalked Geese times without number down wind, and have never seen occasion to alter my practice. In stalking down wind, more care has to be exercised in maintaining the most perfect silence, avoiding loose stones, snapping twigs and so on, because these sounds are more readily conveyed down wind, and no one doubts their power of hearing. If a flock of Geese were to alight in such a position that they could be stalked from two different directions up wind or down, but the down wind crawl gave better cover, I should unhesitatingly try to get in down wind, and risk their detecting my approach by their powers of smell. If they see you, if they catch the smallest glimpse of anything suspicious, the game is up, equally so if they hear any abnormal noise; but I do not think the question of smell would have any appreciable bearing on the result.

Perhaps this may be the place to say a word about their extraordinary sensitiveness to weather-changes of all kinds, the barometric sense, one may say. They have a most acute knowledge of coming weather-changes, which often become sensible to them before the mercury in our own barometer has begun to move.

A gale of wind upsets all Geese to some extent and adds to their difficulty in obtaining food. They are frequently very busy in laying in a good supply before the advent of the gale, and are in consequence very tame on such occasions, and again immediately after the storm. More especially is this the case with the marine Brent Goose, which may be unable to get at the *zostera* beds for food, or to obtain any rest on the broken water during the continuance of the storm. They have but two ideas when threatened with a storm, food and sleep, in preparation for the strenuous battle that they know is in front of them. Immediately after the storm, the weary and famished birds again think only of food and rest, rest and food.

Their natural caution is entirely cast aside until these two primary necessities have been satisfied.

Frost.—Frost affects the movements of Geese in a marked way. Even a slight frost in such a place as the Western Islands, where any temperature below 32° F. is out of the common, alters the usual feeding-ground, spoiling the pasturage, freezing up the bogs and shallow waters. The Geese are then congregated more and more in those few places where the feeding conditions are satisfactory, and where, by reason of springs or running water, the shallow places still remain open. If the cold continues and increases, they are driven to the cultivated fields, clover-layers and stubbles for food, and to such big lochs as remain unfrozen, for water. [In the Eastern counties of England these conditions would drive all the Grey-geese down to the salt water estuaries with their big mud flats]. And if this state of affairs lasts for any length of time the Grey-geese leave the island altogether and migrate southward, while the half-starved Barnacle Geese remain a little longer, trying to gather a scanty sustenance on the sea-shore, until they, too, take the southern flight. Of the two Grey-geese, the White-front is more sensitive to cold, and the hardships it brings with it, than the Grey-lag. They, northern breeders though they be, sometimes shift south in a body before a single Grey-lag has moved. So we see with the Thrushes; the species that suffer first and suffer most from a severe cold spell, are the northern Red-wings and Field-fares rather than the temperate Song-thrush, Missel-thrush and Blackbird.

I now propose to deal with some observations, chiefly drawn from a recent visit to the Outer Hebrides. I have selected these diaries, rather than notes from East Anglia or Ireland, for the main subject of my discourse, because in the latter districts, Geese were rather exceptional captures, and the diary would have contained little of interest beyond the mere record of shooting. The opportunities for observation, except in the case of the marine Brent, were very limited, whereas in the Hebrides I lived for two months in close contact with three different species of Geese, the Grey-lag, the White-front, and the Barnacle. To them I practically gave up the whole of my time, watching them from sunrise to sunset, and endeavouring to outwit them. One almost always saw these different species each day, and sometimes shot examples of each. I did shoot a fourth species of Goose on this island, the Brent, a single example only, but they are very rare in South Uist, and my knowledge of the Brent is chiefly derived from the eastern counties of England.

The shooting I am referring to is rather peculiar in character, and as the Geese were curiously local in their distribution, I must ask you to allow me to spend a moment in describing the topography.

The goose-ground consists of a long and rather narrow strip, perhaps six miles in length by one-and-a-half to two miles in width, bounded to the west by the Atlantic Ocean, to the east by the main

road of the island, running through from south to north. On the eastern side of the road the ground rises suddenly to heather-covered hills of variable but considerable height (200 to 1,000 feet and more). This is what I call "the never-never land." These hills are the mountain fastnesses of the two grey species, and to them they retire whenever their nerves are shattered by attacks from the west. Here they were quite unapproachable, but the better feeding on the low ground generally caused their return sooner or later, and almost always before dusk, for their evening meal.

Between the main road and the sea, there were two quite distinct grounds, separated from each other by a long and almost continuous chain of fresh-water lochs (in fact they *were* continuous during my stay owing to the heavy rainfall and consequent floods). The eastern portion consisted of low, broken ground, small hills and miniature valleys, with a great deal of naked rock out-cropping. The hills were mostly covered with coarse grasses of various kinds, and a certain amount of dwarf stunted heather. The valleys were wet, rush-grown swamps, with, generally, a liberal growth of flags in the wettest parts; better stalking ground for Geese, on the whole, than one usually meets with. On the west side of the lochs the character of the ground changed entirely. It consisted of large, open plains and low hills formed entirely by sand-drifts, serving as a barrier to the sea. The plains were covered with a thin crop of poor grass, plentifully interspersed with moss, while the sage-green bent grass clothed the hills. A stretch of country such as one might see in many spots on the east coast of England; Brancaster, for instance, in Norfolk, or the Bentlings between Sizewell and Dunwich in Suffolk. These sand-dunes, or bentlings, as I should call them, are named the "Macher," by the Gaelic-speaking natives.

Until the frost drove them out of it, the Barnacle-Geese were entirely confined to the "Macher," hardly ever extending their ground on to the wet bog, and never, under any circumstances, however much harried they might be, taking to the detestable "never-never" land. These wide, flat, open plains afforded absolutely no cover for stalking, unless the Geese happened to pitch close by, or feed up to some of the bent-covered hills bordering the sea. Otherwise they were unstalkable, and the only possibility of getting on terms was to shift or drive them over the concealed guns.

The "Macher," then, was the home of the Barnacle; the low moor and wet bog the home, when undisturbed, and the feeding-ground, in any circumstances, of the White-fronts and Grey-lags; but here a further sub-division could be made. There are four farms on this ground: Askernish, Milton, Bornish, and Ormaclett. Round each farm a part of the bog had been brought under cultivation. The cultivated land was specially attractive to the Grey-lag, while the White-front generally preferred the wettest bogs intervening between the farms.

GREY-LAG (*Anser cinereus*, Meyer).

Of the three Geese found in the winter in these outer islands the Grey-lag is by far the most interesting to British naturalists. It is the one Goose which breeds, or, presumably, ever has bred in the United Kingdom. They formerly nested in numbers in the Cambridgeshire and Lincolnshire fens, and probably in Norfolk, the last nest being taken in Lincolnshire in the early part of the last century. Its present breeding-grounds are confined to a few pairs in some of the north and north-western counties of Scotland, and to some of the outer Hebrides.

The name "Grey-lag" has been a subject of much discussion among ornithologists and etymologists. Yarrell derived "lag" from *lacus*, Italian *lago*. Professor Skeat, considers that the adjective "lag" means late, last or slow (compare laggard, lag-last, lag-man, lag-teeth). According to this authority, the Grey-lag Goose is the Grey Goose which in former days lagged behind the others to breed in our fens, when its congeners had betaken themselves to more northern quarters. This is the commonly accepted derivation at the present time. Mr. J. E. Harting, however, suggests that "lag" is derived from *leag* or *lea*, and means Field-Goose, as distinctive from the "rut," or root-eating species, such as the Brent.

It is from this Goose that our domesticated stock has been derived, as may well be seen from the general similarity of the plumage of the wild bird, and of the darker forms among droves of tame Geese; from its cry, which is to my ear absolutely indistinguishable from the cackle of the farm-yard Goose. So exact is this resemblance to me, at any rate, that I was constantly confused, when flying in the dusk near any of the farms, between the voices of the tame and the wild birds, mistaking the one for the other. And equally by day, when lunching in one of the farm-byres, a cackle might reach me; on investigation, it sometimes turned out to be a flock of Wild Geese, settling close by, sometimes merely an animated discussion proceeding from the domesticated birds.

I do not propose to occupy much time in this paper in describing the plumage of these Geese, but I feel compelled to enter rather carefully into the colouring of the soft parts of both species of Grey Geese, since I think almost all plates and most descriptions are quite inaccurate on these points.

The soft parts which require special notice are :—

1. The bill, including, of course, the nail.
2. Legs, toes, inter-digital membranes and toe-nails.
3. The eyelids, the narrow circle of naked skin bordering the eyes. This is frequently coloured and sometimes markedly swollen.

I. Grey lag goose
Anser cinereus

II. White fronted goose
Anser albifrons.
ADULT

I had many opportunities of studying the bill of the Grey-lag during life, for I often watched flocks for an hour or more with a telescope at a comparatively short range, hoping that they would shift their position off some ridge or high ground, and feed out of sight so as to give me a chance of a stalk. I also killed a number of these Geese, and examined their bills carefully immediately after death. Whether these specimens were male or female, immature or adult, I found the bill orange-coloured; the nail a dull white, never so brilliantly white as in a White-front. Immediately above the nail, the bill was rosy pink; this same pink colour was carried along the cutting edge of the mandible and round the edges of the nasal opening. For the rest, the bill was orange, rather paler and duller on the upper surface from the forehead to the opening of the *nares*, and rather brighter on the lateral surface. The illustration (plate IV, fig. 1) gives a better idea of the distribution of colours than any words of mine can do. The bill of the immature bird differed from that of the fully adult, only in having more yellow; the rosy tinge about the tip, cutting-edges and *nares* being less in evidence.

The legs and toes were pinkish flesh-coloured. The inter-digital membranes a shade lighter, and the toe-nails dark horn-coloured. Within a few hours of death, a great deal of pink colouration was lost, and the legs had acquired a dead flesh tint.

EYELIDS.—These were markedly swollen, rose-pink in the adult and lemon-yellow in the immature bird.

A few white feathers crop out among the dark at the base of the bill. These are not found in young birds, and even in the case of adults, the white is never very extensive. In a very old Gander, the ill-defined white band measured one quarter of an inch. The under parts, lower breast and belly, of the Grey-lag, show a variable amount of black spotting; isolated spots, not bars or bands. These spots are entirely absent in birds of the year, and gradually increase in number and size with age, but never in any way suggest the heavy black bars found in the White-front.

The Grey-lag is considerably the largest and heaviest of all the British Geese, though I think the average weight is very much over-estimated in most of our books. Out of some fifty specimens, I never obtained one that exceeded 8 pounds 10 ounces; the average weight before the frost came was about 7 pounds 8 ounces, and fell rapidly to somewhere about 6 pounds, as the result of ten days' frost.

The species may readily be recognized by the light, blue-grey shoulders, and orange-coloured bill with the white nail. At a considerable distance it is distinguishable by its cry, which is similar to that of our own domesticated species, and quite distinct from the cry of any other Wild Goose.

This Goose still breeds with us, but in ever-decreasing numbers on the mainland. The outer Hebrides may be looked on as their last

stronghold, but even here they are curiously local. I believe I am right in saying that their nesting-grounds are confined to the Islands of S. and N. Uist, and that they do not breed in Barra, Benbecula, Harris or the Lewis. I could not obtain any reliable information of their breeding in Skye or any of the inner Hebrides, and I believe they are only winter visitors to Jura and Islay. The two Uists certainly accommodate a very large percentage of the total number of Grey-lags that breed in the United Kingdom. S. Uist is the more favoured of the two. Last year, in which the numbers of nesting pairs were above the average, the keeper estimated there were about 180 nests. The estimated numbers in N. Uist I could not get, but they are admittedly much fewer than in S. Uist, possibly there would be 250 nests in the two islands together. Fortunately both proprietors, Lady Gordon Cathcart and Sir Arthur Orde, take great interest in the preservation of birds, especially those rarer birds like the Red-necked Phalarope, which collectors and dealers would have exterminated long ago but for their watchfulness. No doubt, the Grey-lags benefit from the same cause, particularly in the nesting-time.

Their ultimate survival as breeders, however, it seems to me would rest on rather more secure foundation, if those who drew up the Protection Order for the various counties, were endowed with a little more sense. Formerly, Parliament was responsible for drafting our game-laws and wild birds Protection Acts. It cannot be said that their legislative efforts were particularly happy in every case. I would instance the legal seasons for Black-game shooting in Scotland—August 20th to December 10th. Young Black-game, as everyone knows, are scarcely fledged in August, and the old birds are still in full moult. On the other hand, from December 10th to February 1st Black-cocks are strong and powerful fliers, affording magnificent sport, and being polygamous birds, it is very desirable to shoot off the excess of old males, as is done with Pheasants. Landowners, sportsmen, naturalists and game-keepers alike recognise these facts, and have long been agitating for an alteration in the close time to the period from October 1st to February 1st, bringing the bird in line with the Pheasant. This alteration would be against no one's interest that I know of. I cannot believe that the most advanced Radical sees any advantage in massacring half-grown birds in August, or in sparing the old Black-cocks in the last half of December and throughout January. Many efforts have been made by private members to get this entirely non-contentious measure passed through the House, all without success, and the close time will probably remain unaltered until the Black-game has become extinct.

The year 1888 was remarkable for an extraordinary invasion of Europe by the Sand-grouse, of which Great Britain had its full share. Strenuous efforts were made by naturalists and landowners to afford these strange visitors efficient protection. Parliament

took the matter up, and passed a Bill insuring their complete immunity through all seasons; a short, concisely drafted Act, altogether admirable in its conception. It had, however, one fault—it did not become operative until February, 1889, by which time all the Sand-grouse that had escaped being massacred, had left the country!

In recent years, the protection of wild birds has been put into the hands of County Councils. On paper this sounds ideal; a body of local legislators, knowing something of the natural history and needs of the district, and peculiarly able to extend a fostering care to such birds as require it. In practice, nothing could have turned out more disastrously, and the parochial legislation has proved, in fact, considerably more inefficient than the occasional spasmodic efforts by the elect at Westminster. At least, that is my view, based on the knowledge of the working of a number of county orders. I draw your attention to it now, as the county of Inverness (N. and S. Uist being in Invernesshire), especially excepts the Grey-lag Goose from protection in S. Uist.* In Clause 2, in which the Grey-lag is scheduled as a bird protected under the Act of 1880 for the county of Inverness, the following exception is made: "Provided that this Clause shall not apply within the Island of South Uist to the Grey Lag Goose." In almost the last stronghold of this fine bird, protection is refused during the breeding season!! In N. Uist, in the same county, where the conditions are precisely similar, though the birds nest in much smaller numbers, protection is afforded!

There is no close time in S. Uist during any month of the year for any of the Geese. The White-fronts and Barnacle are shot throughout March and during as much of April as they remain there, and with them the Grey-lag.†

On the east coast of England, and in many parts of Ireland, continual efforts have been made to have the season for Brent—the black, marine-feeding Goose—extended from March 1st to March 15th. These Geese are a source of great profit to the poor wild-fowler; their breeding-ground is thousands of miles away, and they are often more plentiful in March than in any other month of the year, giving the fowler some chance of recouping himself after a bad season. My sympathies are entirely with the proposed extension. It is recognised as reasonable by anyone who is cognizant of the facts and of the efforts that have been made, for the past thirty years or more, to open the season for Brent, at any rate to the 15th of March, all without success. The Brent season still closes on March 1st, as it has done ever since the Wild Birds' Protection Act came into force in 1880.

In S. Uist, the law allows anyone to shoot any species of Goose throughout the year. In the case of the Barnacle and White-

* See the "Wild Birds' Protection Order, County of Inverness," issued on the 31st of May, 1911.

† The taking of the eggs of the Grey-lag is prohibited by this Order.—EDITOR.

Grey-lag Goose

fronts, which, like the Brent, breed in high, northern latitudes, no great harm is done. It is the legal slaughtering of the Grey-lag Goose in March and April that seems to me so monstrous.

Over a hundred Geese were shot last season in March and April by the proprietor and his keepers in S. Uist, so I was informed. At least a third, and probably half, of these were Grey-lags: "You can always tell the paired breeding birds," the keeper said; "it is only the young, non-breeding ones we shoot." That may be true to a large extent. Probably the majority of the mated birds do escape, as they have taken to the hills by the middle of March; but the immature birds that are shot are just those that should furnish the best breeding-stock for the following year.

This ill-considered order of the County-council of Inverness should go far to exterminate the Grey-lag in S. Uist, and when that is accomplished, its final disappearance in Great Britain as a breeding species should not take long.

THE BREEDING HABITS OF THE GREY-LAG.

Early in March the Grey Geese begin to pair, and by the middle of that month leave the low moor and betake themselves to the hills. Those that remain after that date are mostly immature birds that will not breed that season. These, in their turn, will take to the hills about June 15th, in order to carry on the annual operation of moulting in safe seclusion. From the middle of June to the early days of August, when the moult is completed, the low ground is entirely devoid of Geese of any kind.

The hills to which the Geese betake themselves are of varying height, covered with heather, sometimes short and stunted, often, especially by the burn-sides, long and rank. There are, further, a number of fresh-water lochs scattered about among the hills; on many of these lochs are dotted one or more islands. Until the appearance of the angler, in July and August, this country remains almost entirely undisturbed. A few sheep, an occasional shepherd or game-keeper are the only objects which meet the eye of the brooding Goose. Where it is possible, the Goose very much prefers nesting on an island in a loch, so that they are completely isolated; but as they do not like building very close together, and as there are not enough islands to go round, a considerable number put up with the moor.

The nest is sometimes made in a tussock of grass, sometimes in short heather, and sometimes in long rank stuff, which entirely conceals the sitting bird. But it is always difficult to find, whether the Goose is actually on the nest, where she sits very close, or whether she is off, and the eggs covered with down.

The nest itself is a very elementary structure. In scraping out a hollow a few heather roots are exposed, a few more twigs are added

as a foundation, and some moss and loose blades of grass complete the building. To this the female adds down plucked from her breast, on which the eggs repose, and which is constantly added to during the period of incubation. It is with this down that she covers her eggs when leaving to feed, etc. The eggs are moderately large, 3.5 by 2.4 inches, creamy white, and smooth in texture. The number varies considerably, both with the season and the age of the bird. In S. Uist three to six form the clutch, as many as seven being very rarely found. In the spring of 1911, most of the clutches were small and seldom exceeded four, although the number of nests was above the average. The eggs are generally laid from the 15th to 25th April, by which time the nests are full. Incubation is said to last 28 days, so that the goslings hatch out from the middle of May. They are, of course, covered with down, olive-brown on the back; head, neck and upper breast yellowish-green, and belly and under-parts pale sandy-yellow. There is, however, a good deal of variation in the colouring of goslings, even between individuals from the same nest. They are able to walk, run, swim and feed themselves from the time they leave the shell. They are taken to the water at the earliest possible moment by the parents, and both assist in covering the nestlings at night. As a very exceptional occurrence, the S. Uist keeper told me he had, on one occasion, found goslings hatched out by the end of the first week in April, but the main hatching may be looked for somewhere about the middle of May.

The next event of importance is the moult, which takes place when the young are three or four weeks old. If the movement of the immature, non-breeding birds from the low ground to the hills may be taken as a criterion, this should be about mid-June, the Gander a little earlier than the Goose. The moult lasts, from start to finish, some six weeks, so that from June 15th to August 1st (of course these dates are only approximate) all the Geese in the island are without the power of flight. The goslings have not attained their flight feathers, and the remainder of the Geese, whether immature or breeding, have cast their quills in a body, and are busily engaged in reproducing a new set.

At such time the Geese are a ready prey to any enemy they may meet on land, and, in consequence, they spend their days on the water, or so near it that they can readily reach it at the first sign of danger. Sir Arthur Orde told me that on one occasion, towards the end of July, he was anxious to shoot some seals (N. Uist), and sent his keeper round to spy a sea loch, which ran up into the hills.

The keeper presently returned with the report that there were plenty of seals, but that all the Grey Geese on the ground, old, immature and goslings, were also on the loch, and strongly advised his master to defer his seal shooting under these circumstances. The danger he feared was that the disturbance caused by firing at the seals, would drive all the flightless Geese on to the land, where they would fall a ready prey to the passing crofter and his dog.

Early in August the Geese begin to make their reappearance on the low ground, which I have already described, and to which they will adhere for the next seven or eight months unless very much disturbed.

WHITE-FRONTED GEESE (*Anser albifrons*, Scopoli).

These make their first appearance on the island about the middle of October, and remain until the end of April. There is a very marked difference in the plumage of the adult and that of the immature birds, while the adults vary rather widely among themselves, and the same may be said of the immature specimens. In the adults, some birds have only a few incomplete black bars or bands underneath; in others again, these parts are almost completely black; the extent of the white forehead also varies very widely. In the immature birds, all are without the black ventral bands, but some have light grey, some quite dark brown under parts. The white forehead is never fully developed. In some it is altogether wanting, in others a few white feathers springing out here and there among the brown, give a piebald aspect.

It is mainly to the soft parts I wish to call your attention.

Adult.

1. The bill is, in the main, a beautiful waxy white (the colour of a newly-bound vellum volume). On the upper surface—the bridge of the nose, so to speak—is a longitudinal band of bright cadmium-yellow, about one inch long, with its centre opposite the *nares*, fading away to white above and below. A narrow streak of the same bright yellow is seen on the cutting edge of the upper mandible, and above the opening of the nostril, and a broader band appears on the basal half of the lower mandible. The nail is a brilliant glistening white (Plate IV; Fig. 2).

2. The legs and toes are the colour of a ripe orange, the interdigital membranes slightly paler, and the toenails pure white.

3. The eyelids are dark brown, and are not swollen. In two adult Geese, however, that I shot, the eyelids were lemon-yellow, which is supposed to be one of the distinguishing characters of *A. erythropus*. My specimens certainly belonged to the common species *albifrons*.

Immature.

1. The bills vary enormously, the variation being due to age, I think, rather than sex. The bill is almost entirely dull chrome-yellow; there is frequently a little black pigment about the opening of the *nares*, and the nail is parti-coloured, its terminal two-thirds being dark-horn, and the proximal one-third greyish-white (Plate V; Fig. 3).

III. *A. albifrons*. -
IMMATURE

IV. *A. albifrons*.
IMMATURE
30-1-12.

In a very puzzling bird (Plate, V; Fig. 4) shot on January 30th, 1912, which could not, therefore, have been a *very* young bird, the bill was, in the main, dirty chrome-yellow, with an almost black nail, black patches over the orifice of the *nares*, a black median band on the upper surface, and a wide black band occupying rather more than the middle third of the lower mandible. In this bird, the black occupies almost the same position as the bright cadmium-yellow does in the adult. The feathers round the base of the bill were without a trace of white, and the under parts unbarred. There were, therefore, none of the so-called distinguishing marks of the White-front about this specimen.

2. The legs and toes are orange, but several shades less bright than in the adult, and the toe-nails very dark horn, practically black. In some birds, passing into adult plumage, one found white and black nails on the same bird.

Voice.

The White-fronted Goose is sometimes called the Laughing-Goose from its cry. It is a loud, sharp, clear, bi-syllabic note, typically anserine, but very distinct. When on the wing, they are perhaps the noisiest of the Grey Geese. The leader calls at frequent intervals; occasionally other members of the flock will join in, particularly if anything has occurred to disturb them. The cry can be heard and easily recognised at a distance of a mile or more. Besides the loud call note, the flock keeps up a very soft, murmuring conversation among themselves when on the wing, which can only be heard at close quarters as they pass over head. On the ground, they are generally silent, unless they happen to answer another passing flock, or unless they are suspicious of danger. If they begin to call while a stalk is in progress, it usually means that they have taken the alarm, and that no time is to be lost by the stalker in getting in his shot.

Weight.

In size, the White-front is the smallest of our Grey Geese, but a large *albifrons* would out-measure and out-weigh a small Pink-foot or Bean. Mere size is therefore not a sure diagnostic mark.

Six pounds is a good weight for an adult Gander, the Goose half-a-pound less, immature birds proportionately lighter.

In S. Uist, these Geese were very local in their habits, always feeding at the southern end of the ground, making their headquarters between Askernish and Milton, and comparatively rare at Bornish and Ormaclett. Like the Grey-lags, they made off to the hills in the east, the "never-never land," when suffering from nervous

breakdown ; but if undisturbed, they spent the day on the low moor, feeding in the wet swamps. They usually moved about like the Grey-lags, in small parties of seven to twenty, a flock of forty or fifty was quite unusual. From the stalkers' point of view, I think this species was the worst of the three to deal with.

BARNACLE GOOSE (*Bernicla leucopsis*, Bech).

Neither of the Black Geese (Brent and Barnacle) requires any special description as to the soft parts ; the bill, legs and feet being black.

The Barnacle arrives at S. Uist somewhat later than the White-front, the first flock putting in their appearance towards the end of October. The numbers become largely augmented throughout November and December by fresh arrivals, so that by the end of the month there are perhaps 3,000 Barnacles or more on the whole island, considerably exceeding in number both species of Grey Geese added together.

They are very local in their habits, and confine themselves entirely to the "Macher" (sand-dunes) bordering the shore, unless driven inland by frost. They are essentially dwellers by the sea ; they are eminently gregarious, feeding together in close packs of 100 to 1,000 on the open plains, and are very noisy, whether on the wing or on the ground. The cry is harsh and somewhat Duck-like when heard from a single bird, but on the wing almost every bird insists on doing his share of talking, so that the volume of sound when seven or eight hundred Geese rise at once, is simply deafening. Unlike most Geese, they also call a good deal while they are feeding.

Their food consists entirely of the poor grass growing in the sandy soil of the Macher. This grass is largely mixed with moss, and as they pull the grass up by the roots, they loosen all the neighbouring moss at the same time. The places where they have been feeding are, therefore, marked by quantities of this turned-up moss, the grass having disappeared, looking as though a number of moles had been running just under the surface and lifting the moss.

I do not think that the Barnacle and Grey Geese get on very well together. Until the frost came, the Barnacle confined themselves entirely to the Macher ; when they were frozen out and driven inland to the bogs and cultivated land, they came in contact with both the Grey-lag and White-front. On one occasion, a few Barnacle settled near a flock of Grey-lags on the Askernish farm, and, as I watched, the latter kept on bullying them and driving them off their pitch. Presently, a large flock of Barnacle came down and joined the others, and this settled the Grey-lags, who could not deal with an army of Barnacle, so they made off themselves. White-fronts and Grey-lags, on the other hand, may often be seen feeding in close proximity in perfect amity.

Barnacle are, I believe, the least wary of the Geese, and would be comparatively easy to stalk but for the enormous numbers they move about in. After they were driven off the Macher by the frost and took to the bog, stalking would have been simple enough on the broken ground but for their numbers. These were so great as not only to fill the valleys, but all the surrounding tops as well, and this made approach from any quarter out of the question.

I now propose to say a few words on Geese from the sportsman's point of view. It might be thought that so large a bird would offer an easy mark to any responsible gunner if within, say, forty or fifty yards. That is not so. In the first place, it is extremely hard to judge the distance a Goose may be away from you. I have seen men shoot over and over again at seventy and eighty yards under the impression the birds were inside fifty. Then their large size makes one misjudge their pace altogether. They appear to be travelling much slower than in fact they are. This misconception results in the whole charge going behind the bird altogether, or at best cutting out a few tail feathers. Pounding a Goose in the body, unless he be very close, is sheer waste of time. The breast and belly are so padded with feathers and down as to be practically shot-proof, and the wing-bones from their great strength are hardly more vulnerable; so that for working purposes the target is reduced to the head and neck only. The total length of the Goose may be thirty-five inches, and something less than a quarter of this is represented by the head and neck. The only method I found at all effective was to make up one's mind, to shoot so far in front of the bird as to be sure of missing it. I do not know that I ever did succeed in putting a charge entirely in front of a Goose, but the only way I could keep forward enough was to fire so far in front that I estimated, after allowing for size and pace, that the whole charge would pass clear of the bird's beak.

These are difficulties connected with the bird; there are other and worse connected with the position in which the shooter finds himself when the critical moment for the shot arrives. He may be lying prone on his face, occasionally he is to be found on his back, often cramped up behind some small stone, which is hardly big enough to hide a lark, but never standing comfortable and erect on his feet, the only position in which he can use a gun with comfort. Suppose you are walking over the bog unconcernedly with nothing in sight, when suddenly someone cries: "Look out! Geese!!" Down you go behind a stone, if one is handy; if not, flat on your chest, keeping your hands, face and gun out of sight as much as possible. If the Geese happen to keep on in your direction, the only chance is to remain absolutely motionless until you decide in your mind that they have reached, or are just reaching their nearest point to you. They are now very nearly over your head, and you we will suppose, are lying prone in the swamp. Once you move the

game is up ; whether you have judged the moment rightly or not, the Geese see the movement, and sheer away at once ; therefore you abase yourself until the very last moment, then struggle to your knees, with a heavy gun, or to your feet if you care to waste more time, and do the best you can with the Geese that are rocketting nearly straight up into the air as hard as they can go, and whose heads and necks are about the only part of them you cannot see.

I should like to see what kind of performance a first-rate Grouse or Pheasant shot would make if he were compelled to lie flat on his face in the grouse-butt or outside the cover, and only allowed to rise and fire when the birds were directly over his head. A free, comfortable and upright position counts for a great deal in shooting, and these hardly ever fall to the wild-fowler's lot.

All the difficulties which beset the deer-stalker are present and magnified in stalking Geese, with the single but important exception of the *wind*.

This, with deer, is of supreme importance ; with Geese, in my opinion, it is of small account.

But against this must be set the difficulty of the shot itself. " Take time, take time ! " the stalker whispers when he has got you up to within 100 yards or so of a stag.

There is no time to take, once you are in sight of Geese ! As you crawl over the ridge, they see you, and spring at once. Almost every successful stalk is finished in this way, with a snap shot at the birds on the wing, a deliberate shot at them on the ground being the rarest exception.

As with deer, so with Geese, any abnormal sound or movement readily scares them. A Curlew, a Crow, or a Raven passing over the prostrate stalkers will often put the Geese up, with their sudden cry of alarm. A startled sheep cantering into view of the Geese, generally means the end of everything—even a panic-stricken rabbit may cause a carefully-planned stalk to come to a sudden and disastrous conclusion.

I will conclude with a few extracts from the diary, showing the ups and downs, mostly downs, that attended me in this sport :—

December 22nd : Milton.—Mackintosh had marked some Grey Geese (Grey-lags) down on the bog before our arrival, so he posted the guns, and went round to try and shift them in our direction. They had, however, miraculously disappeared, and we never saw anything. He then tried to drive rather a large flock of Barnacle, feeding on the Macher, over Kildonan Loch. Three guns were placed rather widely apart. In the end, I was the only one they came anywhere near. They were certainly high, and I was very cramped up behind a miserable little stone, but I ought to have had a couple : as a fact, I clean missed.

We had a long wait for this drive, bright sun, no wind, and the surface of the loch like glass. Two Cormorants, one a very beautiful adult bird, with white cheeks and white thighs, the other an immature bird, scrambled out of the water on to a little rocky island, within about two hundred yards of me, and started drying their wings after their trout fishing. Presently, on the far-side of the loch a Short-eared Owl came into view, and crossed the water to my side, passing over the Cormorant rock in her course. Both these birds slid off the rock back into the water, directly the Owl came near them. After she had passed, they clambered up on to the rock again and resumed drying operations. It is quite certain that they dropped off the rock into the water because they were frightened or disturbed by the Owl. But what possible harm a Short-eared Owl could do to a bird like a Cormorant, I cannot conceive.

For the next twenty minutes, while waiting for the Geese, I had ample opportunities of watching the Owl hunting the ground all round me, and several times settling within a dozen yards or so. I could not see that she caught anything while I had her under observation, though the bog here seemed teaming with some kind of vole. The sun was very bright all this time, but the Owl went on diligently hunting in the full glare without the least inconvenience, and was still quartering the ground, when I put an end to everything by firing at the Geese.

At 1 p.m., H— and I went on to the reef, which proved a complete failure, owing, probably, to the fine weather. H— got a Teal and lost a Mallard; I shot a Cormorant, probably nineteen or twenty months old, with an unusual amount of white on the breast and muddy-green irides. We “flighted” in the evening above Milton: none of us fired a shot; one Teal and one Cormorant was our bag for the day, with three guns and three gillies!

January 17th: Ormaclett and Bornish.—Very rough, with whole gale from south east. This was a day of mishappenings. Geese were very uneasy when we arrived, all moving south. This movement was not due to any shifting by shepherds, but was entirely “on their own,” and must have been due to some cause which affected all the Geese, Grey-lags and White-fronts as well as Barnacle. As regards the Barnacle, this north-to-south migration lasted more or less all day, sometimes in small, and sometimes in big flocks, low down over the Bent hills in the teeth of the gale.

We got a White-front and Barnacle in the morning, but it was not until after lunch that our troubles began. We only then recognized that the migration was continuous, and the line of direction very uniform. We therefore, moved the guns out into the Bent hills in the direction of the sea, but were stopped by a fresh-water loch, and it was on the west, or seaward, side of this loch that most of the Geese were passing. On the open plains, to the north of us a native was rabbiting. He saw us go into our “hides,” and knew that we had not been able to cross the loch,

and proceeded deliberately and intentionally to spoil our drive. He left his rabbit-traps whenever he saw the Geese moving towards our line, and walked up and down in front of us, preventing the Geese keeping on their course and turning them over to the westward, a really remarkable piece of spitefulness. With the best intentions, he could not prevent the Geese keeping over the sand hills, though he could push them out of our reach, and had I crossed the loch in time, I should not only have got very good shooting myself, but turned crowds of Geese back on to the other guns. Later on, I did manage by wading to cross the loch, and after firing a couple of shots, found I was without my cartridge bag. Mackintosh, who had gone north to drive the geese, had taken it with him. For the next twenty minutes or so, Barnacle poured over me and the empty gun, a lot settling within easy shot of the bank I was lying under. C— had two Barnacle, T— one, and self one, total four; with ordinary luck and decent management, we should have had twenty-five.

On other days we could do nothing wrong. On January 24th, I sat down to lunch with eight White-fronts and one Grey-lag, the result of three separate and very difficult crawls. On January 25th, nine by luncheon (six Barnacle, two White-fronts, and one Grey-lag); again a morning without a miss.

January 30th: Bornish.—End of the frost; heavy rain early, which cleared off about 9.30 a.m. Mostly Barnacle, I hardly saw a Grey Goose all day. We started stalking a large and very scattered lot of Barnacle by the Ormaclett stacks. They rose before we had finished our crawl, and some came over us. I got a pair (right-and-left; nothing else touched). T— bagged one. I crammed in two other cartridges and fired at some rather distant ones. One came down close to the Ormaclett farm, and was ultimately gathered. After lunch, we drove the Chapel field north, past Bornish. I got two (right-and-left; nothing else touched) and T— one.

We then went to the Ardvula point, where we found Geese, and, unhappily, a crofter, the latter ostensibly collecting tangle. He spent his time spoiling our intended stalks. Three times the Geese settled right on the edge of the point, in a splendid position, and three times he put them up. A really good chance of a fat family shot on the ground spoilt by this infernal scoundrel. While waiting on the rocks by the shore, a solitary Goose came flying along the edge, which I could not make out. I shot it, and it proved to be a Brent, a rare goose in S. Uist. My shot disturbed the Duck on the brackish Ardvula loch, and a good flock of Scaup came over my head, from which I extracted five, three of them in the finest plumage I have ever seen. These were followed by a male Merganser, which I also got, and so ended a day which was not bad, but should have been much better.

5th March, 1912.

VIII.—The Food of Some of our Commoner Falconidæ.

VIII.—THE FOOD OF SOME OF OUR COMMONER FALCONIDÆ, AS ASCERTAINED BY DISSECTION.

I. INTRODUCTION.

IF the expression “some of our commoner Falconidæ,” which I have used in the title of this paper, were to be interpreted literally, our discussion would be limited to two species only, the Kestrel (*Falco tinnunculus*) and the Sparrow-Hawk (*Accipiter nisus*). They are the only two which can properly be called *common*, from one end of Great Britain to another. In the fertile and highly-cultivated lands south of the Tweed, or in the bleak, rocky glens of the western Highlands, the Kestrel is equally at home. It is common in the Orkneys, even to their northernmost islands, like Westray, and throughout the whole of the Hebrides, Inner and Outer. The same is true of the Sparrow-Hawk, provided that a certain amount of timber is present. As there are but few trees in the outer islands, the Sparrow-Hawk is absent, or but very rarely met with as a chance straggler on migration. For the rest of Scotland, given a sprinkling of woodland, the Sparrow-Hawk is as widely distributed as on our side of the border. I doubt if the number of either species has been seriously diminished in the last half century, despite pretty constant persecution.

It is to these two species that I propose to devote a considerable portion of my notes. In the first place, because I have a sufficiently large series of skins to be able to arrive at reasonably definite conclusions; and in the second place, because these two Hawks come into continual contact with the game-preserve and his keepers, and for that reason are of some economic importance.

The Sparrow-Hawk has a thoroughly bad name, and it is rare indeed to find anyone, even the most soft-hearted naturalist, putting in a good word for him. He is held in universal detestation. I think my dissection-notes will show that this hawk is nothing like as harmful as he has been thought to be.

With regard to the Kestrel's good name, the case is quite different. Some ornithologists have gone so far as to state that the

Kestrel is absolutely harmless to game-birds. Others have said that while he may take an occasional chick, the good he does far out-balances the evil, and that the bird should be strictly protected. Very few writers admit that the Kestrel does any serious harm to the game-preserver. On the other side, game-keepers on estates where game is reared by hand on a large scale, tell a very different story. They paint the bird's misdeeds in the most lurid colours, and they look on the Kestrel as one of their worst enemies, and in many cases treat him accordingly. No doubt the naturalist minimizes and the keeper exaggerates the harm done to game by this hawk. It was to procure definite evidence on this question that I collected a rather large series of skins, and the results of the examination of their crops and stomachs I am bringing before my readers. It is, I am afraid, an exceptionally dull subject, but one of considerable importance.

The food found in the crop and stomach is *positive* evidence, and very valuable as far as it goes, provided it is fairly used. Where only one or two specimens are obtained, especially if these come from the same locality, the evidence is often insufficient and sometimes absolutely misleading. I have a specimen of a female Long-tailed Duck, shot (July 27th, 1891) off the Suffolk coast, whose crop and stomach were crammed with barley! The Long-tailed Duck is rather a scarce *winter* visitor to the Suffolk coast, and is extremely rare in any of the *summer* months. It is a pure diving-Duck feeding in the ordinary way on shell-fish, but in this instance was full of barley. I don't suppose anyone, before or since, ever recognised barley as one of the foods of this essentially marine diving-Duck, anywhere or at any season. About the same period I obtained three or four Common Scoters ("black Ducks") off the same part of the coast. They, too, are marine diving-Ducks, feeding entirely on shell-fish of all sorts, but in this instance I found them full of barley and nothing else. It happened that I knew the explanation of these strange findings. A small iron steamship, "The Arndilly," was wrecked off Thorpe Ness; she was laden with barley in bulk. The vessel broke up very slowly, and the grain was washing out of her holds for months, with every ebb and flow of the tide.

Large flocks of Scoters were in the habit of diving over this ground for their normal shell-fish diet, and with them this chance visitor, the Long-tailed Duck. Of a sudden they found the bed of the sea strewn with a plentiful supply of barley, as well as the shell-fish they were in the habit of gathering. They sampled the grain, greatly approved, gave up their shell-fish and stuck to the barley for the next three months. A case of treasure-trove and an entirely abnormal diet for these shell-fish feeding birds.

And so I think the rearing-field with its thousands of young chicks, has a similar effect on the Kestrel. He comes for the mice; one day takes a chick and finds it a satisfactory diet, and for the

remainder of the rearing season gets his supplies from the same easy source.

Passing the Kestrels and Sparrow-Hawks, which are really common, there are several other members of the family which occur in considerable numbers at various times and districts. There are certain favoured localities where the Common Buzzard still breeds, and is comparatively common. His rough-legged cousin is only an autumn visitor, but common enough on the east coast of England in some seasons, while in others hardly a bird is seen. The Harriers are now scarce in their former haunts in East Anglia. The Marsh Harrier is almost extinct in all parts of Britain. Montagu's Harrier remains a not very uncommon summer visitor, and the Hen Harrier, though decreasing year by year, is still seen from time to time, generally between autumn and early spring. If, however, you go further afield, to some of the Hebrides or parts of the mainland of Orkney, for instance, you find the Hen Harrier common in summer and winter, and breeding in some numbers. Peregrines hold their own very well in the struggle for existence, at any rate in the north, and I think their numbers remain undiminished, and may even be on the increase. While the White-tailed Eagle is practically exterminated as a breeding species, the Golden Eagle is certainly increasing year by year.

As I have skins of most of these, in which the contents of the crop and stomach were carefully examined and noted, I propose to deal with these species briefly after I have finished my observations on the Kestrel and Sparrow-Hawk. Finally, although this bird is not one of the Falconidæ, I shall say a word on the Little Owl (*Athene noctua*), an introduced species, increasing very rapidly in many parts of England, and likely to prove exceedingly harmful.

I am very greatly indebted to Mr. T. E. Gunn, of Norwich, my bird-stuffer. Practically all the dissection-notes are his; perhaps I am responsible for two or three per cent., and any interest the paper may have is really due to his work and not mine. He adopted the following routine method for dealing with specimens that came in for my collection. Weight and all measurements were taken first, and the colour of the soft parts noted, and, if at all abnormal, recorded in a water-colour sketch. Then the skin was removed from the body, and prepared as a museum specimen. Finally, the body itself was carefully dissected, contents of the crop and stomach noted, sexual and other organs examined, and, where desirable, preserved in formalin. These particulars were written on a label which was attached to the skin.

II. KESTREL AND SPARROW-HAWK.

THE KESTREL (*Falco tinnunculus*, Linn.).

My own object in collecting a large series of skins of the Kestrel was to ascertain how much, if any, damage these Hawks do to game. The Kestrel is a small and not very dashing Falcon, with no great difference in size between the sexes. Before I started on the collection, I accepted certain facts which are common knowledge. For at least nine months in the year the Kestrel is harmless to game, and extremely beneficial to the farmer from its habits of preying on rodents. It takes, in addition, a considerable toll of small passerine birds—Finches, Pipits, Sky-larks, etc., up to the size of a Thrush—and is immoderately fond of the larger *Coleoptera* (Dor-beetles, May-bugs, June-bugs, etc., when they are in season). In two instances in my series a lepidopterous larva was found in the stomach.

I was left to collect evidence over the three months in which they might possibly be expected to do harm, and in the course of my investigation, I came to the conclusion that twelve weeks was a longer period than need be allowed for, eight or nine weeks being nearer the mark. For though a Kestrel takes game, and takes it freely enough under certain circumstances, it is essential that the prey should be very small. Game-birds are not, in general terms, hatched before the middle of May, and by the middle of July all, except very late hatchings, are too big for the Kestrel to lift.

In order to carry out this purpose, it was necessary to procure specimens from such estates as were highly preserved, and which had one or more rearing-fields with an abundance of Pheasant-chicks, and, in some cases, hand-reared Partridges in addition.

Further, it was desirable to collect from several different estates during the game-season, provided always that these were highly preserved. I, therefore, wrote to three friends in Suffolk, and one in Cambridgeshire, asking if I might have *all* the Hawks that were killed by the keepers, from May 1st till August 1st. I carefully explained that I didn't want any Hawks killed on my account, but that I should be grateful for all birds killed by the keeper in the course of his duty, which would otherwise be thrown away or nailed up as scarecrows on the keeper's "gallows."

The material presented consists of specimens from four estates in Suffolk (three on the coast and one in mid-Suffolk), one in Cambridgeshire, and occasional specimens from Norfolk. On these grounds game was reared on rather an intensive scale, and they, therefore, fulfilled my requirements.

I may say at once that I found a fairly large percentage of the Kestrels frequenting the rearing-fields, and doing a vast amount of damage. Out of fifty-nine birds between May 15th and July 15th,

including nestlings and fully-fledged young, dissection proved twenty-five to be game-stealers, while thirty-four escaped with a verdict of "not proven." That is the practical fact that concerns game-preservers, but it does something less than justice to the Kestrel.

The Kestrel's occasional practice of taking young game-birds off the rearing-field is, in my opinion, a recently-acquired habit, depending on the highly artificial condition under which game is reared to-day in these great shooting-preserves. I do not believe that a hundred years ago a single Kestrel could have been found destroying wild game-chicks. In Scotland, the west coast of Argyleshire, for instance, the Kestrel is quite as common as it is in the south. Here the chicks of the wild Pheasant, Grouse or Black-game are at their disposal in some numbers through the breeding season, if they care to seek them out. But I know of no instance of a game-bird being taken. *There* they are perfectly free from this vice, and from the amount of rodents they destroy throughout the year, are highly beneficial to the farmer and landowner. Very few Scotch keepers ever think of destroying Kestrels, and they are protected all the year round by most of the County Councils under the Wild Birds' Protection Act.

What then is the cause of this difference in habit between the Northern and Southern Kestrel? It is not very far to seek. It is entirely due to the intensive hand-rearing of game, and a certain sequence of events which follow these artificial conditions.

A field is chosen with a warm, dry aspect, probably lying close to one of the big woods which are the home of both Kestrel and Sparrow-Hawk. Two hundred to three hundred coops are put down, and each hen starts with, let us say, fifteen Pheasant chickens. We have, then, on this small area of ground, some two or three thousand chickens or more. The keeper feeds frequently and liberally, much is eaten and much is wasted. The wasted surplus attracts all kinds of rodents, from the common brown rat downwards. Then the Kestrel appears, hovering over the field, hunting, in the first place, for his legitimate prey—a small rat, a field-mouse or some other rodent. It is rather like the house that Jack built, the keeper's corn attracts the rodents, and the rodents attract the Kestrel, and so far no harm is done. Then one day, when his luck with the young mice is out, he snatches a young Pheasant, eats it or takes it home to his family. *Facilis descensus!* From that hour he gives up the old laborious but honest hunting for a living, and becomes a common thief, taking the chicks off the rearing field all day long. There is the mother at home and five hungry chicks; here is an inexhaustible supply of good food. On this the family subsists with little variation. After a week or ten days, if the weather be warm and dry, the young Hawks can be left to themselves for many hours of daylight, while the hen bird joins the cock at the coop, and a double toll of game-birds is taken.

It is possible that heredity would have some influence here, and that those Kestrels reared on a diet of game-chicks in their nursery days, would be the more ready, when they themselves took on family cares, to fall back on this same handy and inexhaustible source of supply.

This sounds a very harsh indictment against the Kestrel, but I am trying to put the case fairly and without prejudice. Kestrels, I believe, do no harm whatever to game, except under artificial conditions ; that is to say, where game is hand-reared in large quantities. Even there, on these highly-preserved estates, I do not suppose that one pair of Kestrels in three, perhaps not one in five, do any damage whatever to game right through the breeding-season. And these birds have a heavy balance on the credit side for the good they do.

But as regards the minority on the black list, whether this be one in three or one in five, or even less, the only thing to do is to exterminate them root and branch or give up game-rearing by hand. It is not the question of an occasional chick being taken ; once a Kestrel has started on the rearing-field, I don't think anything short of death stops him. He lifts chicks all day long ; it is almost incredible the number of birds one pair of Hawks will take, day by day. I remember losing thirty Partridge chicks at Sizewell in less than ten days (we only had sixty altogether) at the hands of one pair of Kestrels. That's nothing out of the way. Keepers often lost a dozen Pheasants from one coop in the course of a morning.

It must be understood that I am weighting the scales very heavily against the Kestrel by selecting birds obtained between May and July from highly-preserved grounds. Otherwise, I have tried to hold the balance even, and simply to record the contents of crop and stomach as we found them. I have not doctored my series in any way. The skins were collected over a period of twenty years or more, but the greater number in the last seven or eight years. *All* the birds sent in were preserved, whether they were game-eaters or not. By picking over a number of birds, keeping some and destroying others, it would be possible to prove anything ; that Kestrels were harmless to game or that they never ate anything but game, according as our sympathies were *anti* or *pro*. I have kept full dissection-notes of all the birds which came into my hands, and have left the results to speak for themselves ; but inasmuch as all my skins come from highly-preserved districts, I make out a much worse case against the bird than if I had collected specimens over the country generally.

For the eight weeks, May 15th to July 15th, fifty-nine skins, young or old, were examined, and twenty-five of these, that is forty-two per cent., were feeding on or capturing game.

Newton, in his " Dictionary of Birds," under Kestrel writes : *
" Where what are called ' tame ' Pheasants are bred, a Kestrel will

* P. 478, footnote.

often contract the bad habit of infesting the coops and carrying off the young birds. This evil may easily be stopped ; but it should not lead to the relentless persecution of the species, especially when it is remembered that the Kestrel is in the first place attracted to the spot by the presence of the mice which come to eat the Pheasant's food." This is a perfectly wise and fair statement of the case. The rather cryptic sentence, " this evil may easily be stopped," being interpreted, means that the offending birds can easily be killed, and should be killed, unless game-rearing is given up. As to the ease or difficulty with which the killing is carried out, this varies greatly. Some birds are quite careless in their raids, and soon fall victims to the keeper. Others, though bold enough, are slim and full of cunning. They carry off birds day after day, always making their approach from some fresh point, and always avoiding the hidden gun. Such birds sometimes go through the whole season taking a daily toll of chicks, and escape scot-free in the end.

I think that where food is plentiful and easily procured, most animals are eminently wasteful and careless. Birds certainly are, and it is only scarcity and the actual pinch of hunger that makes them exercise any sort of economy in their house-keeping. A Mistle Thrush in early October will pluck the berries off a rowan tree, letting ten fall to the ground for every one he eats. I watched a Peregrine Falcon on Grassholme Island off the Welsh Coast, knock four Puffins down one after the other without bothering to pick up one. A Golden Eagle on a sheep-farm, not only carries off lambs, but takes at least three times as many as the family require. And so it is with the Kestrel ; once he has begun on the rearing-field, his depredations never stop, until the keeper's gun finishes his career abruptly, or the game-chicks become too big for easy lifting. While they are small, he takes far more than he needs for his family or himself, and the excess is allowed to rot.

I made the following note of a Kestrel's nest with five young in July, 1915.

" I found under the tree, where the parents were feeding the young, four Starlings, one Green-Finch, one Lark and two young Partridges." The young birds were in three cases out of the four full of Partridge-chick remains. The overflow at the foot of the tree was surplus supply and was entirely wasted.

Proceeding now to summarize the crop and stomach contents of the Kestrels collected, there are twenty females and twenty-nine males, shot between April 1st and September 1st. In addition, there are five more or less complete families (6, 5, 5, 5, 5,) or seventy-five birds in all. Of the forty-nine adult skins, in *fourteen* there were found remains of passerine birds, including Meadow-Pipit, Thrush, Sky-lark, Sparrow, and three unidentified.

In *twenty-one*, rodents, including rats, mice, long- and short-tailed field-mice.

In *ten*, beetles (*Coleoptera*), including Dor-beetles (*Geotrupes stercorarius*) in quantity, Cock-chafers (*Melolontha vulgaris*), Mid-summer-chafers or June-bugs (*Rhizotrogus solstitialis*), ground beetles (species not identified), small black and brown beetles, wing-case of bronze-beetle.

One bird (female, Table I., No. 10), besides the remains of a field-mouse, contained twenty-six quite good-sized stones. This is the only occasion on which I have found stones inside a Raptor. I mean stones of considerable size, and obviously gathered up by the Hawk herself.

Many of the strange things one finds in the crop and stomach of a raptorial bird are really derived from the prey they have swallowed. Thus, a game-chick will have grits in its gizzard, possibly grains of corn and small insects in crop or gizzard, and these may all reappear in the Hawk's stomach when the chick is in process of digestion. A Little Owl contained several fragments of an acorn, together with the remains of a farm-yard chicken six weeks old. The chicken was, of course, the original proprietor of the acorn. In almost every case of abnormal contents being found, one can account for them through the food of the prey.

But the case I am speaking of stands on quite a different footing. The stones were much too large and much too numerous to have been contained in any bird, either gallinaceous or passerine, likely to be captured by a Kestrel, and the only reasonable supposition is that the Kestrel deliberately picked these stones up herself and swallowed them. I have never read of a similar case, and am at an entire loss to know what the object of taking in stones could be, or what purpose the stones were intended to serve. The stomach of a bird of prey is in no way comparable with the muscular gizzard of a gallinaceous bird; the fleshy diet does not require to be put through a mill, such as the Grouse, for example, has to subject the heather to before it is passed into the intestine. The case is unique in my experience, and I have no explanation to offer.

Looking at Table I., and the more ordinary food found in the Kestrel, I was rather struck by the number of small passerine birds, up to the size of a Thrush, taken.

Almost all writers emphasize the fact that the Kestrel's diet in the main consists of small rodents, and in Southern Europe of insects, while *birds* are seldom taken. Howard Saunders, in his "Manual of British Birds," 1889, p. 356, writes: "In northern countries the Kestrel preys chiefly on mice, birds being seldom taken; to the southward it feeds largely on beetles, grasshoppers and other insects." The same error, as I think, is propagated by many other well-known writers.

As already stated, in the forty-nine birds which appear in Table I., the crop and stomach of fourteen contained passerine remains, and of twenty-one rodent remains, or a proportion of only two to three in favour of the rodent diet.

Of the five families in my collection, the stomach-contents were as follows :

(1) July 5th, 1894 ; adult male and five very small nestlings. All full of Pheasant-chick remains, two freshly-killed chicks on the edge of nest. The stomach of the female adult was empty at the time, though no doubt she was on the same diet.

(2) June 9th, 1915 ; adult female and four nestlings. All contained mouse-fur and nothing else.

(3) July 1 and 2, 1894. Five fully-fledged young birds, all full of Partridge chicks.

(4) July 7th, 1913 ; adult male and four fully-fledged young ; remains of passerine birds and mice.

(5) July 9th and 11th, 1915 ; adult male and four nestlings ; long-tailed field-mouse and four fully-fledged young birds. Three contained remains of Partridge chicks.

So that, of the five families, two were entirely innocent of poaching, and the other three were subsisting on game-birds and little else, victimizing the keeper every hour of the day.

When the young of the Kestrel, and I think the same is true of many other Raptors, are fully fledged and able to fly for a short distance, the parents commonly move them from the nest. They select some suitable tree in the neighbourhood, which affords a sufficient leafy cover, to which the family is taken, and there complete their education in flying and learning to secure their own prey. Unless they are disturbed, the young Hawks will remain about this tree, for perhaps another fortnight. All this time the parents are assiduous in bringing in food throughout the day ; and, as one may see by examining the ground under the tree, they commonly bring in far more than the young require, and much is wasted and left to rot.

Finally, when the young are fully able to take care of themselves, the family party is broken up and the young are driven out into the world to seek their own living.

The Kestrel is eminently a migratory bird, and almost all the Kestrels that breed in the country leave for the South in early autumn, returning again towards the middle of March. At the same time, October brings an influx of foreign Kestrels, which, in their turn, winter with us, unless the weather be exceptionally severe, and leave our shores in the early spring. Kestrels are fairly common in this country in every month of the year, but are far more numerous in summer (April 1st to October 1st) than in the winter months (October to end of March).

Kestrel

TABLE I. [a]

KESTREL

[20 Females]

No		CONTENTS OF CROP AND STOMACH.				
		Passerine-birds	Game-birds.	Rodents.	Coleoptera.	Lepidoptera.
1	(Not noted)					
2		Meadow-Pipit				
3				Field-mouse		
4		Song-Thrush				
5				Rat		
6				Field-mice		
7		Young Sparrows				
8				Mice		
9		Skylarks				
10	26 stones			Field-mouse		
11				Field-mouse	Elytra of a bronze beetle	
12			Pheasant-chick			
13	Stomach empty		Carrying Pheasant-chick in claws			
14			Carrying Pheasant-chick in claws	Long-tailed Field-mouse		
15				Mouse fur	Black ground-beetles	
16			Carrying young Pheasant in claws			
17				Mouse fur and bones		
18				Mouse fur and bones		
19	Fibre and stones					
20					Dor-beetles and skin of beetle-larva	

Summary of Food of 20 Female Kestrels :

In 4 cases, Passerine-birds.
 In 10 cases, Rodents.
 In 4 cases, Pheasant-chicks.
 In 3 cases, Coleoptera.

Kestrel

TABLE I. [b]

KESTREL

[22 Males]

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No	CONTENTS OF CROP AND STOMACH.				
	Passerine-birds	Game-birds.	Rodents.	Coleoptera.	Lepidoptera.
1	Empty				
2			Field-mouse		
3			Field-mouse		
4			Field-mouse	Small black beetles	
5	Meadow Pipit				
6	Song Thrush				
7	Feathers and small bones (not identified)				
8	Small bird (not identified)				
9	Young Thrush			Small black and brown beetles	Skin of larva of <i>Bombyx quercus</i>
10		Young Pheasant			
11	Thrush				
12			Half-grown Rat		
13			Three-quarter-grown Rat		
14	Small bird (not identified)				
15	Young Sky-lark				
16		Carrying Pheasant-chick in claws	Fur of Mouse		
17			Long-tailed Field-mouse		
18		Carrying Pheasant-chick in claws	Long-tailed Field-mouse		
19	Young Thrush				
20		Young Pheasant			
21			Brown Rat		
22		Pheasant-chick		Cockchafer	
23	Meadow Pipit				
24	Empty	Carrying Pheasant-chick in claws			
25			2 Field-mice		
26				Coleoptera	
27				Dor-beetles	
28				Dor-beetles and June-bugs	
29			Young Rat	Dor-beetles	

Summary of Food of 29 Male Kestrels :

In 10 cases, Passerine-birds. In 11 cases, Rodents. In 6 cases, Pheasant-chicks.
In 7 cases, Coleopterous Insects. In 1 case, Lepidopterous Insect.

THE SPARROW-HAWK (*Accipiter nisus*).

In the fourth edition of Yarrell (vol. i., p. 89), Newton writes : "The female Sparrow-Hawk is, indeed, the only bird-of-prey which the game-preservee nowadays need fear." The Professor qualified this statement somewhat in his later writings. In his Dictionary of Birds (p. 478) he admitted that Kestrels on a rearing-field might be a source of considerable annoyance to the keeper. And I think that my series of skins shows that this is a very mild statement ; that the real game-eating Kestrel is one of the worst offenders the game-preservee has to contend with during the seven or eight weeks when his fields are crowded with small game-chicks.

But I have finished with the Kestrel, and put what facts I have collected before you. Under ordinary conditions, he is not only harmless, but a most useful bird ; under certain conditions of intensive hand-rearing he is the keeper's worst enemy.

What surprises me is the universal condemnation of the Sparrow-Hawk. It is not merely the sportsman, game-preservee and keeper that cry aloud against him. *Naturalists*, like the late Lord Lilford, or Howard Saunders, or Newton, men who were always ready to take on the defence of any bird, if a defence were at all possible, can find nothing to say in his favour. The Sparrow-Hawk was, I think, the only Hawk that Lord Lilford allowed his keepers to destroy ; to them he extended no mercy.

My own views in olden times were much the same, but they have been greatly modified by a careful examination of a comparatively large number of skins, collected over a period of twenty years or more. These comprise twenty-one females, sixteen males=thirty-seven ; three broods of nestlings (5, 5, 6)=sixteen ; total, fifty-three.

It must be remembered that with two exceptions (numbers 20 and 21, females) these were all collected between April 1st and September 1st. They were obtained on the same estates as the series of Kestrels, and for that reason they afford a very proper comparison.

On all these estates, from mid-May to mid-July, game-chicks were very abundant, and easily procurable, had the Sparrow-Hawks chosen to visit the rearing-fields. But what do we find ? Speaking generally (I will come to the detail later), out of thirty-five birds obtained between April 1st and September 1st, shot or trapped through the height of the breeding-season, twenty-seven contained remains of passerine birds* ; in seven the crop and stomach were empty, or decomposition had set in, or for some reason or other no note was obtained, and three only had the flesh of game-birds inside them. There was positive evidence of guilt in only *three out of thirty-five* !

* This includes a Wryneck, which is a Picarian bird.

Of the three families of nestlings :

(1) May 28th, 1913 ; five very small nestlings, probably not more than two days old ; nothing was found in crop and stomach.

(2) July 4th, 1913 ; five half-grown nestlings ; stomachs of all five birds loaded with Pheasant-chick remains.

(3) July 7th, 1909 ; six three-quarter-grown young birds ; all contained passerine remains, and nothing else.

From this evidence we may infer that one family out of three drew supplies from the rearing-field.

It is the rule in the family (*Falconidæ*) with which we are dealing, that the female is larger than the male. In some cases the Hobby, Merlin and Kestrel, for example, this sexual difference is not very marked. In the Eagles, Buzzards and Harriers it is considerable, but in two of our British Raptors—the Peregrine-Falcon and the Sparrow-Hawk—the difference reaches an extreme limit. The females are much larger and nearly double the weight of the males. The female Peregrine weighs some two pounds four ounces, and has a total length of twenty inches, against a weight of one pound eight ounces, and a length of eighteen inches in the male.

In the Sparrow-Hawk, the adult female weighs, on the average, ten ounces, the adult male five ounces ; in length, the female measures fifteen inches, the male twelve-and-a-half.

This very great difference in the size and weight between the males and females is of considerable importance. For while the cock bird can hardly manage anything above the size of a Blackbird, the hen will successfully attack much larger game, even Wood-Pigeons and Partridges.

The depredations that a male Sparrow-Hawk could possibly carry out on game must, therefore, be confined to the breeding season, while the birds remain small. At this time he may take Pheasant or Partridge or farm-yard chicks, but as these grow in size, they become immune from capture.

With the female it is quite otherwise. The first Sparrow-Hawk in Table II., an immature female, killed an adult female Partridge just after daylight on the 13th of April, 1892 ; and we trapped her at the remains an hour afterwards. Now, a female Grey Partridge weighs, on the average, fourteen ounces or a little more, and is consequently too heavy for the Hawk to lift. The same is true of wild or domestic Pigeons. The Hawk kills them, and has to eat them where they lie ; she can generally be trapped at the remains without much difficulty.

On July 11th, 1894, an immature female Sparrow-Hawk (Table II., 17) was shot in one of the rides of the Scots Hall big wood, carrying in her talons a young Pheasant, which was headless, and weighed in this state just over six ounces. The missing head we subsequently found in the Hawk's interior. I am inclined to think that six ounces is about as much as they can comfortably

carry on the wing, and considering that they only weigh ten ounces themselves, it is by no means a bad performance.

On November 15th, 1895, I shot an immature female Sparrow-Hawk (Table II., 20), and, on dissection, found the crop to be extremely distended with the flesh and feathers of an adult cock Pheasant. It is impossible to suppose that the Hawk could kill, or would even try to kill, a perfectly sound cock Pheasant. As a matter of fact, I shot this bird on the second day's cover-shooting at Scots Hall, and I can only suppose that the Sparrow-Hawk, a bird of the second year, found a wounded Pheasant of the day before, attacked and killed it. It remains rather a puzzling case, whatever supposition one puts forward. It is altogether against the ordinary habit of this dashing Hawk to attack a sickly or wounded bird. I do not believe they would ever look at a dead bird. Their custom is to pursue a prey which is strong and active; no bird, unless it be the Peregrine, appears to enjoy the pleasure of the chase more than the Sparrow-Hawk. He is far too good a sportsman to follow the sick, wounded or infirm, as a Buzzard will readily do; and I am still wondering how that Hawk and the cock Pheasant came to get so intimately mixed up.

The male Sparrow-Hawk, as we have seen, can only take game-birds when they are small. The time during which he can do any damage is limited, as with the Kestrel, to some eight weeks from mid-May to mid-July. The female may, if she chooses, prey on game-birds (Partridges) all the year round. Yet, in my twenty-one skins, there are only three instances, as just mentioned, in which dissection proved that she had taken game. Two of these were outside the proper breeding-season altogether, and the third concerned a half-grown Pheasant taken in the woods, and not on the rearing-field.

Of the sixteen male skins, only one bird (No. 6) May 26th, was found with game in his stomach. This was a Partridge-chick, and was, I think, most likely obtained well away from the rearing-field.

I doubt whether the rearing-field presents any great attraction to the Sparrow-Hawk, male or female. The mice which brought the Kestrel to the spot in the first instance, he doesn't care for; and the small, fluffy chicks don't at all comply with his idea of a sporting meal.

If you will refer to Table II, giving the contents of the crop and stomach of the Sparrow-Hawk, and compare it with Table I of the Kestrel, you cannot fail to be struck by the great difference in their choice of food. I would, further, again emphasize the fact that both series were procured under exactly the same conditions, from the same highly-preserved grounds and over the same period of time. The two tables are, therefore, peculiarly suitable for comparison. With the Kestrel, rodents head the list, then passerine birds, some of these hardly fully-fledged, while game-chicks and beetles tie for the third place.

The Sparrow-Hawk shows no such variety; the dietary is confined almost entirely to birds, passerine birds, varying in size from a Thrush or Blackbird to a Pipit: in addition, there are four cases where game-birds were taken. Even the requirements of a large family do not seem to have caused the Sparrow-Hawk to yield to the temptation of the rearing-field. Of course, most of the birds obtained between May and July would be breeding-birds; at any rate, only one brood of nestlings proved to have remains of game-birds inside them.

So far as my experience goes, Sparrow-Hawks never take any prey except *birds*, and those for choice perfectly strong and healthy. Sickly or wounded birds are seldom attacked, and I don't believe a Sparrow-Hawk ever touches anything dead, except it be his own kill.

Several responsible authors, however, give a far greater variety to the Sparrow-Hawk's bill-of-fare. Macgillivray ("British Birds," 1840, iii., p. 354) writes: "In the fields, it preys on leverets, young rabbits, field-mice"

Seebohm ("British Birds," 1883, p. 138) says: "But birds do not form the Sparrow-Hawk's only fare. Sometimes you see him dip silently and swiftly down among the marshy vegetation in old watercourses and bear off a rat or a frog; and field-mice, leverets, and young rabbits are often victims of his rapacity." (I imagine that the terminal sentence has been borrowed, without acknowledgment, from Macgillivray.)

There are fifty-three skins, male, female and young, to which I have referred (I have other skins, shot in the winter months). Not one single specimen contained any food but birds, and I confess to being somewhat sceptical about the rabbits, leverets, mice and frogs.

There are one or two curious points which this series of skins brings out. The Sparrow-Hawk is somewhat slow in acquiring the *fully-adult plumage*; at least three years, perhaps more; but they must arrive at their *sexual maturity* much sooner, and many birds, if not the majority, certainly breed in their first year (hatched in May, breed the following May) in very immature plumage. When a nesting pair are destroyed with their eggs or chicks, it is exceptional to find both parents fully adult. If the cock is adult, the hen is generally immature. More rarely we find an adult hen and an immature cock, while sometimes neither has acquired the plumage of maturity.

I believe that breeding before the full plumage is acquired is not uncommon with several members of this family—Peregrines and Golden Eagles, for instance—but no other raptor breeds in such juvenile plumage as the Sparrow-Hawk. In the case of most birds that take a long time to acquire their fully adult dress—for example, the Gannet or the Great Black-backed Gull—the sexual organs only mature with the plumage; and they do not

breed until their fourth or fifth year * when they have acquired the full plumage.

It would be interesting to know why the Sparrow-Hawk has developed this precocious habit, and what has led up to it ; for it seems certain that the maturity of the plumage, and the maturity of the sexual organs are meant to run side by side in birds, as in other animals.

Number 1 female in Table II, which was trapped at the remains of a female Partridge she had just killed, was certainly a bird of the previous year's hatching, being then, April 13th, about ten months old. I dissected this bird myself and made the following note : " Right and left ovaries well-developed, with numerous good-sized ova in both ; would certainly have bred this season, though it was only a bird of last year."

That raises another point of some importance, though it has no direct connection with the subject of this paper ; namely, the frequency with which the right as well as the left ovary is found to persist in certain members of this family (Falconidæ), especially the Sparrow-Hawk, Kestrel and all the Harriers. Out of twenty consecutive female Sparrow-Hawks examined, fourteen had *paired* ovaries. Mr. Gunn published a valuable paper on this subject in the Proceedings of the Zoological Society, March, 1912. A great deal of his material was obtained from the specimens now in my collection.

Finally, an examination of the three broods of nestling Sparrow-Hawks reveals a very remarkable excess of females over males. † There are, in all, sixteen nestlings, and of these, *twelve* were females, and only *four* males, or three females to every male. My small series of sixteen chicks is too small to base any very definite conclusions on, but while the proportion of one to three may very easily be too high, I think it probable that in a large series of nestlings the females would be found to outnumber the males very largely. The reason for this excess, if it exists, is not very obvious. With a polygamous bird, like a Pheasant or Black-cock, a preponderance of females might conceivably be beneficial to the species, but the Sparrow-Hawk is monogamous ; it would theoretically serve the species best that the sexes of the young should be as nearly even as possible.

* See footnote on p. 23.—*Editor.*

† (1) May 28, 1913	...	...	...	...	5 very small nestlings,	2 males & 3 females
(2) July 4, 1913	...	...	...	...	5 half-grown nestlings,	1 male & 4 females
(3) July 7, 1909	...	...	...	...	6 three-quarter-grown nestlings,	1 male & 5 females
						<hr/>
						4 12
						<hr/>

[TABLE II.

TABLE II. [a]
SPARROW-HAWK

[21 Females]

No.	CONTENTS OF CROP AND STOMACH.	
	Passerine-birds.	Game-birds.
1		Killed adult Grey Partridge, trapped an hour later
2	2 House Sparrows	
3	Decomposed and not identified	
4	Sparrow	
5	Not noted	
6	2 Meadow Pipits	
7	Not noted	
8	Skylark	
9	Finch (?)	
10	Common Bunting	
11	Empty	
12	Young Sparrow	
13	Feathers not identified	
14	Green Finch	
15	Small bird bones and fea- thers (not identified)	
16	House Sparrow	
17	Skylark	Shot while carrying headless young pheasant weighing 6 ounces
18	Wryneck (<i>Picavix</i>)	
19	House Sparrow and Sky- lark	
20		Crop distended with flesh and feathers of adult Pheasant
21	Wagtail (? <i>M. alba</i>)	

TABLE II. (b)
SPARROW-HAWK
[16 Males]

No.	CONTENTS OF CROP AND STOMACH.	
	Passerine-birds.	Game-birds.
1	Thrush	
2	2 House Sparrows	
3	Blackbird	
4	House Sparrow	
5	Empty	
6		Beak and down of young Partridge
7	Feathers and semi-digested flesh (not identified)	
8	Sparrow	
9	Empty	
10	Sparrow	
11	Tree Pipit	
12	Meadow Pipit	
13	Feathers of small bird (not identified)	
14	Small bird (not identified)	
15	Skylark	
16	Empty	

Summary of food of 37 Sparrow Hawks (21 female and 16 male)

In 27 cases, Passerine-birds.
 " 4 " Game-birds.
 " 7 " nothing noted.

III. OTHER FALCONIDÆ.

The rather large series of Kestrels and Sparrow-Hawks which I have tabulated, together with the exactly similar condition under which they were obtained, enables one to advance, with some confidence, a statement as to the food they prey on in these selected districts.

With the remaining members of the Falconidæ, of which I have skins, the case is quite different. My numbers are not large enough for me to come to any definite conclusion as to the food of the species. Some were collected in Suffolk and some in Scotland, where the supplies obtainable were likely to be, or might easily be of a very different nature. I think the notes on the Kestrel and Sparrow-Hawk are reliable and thorough. For the rest of the family, the notes do not profess to do any more than record the contents of the crop and stomach of individual birds, and to give an indication of the animals upon which they chiefly prey. They are incomplete for lack of material, but such as they are, I have brought them forward because I think direct dissection-notes rarely come before the public, and for that reason possess some interest. Authors commonly copy one from the other, and sometimes perpetuate errors because they have not had the opportunity or the energy to verify dissections for themselves. That's where Macgillivray stands alone among our British ornithologists. His work is little read at the present day, and was a failure, commercially speaking, when published, but it remains the most original, accurate and scientific book on birds that has so far been produced.

I have skins of the Common and Rough-legged Buzzard, Hen and Montagu's Harriers, with fairly full dissection-notes. These I propose to deal with seriatim, but, in the first place, I should like to make a few observations on the Golden Eagle.

GOLDEN EAGLE (*Aquila chrysaetus*, Linn.).

In Macgillivray's time, the White-tailed Eagle was common enough in all the islands, and on many of the sea-girt cliffs on the mainland of Scotland, while the Golden Eagle was scarce. Even thirty years ago, ornithologists spoke of the rapidly-approaching extermination of the Golden Eagle, and were quite easy in their minds about the status of the White-tailed Eagle. To-day, as we know, the White-tailed Eagle is very nearly extinct, possibly it *is* extinct as a British breeding-species, and the Golden Eagle is increasing, wherever suitable conditions, including, of course, protection in the nesting season, present themselves.

Golden Eagle

The reason for the increase of the Golden Eagle is simple enough. There has, for the past twenty years or more, been a steady foresting of the hilly estates of the Western Highlands ; that is to say, the sheep have been taken off, and the deer have come on. The rents for the sheep-farms were small, and the rents for the deer-forests big. Viewed simply as a commercial proposition, it was far better for the proprietor to place this rough land under deer, than under sheep.

Eagles are strictly protected, themselves, their eggs and their chicks, all the year through, by all the County Councils in Scotland. I doubt if the County Council order in the remote districts would have much effect in itself, but, as soon as the ground is put under deer, the Eagle is jealously preserved by the proprietor of the forest, and by his whole staff of keepers, stalkers and gillies. It is the deer-forest, not the County Council, which saves the Eagle at the present time. The forested land is continually increasing, and the Eagle with the forest.

Why does the proprietor of the forest extend his hospitality to the Eagle ? Because the Eagle kills the blue hares, ptarmigan and occasional Grouse on the ground. All these are an abomination in the forest, and often ruin the best-laid plans. A frightened hare, bolting at full speed in sight of the deer, or a cock Grouse, rising with a loud cackle near the end of a stalk, will as certainly disturb the deer as if you deliberately fired a gun or gave them your wind. So the proprietor of a forest would like to see all the hares, ptarmigan and grouse banished from the ground, and nothing left but the deer and the everlasting hills. There is no harm that Eagles can do on *forested* ground, beyond the very occasional lifting of an under-sized red-deer calf ; anything else they kill is all to the good of the stalking.

But there is another side to this picture. There is the sheep-farm as well as the deer-forest. It often happens that a large sheep-farm marches with the forest. The Eagle makes the forest his headquarters during the autumn and winter months, and seldom appears on the sheep-farm or gives any trouble there. With the advent of spring, he sometimes leaves the forest, and prospects for a favourable nesting-site on the sheep-farm, and finally establishes himself there for the summer.

I have read in books of a Kestrel taking an occasional chick off the rearing-field ; or of an Eagle sometimes lifting a sickly lamb on a sheep-farm. The Eagle and the Kestrel are, in fact, much alike in this respect. A Kestrel which begins on the rearing-field will stick to it until he dies, or until the season is over ; and an Eagle that nests on a sheep-farm and starts on lambs, will go on taking them until they are grown too big for him to carry. As some ewes lamb early and some late, the Eagle gets a pretty extended season. The old story holds good, that wherever food is plentiful and easily procurable, it is wasted. The lambs are plentiful, they

are near at hand, and they are incapable of offering the smallest resistance, and the Eagle picks them up at the rate of two or three a day.

A great deal has been written about the majesty, nobility and courage of the Golden Eagle. The only thing majestic about him is his size. He is not a noble bird. The Peregrine Falcon is the family aristocrat in Great Britain, the Eagle is but a poor and distant kinsman. His nearest affinity is the Buzzard. The habits and appearance of these two birds are curiously similar. The soaring Buzzard is constantly mistaken for the Eagle, and the Eagle for the Buzzard, even by a trained observer, unless he has some guide by which to judge the size of the distant object.

Lastly, the Eagle is not courageous ; for his size, he is certainly the most cowardly of all our Raptors. His prey consists of small, defenceless animals, like ptarmigan, blue hares, or new-born lambs, all picked up from the ground. He never makes the smallest attempt to defend his nest. At the first suggestion of danger, the bird seeks safety in flight, and keeps out of the way till all risk is passed. The stories one reads of Eagles attacking a man at the nest, or carrying off children, are, in my opinion, apocryphal.

I was in Argyleshire during the early part of May of this year, and knowing that an Eagle was breeding on the estate, I walked over the hills to look at the nest, which was built on another part of the ground to that usually selected. There was nothing unusual about the locality or the nest itself. The nest had a large, bulky foundation of sticks (mostly the thicker stalks of "big heather" that had been burned and blackened, but not consumed). A finer lining of coarse grass with a few leaves of the Wood-rush (*Luzula sylvatica*) completed the somewhat untidy structure. The site chosen was a deep ravine or corrie, and the nest was about two-thirds of the way up the face ; there was a sloping over-hang on the top of the cliff, making it very difficult to get a view of the nest from above. The female flew off the nest when I was quite a mile away, and the cock I never saw at all.

I made my first examination from the top ; with the keeper holding on to my legs, I just managed to peer over enough to see into the nest, fifteen feet below me. In it were two eggs (no doubt near hatching), and on the edge of the nest a cock Grouse newly killed. Then I climbed down into the bottom of the corrie, and approached the nest from that aspect. Lying round about on the rocks in the immediate vicinity (the furthest was not more than a hundred yards away) were three freshly-killed lambs, partly broken up, that is to say, some of the daintier morsels had been removed from them ; and on a rock below the nest a newly-killed blue hare, which had not been touched. This was the day's supply for one bird. The cock took his meals elsewhere. As the hen was still sitting on eggs, the food I saw was for her consumption alone. A cock Grouse,

a blue hare, and three lambs, and not one of them had been dead twenty-four hours !

Meantime, the cock was foraging on his own account, and though I didn't see him, I got some very recent news of his performances. Clambering up the corrie on my way home, I ran into the shepherd in charge of the beat. He had a large canvas bag over his shoulder, which shepherds carry on the hill at this time of the year ; they often find a dead ewe with a live lamb, and then they put the lamb into the bag and bring it home. With a little management they can generally induce a ewe who has lost her own lamb to adopt the orphan ; more rarely, they have to bring it up by hand. However, that's the object for which the bag is carried. Now, this particular bag had a large rent in it, and round about the rent the canvas was very blood-stained. I casually asked the shepherd how the bag had got into the wars, and this was his story, which I have no doubt was perfectly accurate.

On the previous day he had been out on the hills soon after daylight. On one of the higher tops he found a dead sheep with a live lamb ; he put the lamb into the bag and laid the bag by a cairn, while he went down into the corrie below to see after the sheep there. His road home lay over the top and past the cairn where he left the lamb in the bag. When he reached the cairn on his return, he found the following state of things ; there was a large rent in the bag, from which blood was exuding freely ; the lamb, still inside the bag, had been torn open, and the liver and heart removed.

That was the work of the cock Eagle. As he came sailing over the tops his eyes must have caught the bag ; probably the unfortunate lamb gave a kick inside and made the bag move. This caused the Eagle to come down for a nearer inspection. Having satisfied himself what the bag contained, he tore it open and proceeded to break up the lamb.

When the eggs hatched, and the chicks were old enough to be left to themselves, the hen would join the cock in providing food, and there would be four mouths instead of two, and the rate of supply would be doubled.

It is difficult to estimate accurately the damage this one family would do to the sheep-farmer. There were plenty of late lambs this spring, so that that source of food would be well within their reach till the beginning of June, or nearly a month from the time I examined the nest. If we only allow one lamb a day, that would give a total of thirty, but I think that the lambs consumed and wasted would far exceed this number. However, let us accept thirty as the figure. Can anyone say, in these days of scarcity of supplies of all kinds, mutton amongst others, that it is justifiable to allow Eagles to nest and remain unmolested on a sheep-farm, where their food is, in the main, made up of lambs, of which they take a daily increasing toll ?

THE COMMON BUZZARD (*Buteo vulgaris*, Leach).

The Common Buzzard is not a very popular member of the Raptorial family with most writers. He is said to be sluggish and torpid, sitting on a tree-stump watching for any passing prey, following only the young and weak and sickly, and, failing such simple prey, feeding on frogs or slow-worms or any other oddment that comes to hand.

Some of these authors go into ecstasies over the Eagle. The majesty of his flight, as he soars in rising circles, far up in the blue sky, with hardly a beat of his pinions; the glory of the scenic surroundings, and so on.

What is true of the Eagle is also true, to a large extent, of the Buzzard. There is much the same flight, much the same scenery, and much the same output of courage when they are engaged in hunting for food.

I happen to live in a district where both birds are comparatively common. *There* it is frequently very difficult for an expert observer to make sure whether the bird he is watching is an Eagle or Buzzard, so similar is their flight, unless he can tell the size of the bird he is watching. A soaring bird coming suddenly into the field of vision cannot be identified at once as a Buzzard or an Eagle. Presently one picks up the distance of the bird by surrounding objects, and so gets a correct estimate of the size, and then it is possible to say which bird it is.

The Buzzard hunts for his prey in exactly the same way as the Eagle, flying low and lazily over the lower slopes of the hill, in search of leverets, rabbits (their main source of supply in Scotland), or a sickly or wounded bird, or anything that a kind fate will put in his path. That is exactly what the Eagle does; he flies low and lazily over the tops, looking for hares or ptarmigan, rests on a suitable stone when he is tired, and waits for his food to come to him.

But the Buzzard doesn't spend his day in lazy flights and prolonged sojourns on a tree-stump. When he is not actually engaged on the commissariat department, he soars away far up into the heavens in ever-widening circles, filling the glen meanwhile with the curious mewing cry which, to my ear, sounds half-way between the cry of a Black-headed Gull and that of a domestic cat.

When the Buzzard is soaring, it is almost impossible to differentiate him from the soaring Eagle, except by size, and it is often difficult to determine the size of a bird seen at a great distance.

In Suffolk, I think that the Common Buzzard is quite extinct as a breeder, and I believe that its nest is now only found in some of the wilder portions of England and Wales. In parts of the Highlands it is still a fairly common resident. I know a glen in

Argyllshire where the Buzzard is not uncommon as a breeding species.

This glen runs east and west : it is rather a gloomy place ; the winter sun never reaches the northern face, which is rugged and precipitous, clothed with scrubby trees almost up to the summit (about 1,500 feet). The other side has a more genial aspect, but the timber is limited to the low ground ; above this are grass-covered slopes, and then the bare rock-face rising to 3,000 feet.

It is on the bleak, northern, wooded side that the Buzzard generally makes his home. The nest is often built in a tree. I have seen oak, ash and birch tenanted at one time or another. More rarely, the nest is placed on the bare ledges of the rock.

Where a tree is selected for nesting purposes, the Buzzards have a most extraordinary habit of decorating the nest with fresh, leafy twigs, until such time as the young are old enough to leave the nest.

In June, 1915, I took a brood of four nearly full-grown nestlings for my collection. The keeper had closely watched the nest for the preceding five weeks. When he found it, it contained four hard-set eggs ; it was built in a gnarled, stunted ash, well up the hill, and overhanging a rocky precipice. He was able to get a very good view into the nest from the rocks above, and he examined it with his telescope two or three times every week.

The ash is a tree that comes into leaf rather late. When he first found the nest, the tree was bare of leaves, and the nest was represented by a bundle of dry sticks. Directly the leaves of the ash began to expand, the Buzzard started planting small, leafy twigs into the circumference of the nest. But the most curious part of this proceeding was that they selected leaves from some other kind of tree than that in which the nest was built, mostly rowan or birch, more rarely beech, but never at any time twigs from the ash.

The keeper had this nest under fairly constant observation for fully five weeks. He found the decorations were always kept fresh, and must have been frequently renewed, possibly every day.

If, as seems natural, this decoration of the nest is done with the object of better concealment from enemies, human or otherwise, why in the world do the birds gather their leaves from some other tree than that which they have chosen for their nesting-site ? When the eggs were first laid in the nest, and the ash-tree was perfectly bare, they were far too wise to indulge in any decoration, though all the earlier trees had expanded foliage by that date. When at long last the ash-tree comes into leaf, they leave its foliage severely alone and gather their material from a rowan, or birch or beech !

One can imagine their not wanting to strip their own nesting-tree of twigs and leaves, for it wasn't any too big to start with, and a handful of twigs pulled off every day might have made the nest more conspicuous. But why not get supplies of ash-leaves

from somewhere else? There were several ash trees within easy reach of the nest; it would have been as simple to gather from them as from the birch or rowan, and yet they never made use of one single ash-twigg, but always selected some alien species.

It is a problem of some interest. Firstly, what is the Buzzard's intention in this leafy decoration, and, secondly, why are they so careless in matching their material? Do the strange leaves appeal in some way to their æsthetic sense, or are they such poor botanists that they cannot recognise the difference between an ash and a birch?

As to food, the Scotch Buzzards appear to feed very largely on rabbits. In the case of the nest I have just described, there were numerous rabbit remains on the rocks below the trees, and some bones and fleshy remains of rabbit on the edge of the nest; there was also the portion of an ancient skeleton of a red Grouse with entire leg and foot. The four nestlings were packed with the flesh and fur of young rabbits.

In Table III is a detailed list of the contents of the crop and stomach of those Common Buzzards that have come into my hands. The majority of the Scotch birds were feeding on rabbits and nothing else. One contained parts of a hare and blackbird, one the remains of a wood-pigeon, and one a field-vole.

I have only two Suffolk specimens; in them the diet was more varied, and neither had been feeding on rabbit. One had a slow-worm, a bivalve shell and bones of a rat, the other contained remains of a frog, including one leg entire.

In Scotland, the Buzzard is a resident, and has every opportunity of knowing the ground he lives on. In Suffolk, in these days, he is only a very casual visitor, and possibly has to pick up the food that comes easiest to hand. At any rate, the crop-contents are infinitely more varied in these East-Anglian birds.

Mr. Gunn very kindly sent me the following notes on a Norfolk specimen (not in my collection), shot (17th Sept., 1881) whilst flying over Oulton Broad: "It had apparently stumbled across quite a larder of good things, which it seemed to have swallowed indiscriminately. The crop contained an entire dor-beetle, the remains of a second one, the full-grown larva of a Privet-Hawk-Moth, swallowed in three parts, a small toad entire and a frog in parts. The stomach was filled with a semi-digested mass consisting of frog-bones, beetles and a small larva (not identified); this had not been affected by the gastric juice, and must have been the last morsel passed into the stomach. Even the gullet was filled with frog- and toad-remains; in fact the bird was completely gorged with food."

Few Raptorial birds vary more in plumage, a variation which is quite independent of sex or age; some have breasts so dark as to be almost black, others are nearly white, and there is every intermediate stage between the two.

TABLE III
COMMON BUZZARD

No.	Date.	Contents of Crop and Stomach.
1	Jan. 23	Remains of Field-Vole
2	Mar. 20	„ „ Rabbit
3	Mar. 20	„ „ Rabbit
4	Apr. 5	(Not noted)
5	Apr. 9	„ „ Slow-worm, bivalve-shell, Rat
6	June 15 (4 nestlings)	„ „ Rabbit
7	Sept 20	„ „ Rabbit
8	Oct. 2	„ „ Wood-Pigeon
9	Oct. 30	„ „ Frog
10	Nov. 15	„ „ Hare, Blackbird
11	Nov. 15	(Nil)
12	Dec. 2	(Not noted)

THE ROUGH-LEGGED BUZZARD (*Buteo lagopus*, Gm.).

The Rough-legged Buzzard is purely a winter visitor to this country, arriving in October, and generally leaving by the end of January or early in February; in exceptional cases prolonging their visit to March and even April. I have one skin dated April 19th.

They are very much commoner on the East Coast of England than in the Centre, South or West. On the East they become rarer north of Yorkshire. In Scotland it is a somewhat scarce bird even on the East.

In some seasons this Buzzard is exceedingly plentiful, coming over in great rushes. In 1891, for example, five Buzzards were shot or trapped on the Scotts Hall and Dunwich Walks, Suffolk coast, between October 30th and November 3rd. Many others were seen at the same time, both there and at Sizewell. In other years

it is comparatively scarce, but it is very rarely that a season passes without an occasional appearance of this visitor.

In the " Buzzard years," when they come in rushes, November is the great month for their arrival. Probably, if they were unmolested, they would make themselves at home on the big East-Anglian warren, where the rabbits, which are their chief source of food, are plentiful, and would stop until the early spring. But this partiality for rabbits leads to their undoing. The warreners, who are then busily engaged in killing rabbits in these same grounds, naturally do not care for the partnership of the Buzzard, and they employ every means at their disposal to destroy him.

These Buzzards are very easily enticed with a rabbit as bait, and large numbers fall victims, either to trap or gun, at this time. I imagine that at least 75 per cent. of the Buzzards that reach our shores in the autumn are killed within six weeks or less of their arrival. Consequently, there is only one quarter of the original migration left to stock the country-side for the remaining winter and early spring months. The big rushes, so far as I know, always occur in the latter half of October and throughout November. What are found in the country after that date are the remnants of those bodies. I don't think there is any serious migration into the country after the end of November.

Of the many Rough-legged Buzzards which are obtained in Great Britain during the late autumn months, by far the larger proportion are immature specimens. That is one reason why they are so easily trapped, or otherwise done to death. Adults are exceedingly scarce. Of the eleven birds in my collection (stuffed or in skin), ten are birds of the year, and only one is adult or even approximating to adult plumage. I believe that one adult to ten immature is far too high an average, and that a series of a hundred British skins would not produce more than two or three adults.

There is no reason to believe that this bird has ever bred with us, and the fuller the knowledge of its normal breeding-range the less likely does it appear that it ever will do so. There are two reported occurrences of its supposed breeding; one case in Yorkshire, and the other in Scotland, but the evidence is quite unsatisfactory, and the records are discredited by most ornithologists of the present day.

Food (Table IV.)—Of the eleven birds in my collection, all obtained on the coast of Suffolk, five contained fur, flesh and bones of rabbit and nothing else.

Three contained small rodents or insectivores—field-voles, long-tailed field-mice and common shrew.

In one the stomach was empty; of one no note was made; and in the only adult, a male, a few vegetable fibres and a piece of stick is all that is noted.

TABLE IV.
ROUGH-LEGGED BUZZARD

No.	Date.	Contents of Crop and Stomach.
1	Oct. 23	Remains of Long-tailed Field-mouse
2	Oct. 27	" " 3 Field-voles, 1 Field-mouse, 1 Common Shrew
3	Oct. 30	" " Rabbit.
4	Nov. 1	(Nil)
5	Nov. 2	" " Rabbit
6	Nov. 5	(Not noted)
7	Nov. 25	" " Vegetable-fibre, piece of stick
8	Nov. 26	" " Rabbit
9	Jan. 17	" " Rabbit
10	Jan. 18	" " Field-voles in quantity
11	Apr. 19	" " Rabbit

HARRIERS.

Of the Harriers, I have only a few skins, and even in these few the dissection notes are often incomplete or wanting altogether.

A. THE MARSH HARRIER (*Circus æruginosus*, Linn).

A hundred years ago the Marsh Harrier was a common bird all over the fen countries ; to-day it is by far the rarest of the three British Harriers. While human agency may be responsible in some measure for their disappearance, the main factor has undoubtedly been the drainage and reclamation of the great fen lands, depriving the bird of suitable haunts. Even in Norfolk, where the Broad district satisfies its needs to some extent, the Marsh Harrier is very seldom met with now. In over thirty-five years of collecting in Suffolk, but one specimen has come into my hands.

This specimen was feeding on a nest of much incubated Moorhens' eggs ; they were on the point of hatching. Mr. Gunn wrote : " In dissection, I found an unfledged young bird in its throat, the remains of a second bird in its crop, and a few quill stumps of a third, that had previously passed into its stomach. There was not an atom of egg shell, so it is probable the Harrier picked the young bird clean from the egg."

The Marsh Harrier must have been a great terror to the wild-fowl of olden times, being equally severe on eggs and young, but the above is the only personal note I have.

B. THE HEN HARRIER (*Circus cyaneus*, Linn.)

The Hen Harrier stands mid-way in rarity between the Marsh and Montagu's Harrier. While females and immature males are not very uncommon in Suffolk, the beautiful dove-coloured male is very much scarcer.

It is not such a fen-loving bird as the preceding, and is more frequently found hunting over the dry, heathery moorlands characteristic of that district.

In Orkney, in the summer, I found the Hen Harrier breeding rather plentifully in certain localities on the mainland. And in the outer Hebrides it was almost common in the winter months. I sometimes saw seven or eight in a day, and often more than one on the wing at the same time. In the case of these winter birds, the fully-adult males appeared to outnumber the females by five to one or more, which is the exact converse to my experience in East Anglia.

My dissection-notes are very scanty, and are compiled from Suffolk or Norfolk examples only.

April 10th, 1900 ; an adult female contained the remains of a water-vole.

June, 1904 ; an adult male was feeding on a small leveret. This is the only Suffolk adult male I have any note of. I saw the stuffed bird in a keeper's cottage, and he supplied me with particulars.

January 7th, 1907 ; female immature ; stomach contained the remains of a Chaffinch and a Skylark.

March 30th, 1911 ; female adult, feeding on Partridge ; its stomach contained four ounces of flesh.

C. MONTAGU'S HARRIER (*Circus cineraceus*, Montagu).

Montagu's Harrier is far the commonest of the three Harriers in East Anglia. It is purely a summer visitor, and would undoubtedly breed in some numbers if it were allowed to do so. Even more than the Hen Harrier, its preference is for the open moorland rather than the fen.

This Harrier makes its appearance early in May, and leaves our shores by the beginning of August; at least that is my experience. In those very rare cases where they successfully rear a brood, it is probable that they would prolong their stay until September.

It would seem that the males are far more numerous with us than the females. Of ten Suffolk specimens, eight were males, and only two females. In Norfolk, too, I believe that there is a great preponderance of males over females.

Like the other Harriers, they are rather omnivorous. Beetles, mice, small passerine birds and game-chicks appear in my list.

29th May, 1889; male adult; stomach contained fur and other remains of a mouse.

19th May, 1909; male adult; stomach contained a few fragments of some small beetle.

13th June, 1914; male, second year, in change; stomach contained remains of young Pheasant, the right leg being entire.

17th June, 1914; female adult; stomach contained remains of Meadow-pipit.

20th June, 1911; male adult; stomach contained remains of Skylark with legs entire.

22nd June, 1912; male adult; stomach contained feathers and a few bones not identified (contents putrid).

25th June, 1909; male adult; stomach contained only a little dark-greenish matter.

3rd July, 1909; female adult; stomach filled with the remains of two young Pheasants.

IV. THE LITTLE OWL (*Athene noctua*, Scopoli).

I now come to the last bird on my list, the Little Owl. It is a member of the family *Strigidae*, and is therefore outside the title of my paper.

The Little Owl is not an indigenous species, but has been introduced by various enthusiastic acclimatizers; in the first instance I think by the late Lord Lilford,* and since then by various other naturalists, who were able to appreciate the great benefit which we derive from our own native owls, and believed that the new introduction would prove equally advantageous.

To me it seems something more than a pity that these acclimatization experiments should be made by individuals on their own initiative, without the consent of the nation. If such

* George Edwards figures (*Gleanings of Nat. Hist.*, 1758, 1., pl. 228) a Little Owl which was caught alive in a chimney in St. Catherine's Parish, near the Tower of London, and was believed to have escaped from some ship lying in the *Thames*. He also records a second example which came down a chimney in Lambeth.

Probably Charles Waterton can claim to be the first deliberate introducer of this bird into England, as he released five Little Owls (the survivors of a dozen brought by him from Italy) in the grounds of Walton Hall, Yorkshire, in May, 1843 (*Waterton's Nat. Hist. Essays*, p. 284).—

experiments are to be made at all, and the experience which has attended many such efforts here and in other countries in the past, does not lend much encouragement to their repetition, then I do think that there should be some competent central authority, whose permission would have to be sought and obtained before any alien bird or mammal could be turned out loose in Great Britain.

My scheme would, I suppose, require a short Act of Parliament, rendering it illegal to introduce intentionally and attempt to establish, as part of our native fauna, any foreign animal. Suitable and fairly heavy penalties would be enforced for any infringement of the Act, while, at the same time, the County Councils, or other authorized bodies, on being informed of the local introduction of the undesirable species, should be given full power to set about its extermination at once, before it can become fully established.

The Scandinavian Willow-Grouse (*Lagopus albus*) has, within recent years, been introduced into at least two districts in Scotland. In this instance, if the attempt proves successful, the risk is run of the swamping by the stranger of our own Red Grouse, the only bird peculiar to these Islands. The Willow Grouse is far inferior, whether as a bird of sport or from a culinary point of view, to our indigenous species. What possible excuse can there be for this experiment? The only suggestion I have ever heard is that it was hoped that the Willow Grouse might prove more "resistent to disease" than our native bird.

For this pious hope we are to run the possible risk of the extermination of our bird by a very inferior alien. Fortunately, the experiment does not appear to have succeeded very well, and I do not believe that the Willow Grouse is spreading, or, indeed, holding its own in the centres of introduction. But that does not excuse the experiment, which might easily have proved only too successful, and have ended by greatly diminishing, or even extinguishing, our own native Grouse, to the disservice of sportsmen and naturalists, and to the heavy monetary loss of the proprietor of the Grouse-moor, and the many other people indirectly dependent on its upkeep.

To return to the Little Owl. The bird has found no difficulty in adapting itself to the new surroundings. The introduction has proved entirely successful, and the species is increasing all over the country very rapidly. As an instance of this, I may mention that the Little Owl is one of the very few strange birds that I have met with in my own garden (72, Woodstock Road) in Oxford. This was on July 21st, 1914, at 12 o'clock noon in bright sunshine.

From three different Suffolk estates I have had several Little Owls sent me. From one estate in Cambridgeshire (not a very large one either) I received between July 6th and December 30th, 1915, twenty-six specimens, young and old. I think the nearest centre of introduction was Northamptonshire, the county into which

Little Owl

Lord Lilford introduced a considerable number of these birds procured from Holland.

The Little Owl feeds by day, and is not inconvenienced by the brightest sunlight. Of our four common British Owls, three are entirely nocturnal-, or, at any rate, crepuscular-feeders. These three are, therefore, quite innocuous on the rearing-field, for the chicks are in the coops, or, in the case of wild birds, under their mother's wing before the Owl starts on his rounds. The Short-eared Owl frequently hunts in bright daylight, but it is so scarce in East Anglia in these days, during the summer months, that it can hardly be supposed to inflict any serious damage on game. In the autumn and winter, when it is exceedingly common, game-birds are, of course, too big for attack.

By introducing the Little Owl we have added another diurnal bird of prey to our list, and a fresh scourge for the game-preserver. This small bird is courageous and bold, even to the verge of impudence, and is, in addition, exceedingly prolific.

As we have seen with the Kestrel and male Sparrow-Hawk, their depredations on game are necessarily limited to the time when the game is small, the eight weeks from May 15th to July 15th. It so happens that the great majority of my skins of the Little Owl are outside this period, and, consequently, the dissection-notes do not reveal him as a game-stealer. By far the larger number, twenty-eight, were feeding on *coleoptera* and nothing else, especially dor-beetles, midsummer chafers and ground-beetles of various kinds. Only five contained rodent remains, and only one the flesh of a gallinaceous bird, a farm-yard chicken six weeks old. So that the positive evidence obtained by actual dissection does not present a strong case against this Owl. Concerning a specimen taken on July 6th, 1915, (Cambridge), the keeper wrote: "Little Owl was seen taking chicken six weeks old in its claws. I trapped it with the remains of the chicken the same evening. I had previously missed six chickens, and so was watching to see what was taking them." In further correspondence on the subject of the Little Owl he wrote, September 8th, 1915: "Two years ago I had a coop of eighteen young Pheasants. When I fed at 10 a.m. they were quite all right: when I fed again at 2 p.m. there were fourteen missing. I went to get my gun; when I returned there was another one gone. I soon discovered what was taking them, as a Little Owl came at once and got another. I shot it with the Pheasant in its claws. The young Pheasants were three weeks old." That is sixteen Pheasant chicks out of a total of eighteen between 10 a.m. and 3 p.m.

Out of my entire series of thirty-five skins I have only six specimens which come within my game-stealing dates, mid-May to mid-July. Of these, one was trapped with its seventh farm-yard chicken, and one was shot on the rearing-field. While dissection only showed "small black ground beetles," the keeper writes: "This bird took a lot of young Pheasants on the

rearing-field in the daytime." So that two out of the six were certainly poaching.

Owing to the fact that the specimens in my series were almost all obtained outside the eight or nine critical weeks when game is small, dissection does not afford much evidence for the prosecution. But I have not the smallest doubt that this Owl is most destructive on the rearing-fields. Every keeper writes to the same effect. I lack the positive evidence afforded by dissection, only because I have very few examples that were examined between May 15th and July 15th. Throughout the year, beetles (*coleoptera*) of one sort or another appear to be their main source of food, rodents comparatively infrequently, and game-chicks in season.

5th December, 1916.

PLATE VI.

F. M. OGILVIE.

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