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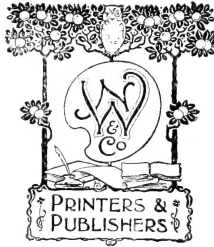
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PREFACE.

THE completion of another volume of 'The Zoologist' shows no diminution in the ranks of students of our British Fauna. The numbers of our contributors are practically an exact equivalent of those who produced the previous volume. Some we shall not hear from again, and we cannot help recurring to the loss of our old and valued contributor—John Cordeaux.

The Mammalia have not been neglected, and many original facts and observations have been published during the present year. Mr. Oldham's description of "The Mode in which Bats secure their Prey" is of permanent value. We have been enabled to give a good figure of the "Sea-Elephant" (*Macrorhinus elephantinus*), while the description of the Trek-bokke (*Gazella euchores*) refers to an animal which, owing to the destructiveness of man, will never be seen in its vast herds again.

Ornithology is the strength of the volume. It is unnecessary to detail any particulars among the many observations which have made 'The Zoologist' for 1899, as in all previous volumes, a special storehouse for facts in avian bionomics. We cannot, however, ignore Mr. Edmund Selous' "Observational Diary of the Habits of Nightjars." This is a unique publication, which seems to alone recall Prof. Mills' method in his "Psychic Development of Young Animals," published originally in the 'Transactions' of the Royal Society of Canada. The many necessary discussions which have appeared in our "Notes and Queries" may be instanced by that on the "Nesting Habits of the Moor-hen."

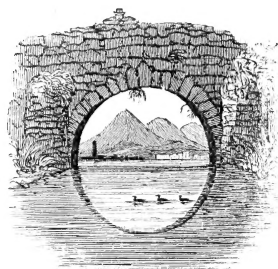
In Reptilia, Mr. G. T. Rope has given us the results of his observations on the Common Toad (*Bufo vulgaris*), and Mr. Monk has written an excellent account of the spawning of

Bombinator pachypus after two years of captivity in England. We have also published many other interesting notes on the Order.

Pisces still claim more recognition in our pages. We have, however, been able to figure a great Eagle Ray (*Dicerobatis* sp. ?), taken at Port Natal; while Mr. Patterson's notes from Great Yarmouth help to accentuate the dearth of news from other sea-ports.

In this volume more attention has been paid to the many interesting questions relative to the progress of organic evolution. Such titles as "Fecundity in each Avine Species, varying according to Accident of Locality"; "Varying Fecundity in Birds"; "The Coloration of British Birds and their Eggs"; "Mimicry," &c., tell their own tale, and prove that 'The Zoologist,' though conservative as to fact, cannot be pronounced as illiberal to theory.

We shall not write the centuries by the numerals "18" again; may the new figures bring prosperity to our Science and its votaries.



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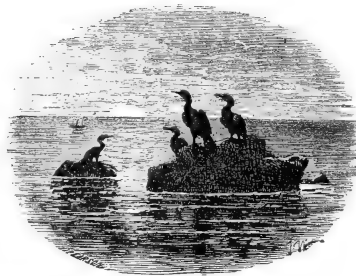
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ORIGINAL SKETCHES OF BRITISH BIRDS.

BY H. S. DAVENPORT.

THE MISTLE-THRUSH (*Turdus viscivorus*).

THE song of the Mistle-Thrush has an indescribable charm for most lovers of birds, and, it may be added, not without reason. Heard at a time of the year when the afternoons are visibly lengthening out, and our thoughts are attuned to the coming of spring, the associations connected with it doubtless tend to a pleasing influence upon the listener apart from any actual merit contained in the song itself, which, to my mind, is considerable.

The melody, however, is somewhat curtailed, no matter whether poured forth in storm or in sunshine, with a distinct kind of curl in it, resembling not a little the wild notes of the Ring-Ouzel. I do not know if others have remarked this peculiarity in the song to which I have alluded, and which it is quite possible may be considered a very indifferent definition of what it is my wish to convey; nevertheless, this curious intonation, which I have attempted to describe by the term "curl," is distinctly present.

It has been stated with a show of authority that Mistle-Thrushes are not gregarious, but that they consort in families; the fact remains, however, that Mistle-Thrushes are to be seen associating in considerable numbers in the month of September every year. Now I must say at the outset that I am far from wishing to criticize the observations and experiences of others,

when irreconcilable with my own, in a harsh or captious manner, for I am by no means insensible of the heavy debt ornithologists of every degree owe to the writings of their predecessors; nevertheless, the *truth* is, or should be, the common object of all who write sketches of bird-life.

Many a time in the spring of the year, when I have been waiting and watching in some plantation or wood in order to watch a Sparrow-Hawk to its selected nest, old nests of years gone by being in almost every tree, have I been indebted to the far less harmonious, not to say angry and objurgatory, notes of the Mistle-Thrush at a distance for warning to pull myself together and be on the alert; while a moment or so later, swiftly and silently winging its flight amidst the trees, has the special object of my ramble appeared, shooting up at last to its perch upon a branch, and remaining perfectly motionless while eventually affording me—provided my ambush had told no tales—the identical piece of information I was in want of. In defence of its nest the Mistle-Thrush is very courageous, but still more so in defence of its young when on the point of quitting it; I have observed some battles royal on the part of this bird with Rooks and Jackdaws, and, though successful on occasions in fraudulently appropriating the eggs, I have never seen the two species just mentioned actually capture the young.

I have good reasons for considering this bird a very early breeder. I have never detected its nest in abnormal situations, nor have I come across abnormal eggs, either as regards colour, shape, or size, as has been the case with sundry other birds; but a most singular instance respecting the nesting of this species came under my notice in the spring of 1883. In May of that year there were two Mistle-Thrushes' nests built low down in ornamental yew trees, within half a dozen yards of each other, opposite the hall-door of a country house in Leicestershire. Both nests contained eggs when I found them, and in each instance broods were successfully reared. Some few days after all the young ones had flown, I was rather surprised to notice an old bird again on one of the nests, and, on inspecting it, I was a great deal more surprised to find that it contained no fewer than nine eggs, five being of the type of those originally laid in it, and the remaining four evidently the property of the Mistle-Thrush

that had built and utilized the nest in the adjoining tree. I took four of the nine eggs away, and the old bird incubated the remainder, and in the course of time brought forth a second brood. Meanwhile the other Mistle-Thrush had constructed a second nest a short distance off, and she too was successful in hatching out a second brood. I should add that the eggs in the two nests in the first instance presented very distinctive features, so the absolute accuracy of what I have related need not for one moment be called in question. The Curator of the Leicester Museum and others were acquainted with this interesting case at the time.

The year following (1884) only one nest was built; I found it on March 24th, some six weeks earlier than in 1883, when the two nests had been built in May, altogether a late date, except on the hypothesis that it was a case of second nesting, which seems probable. The nest was placed in pretty much the same spot in 1884; it contained seven eggs, all fresh, and an old bird was brooding them when I discovered it. Of the seven eggs, four were of one size, shape, and colouring, and three of another, and both lots corresponded with the character and were beyond all doubt referable to the two types of the eggs laid in the preceding year. It may be hazardous to theorize on the subject, but I have a theory, and it is this—that the two hen birds shared a mate between them. In the one instance the eggs were small and round, while in the other they were rather elongated, the ground colour, moreover, as also the markings, varying with each type. Having kept specimens of each in 1883, I naturally compared them with those laid in 1884, and there can be no sort of doubt but that they were the produce of the same two birds.

With regard to this species, I do not remember having met with anything else in their economy or life-history that need be reproduced here. Their conspicuous nests, built early in the spring of the year, and containing, as a rule, four or five eggs, are known to most schoolboys; but when I come to deal with the Lapwing, I shall relate what I have every reason for believing was a second instance of a single male bird aiding and abetting the nidification of two females. Polygamy is natural to some species, but Mistle-Thrushes and Lapwings do not come within the category. Of course, I am far from contending that the accuracy

of my theory is absolutely proven, though it satisfies my own convictions.

With the advance of summer, and after the young are fledged, the Mistle-Thrush's utterance is chiefly limited to a harsh monosyllabic note sounding like *wark*, repeated at intervals. People have often asked me what it was, and not always believed me when I have told them. Some have fancied it to be the croak of a Frog.

Without undue presumption, I think I may claim to have found a Mistle-Thrush's nest so charmingly situated as to have been simply peerless in the natural beauty of its immediate surroundings. A huge bunch of mistletoe hung for many years from one of the middle branches of a lofty poplar at the four cross-roads between Lucton School and Mortimer's Cross, in Herefordshire, and in the centre of this bunch a pair of Mistle-Thrushes one spring built their nest and reared their young. Subsequently an enterprising boy climbed the tree just previously to the Christmas holidays, and possessed himself of the mistletoe in its entirety, which doubtless he put to much less profitable use when it adorned the interior of his own home than had been the case with the striking-looking birds that had once employed it as a nesting site during the month of sunshine and showers.

There is a prevailing notion that Mistle-Thrushes are silent after April has run its course. This may be true of the majority, but one of the species most certainly sang to me almost daily during the first three weeks of May in 1894. There are, I may perhaps observe, many hard-and-fast notions about the history and economy of birds which are wholly erroneous, but which are possibly to be condoned from the fact that they are so often repeated, and therefore fostered, by so-called popular writers on Natural History. Original observations are what we want nowadays; how seldom, comparatively speaking, do we get them where birds are concerned!

THE SONG-THRUSH (*Turdus musicus*).

Of so generally abundant and well-known a species throughout the British Islands I have not very much to say that has not been said scores of times already, and therefore my remarks on this delightful songster will be discreetly and advantageously

curtailed. Its nest is to be found in varying and odd situations, and in the spring of 1894 I noticed, during a long visit to North Wales, chiefly for ornithological purposes, that a very favourite site for it was not only on but *in* banks. I was staying at Llanuwchllyn, a village prettily situated near the southern shore of Bala Lake, and it was almost impossible for anyone who possesses a keen eye for birds' nests to stroll along the charming lanes thereabouts without remarking those of Song-Thrushes so located. Children journeying to and from school twice a day along these lanes made sad havoc of all kinds of nests, but it struck me that the poor confiding Song-Thrushes fared the worst at their hands, not even excepting Blackbirds and Robin Red-breasts. The wantonness with which nests were torn from their picturesque sites, and the eggs flung broken on the ground, fairly made my blood boil on many an occasion; while I ascertained that the little girls were every whit as bad as the boys. If masters and mistresses of village schools throughout the kingdom—for I have little reason to doubt that the wantonness complained of is pretty general—would take upon themselves to impress on the youthful mind the cruelty involved in robbing birds' nests wholesale without any set or scientific purpose, and would further impress the moral by a little salutary correction on the youthful bodies of hardened offenders, the result would be far more conducive to the peace and happiness of the birds themselves, and infinitely less harrowing to the feelings of those who from a genuine and deep-rooted love of their subject make the avifauna of these islands the all-engrossing study of a lifetime.

That some such restrictions in the matter would not be without general and good effect is shown, I think, by a visit I once paid to the Bempton cliffs, on the Yorkshire coast—between Bridlington and Filey—in order to watch the gathering of the Common Guillemots' eggs, and make a selection of quaintly-marked and uncommon specimens for my own collection. On this occasion I was accompanied by my wife, who takes as keen a delight in birdsnesting as myself, and is wonderfully "smart" at finding eggs; and as we walked along the main road from Bempton station to the cliffs, we noticed several nests of different species, containing eggs, in most exposed situations, and were, moreover, not a little struck by the fact that the children we

passed were busily engaged picking the wayside flowers. There is more in this than meets the eye, I thought; so we stopped and asked an intelligent-looking boy of apparently some eight or nine years of age if he or his companions ever meddled with the birds' nests. Quick as possible came back the answer, "Oh, no; we're not allowed to." And on further investigation I rejoiced to find that such was absolutely the case, the children in the village schools thereabouts being very rightly taught the cruelty of an indiscriminate and irrational destruction of birds' nests and eggs.

This species is an indefatigable songster, and probably if it were less frequently heard in our gardens and orchards, we should set greater store by its music—regard its varied and stirring notes with greater favour. I have heard it sing every month in the year at such times as the weather has been mild and open. I heard one give forth a few sweet notes at a quarter to eight on two consecutive mornings in the first week in January in the year 1888, and another bird sang almost every day in my garden throughout the November of 1893. As is the case with most of our feathered songsters, however, the weather plays an all-important part in the "to be or not to be" question of an open-air vernal concert; nevertheless, the Mistle-Thrush must be quoted as a notable exception to this rule, and as one not to be deterred by storms and gales from chanting its pleasing lay. Alike in fair weather and foul, and at its appointed season, the "Stormcock" raises its voice, perched aloft amidst the topmost branches—rather preferring, I have observed, to station itself in an isolated tree either by the roadside or in a hedgerow a field away for the purpose.

The Song-Thrush is a more or less migratory species; it pairs early in the spring, and the nest, which is quite unique, is placed in a variety of situations; but because I once discovered one on the ground in the Rectory plantation at Skeffington is not conceived an adequate reason for suggesting that that is one of its normal situations. We talk glibly enough about the absurdity of drawing conclusions from single instances, and yet I can never get out of my head reading in some book or other intended for the instruction of simple tyros like myself that Nut-hatches' nests were to be looked for in haystacks! I can only

presume it was thought that to this grotesquely aberrant situation for a Nuthatch's nest—the original of which, by-the-by, is to be seen in the South Kensington Museum—the Latin adage *ex uno disce omnes* would most fitly apply. Let all young ornithologists be on their guard against the tendency to generalize from a single and perhaps exceptional experience. Surely I have some memory of a man who once alleged he had shot a Hare at ninety yards, and who wrote proclaiming the feat in a well-known journal devoted to records of sport, and who argued therefrom that he could always kill Hares at ninety yards! Unless I am dreaming, the gentleman with the long bow was somewhat roughly handled by subsequent critics of both his feat and logic in the same journal. The writer once dropped a Grouse dead at ninety yards—a cross shot—that had been previously “peppered”; it was a precious fluke, a stray corn just chancing to penetrate the brain; but many another has been missed at a third of the distance since. It was on the beautiful Kildonan moors, in Sutherlandshire, that the shot was made and measured.

However, the Song-Thrush is my theme. With regard to its eggs, the only abnormal-sized varieties I have met with have invariably been on the small scale. I have also found them on rare occasions unspotted, and in one instance, in Herefordshire, I took a beautiful clutch of five with blood-red markings upon them. The characteristic nest of this species is too well known to need my making any reference to it.

THE REDWING (*Turdus iliacus*).

For a close inspection and prolonged study of the Redwing there is hardly a period more suitable than that of frost and snow, especially when a heavy fall of the latter has covered the ground to the depth of several inches, and the grass of the green fields has been hidden from our view for many days. Then it is that the poor birds, with their normal food supply cut short, and pinched with cold and hunger, draw to the roadside hedges for the purpose of feeding on the winter berries which, in mild open weather, they apparently set less store by, except on first arrival. During a severe spell of weather I have gone close up to as many as ten or a dozen in a low bush, their attitude crouching and despondent, and they have shown neither fear nor inclination to

be gone at my approach. There is some old saying to the effect that adversity makes strange bedfellows, and the truth of it occurred very forcibly to me when one morning a winter or so ago I found some Redwings collected in a thorn-bush by the roadside, sitting quite still, and apparently resigned to any fate that might overtake them. Noticing a dark and much larger-looking object in the same bush, and having my curiosity aroused, I went up to it, and discovered that their companion in misfortune was a Squirrel. The poor thing, tamed by hunger and cold, was as confiding as the Redwings, and seemed to be sharing their frugal fare of hips and haws.

I am of opinion, nevertheless, that this species is able to withstand the occasional severity of our winters much more readily than the Fieldfare, owing to its Thrush-like habit of frequenting, during hard frosts, hedgerow bottoms, and feeding on snails and the pupæ of Lepidoptera. Its haunts and habits somewhat resemble those of the latter bird, and it arrives in this country generally some few days in advance of its equally well-known congener. In the autumn of 1894 I saw and heard both species for the first time on the same afternoon, *viz.* October 15th. My attention was attracted to the Redwing by its familiar "wheet wheet" long before I perceived it, with a companion, perched aloft on the dead branch of a tree in a hedgerow. I oppose the doctrine that Redwings by nature are exclusively insectivorous, and only revert to berries as a last resource; on their arrival in this country they immediately set to work in small flocks on the hips and haws, though I admit that later in the year, in open weather, they may frequently be seen in the pastures feeding on worms and snails and other insects. They frequent the meadows by day, and towards the close of the afternoon, just as dusk is coming on, may be seen in little straggling parties repairing to the shelter of shrubberies and plantations, where they spend the night. The Redwing is easily distinguishable from the Song-Thrush by a broadish white stripe over the eye, in addition to which it is a bird of gregarious habits, which the other is not. As an article of food its flesh is considered very delicate—"better than the Fieldfare," I have heard a good judge of things edible declare; but this, of course, must be a matter of individual taste. Personally, I should say that a fat Blackbird in the

autumnal months, well hung and not too long before the fire, would run them both very close.

Touching the vexed point of the Redwing nesting in this country, I am aware that it has been reported to have done so—indeed, on more than one occasion in my own county—but, though such may have been the case, it is quite out of the question that the mere *ipse dixit* of, it may be, an anonymous correspondent to some paper should be accepted as authoritative on the point. Actual and absolute proof of its nest and eggs having been obtained in this country has not yet been forthcoming, I fancy, and until the birds are killed at the nest and the eggs taken, ornithologists will do well to receive with the fullest reserve all affirmative statements that have hitherto appeared on the subject. It is very easy to make an assertion; it is another matter to prove it. The writer has frequently been girded at as being too particular in his wish for indisputable evidence on sundry points connected with birds, but he maintains that it is a subject on which one cannot possibly be too particular. Only consider for a moment what distinguished modern writers on ornithology have done with a mass of flimsy and unsupported evidence relative to the appearance of this or that rare species in this or that part of the kingdom: why, they have rejected it as utterly unreliable; and had only a proper test been applied in the first instance to communications of the kind, ancient books on the subject of birds would have contained far less fiction.

However, to return to the Redwing. I have had its eggs from Norway, and they much resemble small varieties of those of the Blackbird, the ground colour being almost entirely hidden by tiny streaks, which are evenly distributed over the whole surface. It has a sweet pleasing twittering kind of song as I have heard it, but I am not at all sure that I have heard the real thing, for the reason supplied by the quotation from 'A Spring and Summer in Lapland.' "An Old Bushman" writes:—"Of all the northern songsters, perhaps the Redwing stands first on the list, and is with justice called the northern Nightingale, for a sweeter song I never wish to listen to." This is enthusiastic writing, which I can appreciate without, I regret, being in a position to endorse. I can never have heard the Redwing at its best.

THE FIELDFARE (*Turdus pilaris*).

A bird of passage, and of more than common interest. It comes to our shores in the autumn and departs in the spring; and, though British nests and eggs have been reported as taken, I believe the gravest doubt encircles all such statements. I have special reasons for remembering this bird, and I will relate why. On two occasions I have publicly recorded observations of its existence in this country at what were deemed unusual dates, and on both occasions my communications were as publicly called in question, and it was insinuated that I had blundered in my identification,—in short, had mistaken the Mistle-Thrush for the Fieldfare. That such errors are of frequent occurrence with those who do not make birds a particular study is, I freely admit, beyond question, and consequently there is no reason really why an obscure ornithologist like myself should feel hurt at the suggestion of such lamentable ignorance. All the same, the fact remains that in my own estimation I am just as likely to confuse the two species as any two letters of the alphabet.

In the first case: in 'The Vertebrate Animals of Leicestershire and Rutland' I recorded a Fieldfare's exceptionally early appearance at Lowesby on Sept. 2nd, 1877,—it should have been printed 1878,—and I am at liberty here to amplify this brief notice with a few details, though I would first like to point out that in Mr. J. E. Harting's edition of 'The Natural History of Selborne' there is reference to a Fieldfare shot in a garden near Kirby Muxloe, in Leicestershire, on July 29th, 1864, and forwarded to the editor of 'The Field' for examination. It had been observed about the garden all the summer.

With regard to the Fieldfare seen at Lowesby, however, I remember the occasion distinctly. A cheery companion and friend—alas! long gone from these scenes—and myself had just started out shooting, and we had only got a little distance beyond the plantations that fringe the lower side of the Hall, when my attention was suddenly arrested by a kind of chuckle with which I am infinitely more familiar in mid-winter than during the opening days of Partridge-shooting. The chuckle was repeated more than once, and in a twinkling I descried a Fieldfare perched high up in a lofty tree. I tried to stalk the bird, but it was far

too wary for me, and just as it took wing, it again uttered that well-known laughing cackle, somewhat more briskly this time, which I have noticed is a common habit of the species on the moment of taking flight. I admit that I was "let down," so to say, very courteously in 'The Vertebrate Animals of Leicestershire and Rutland,' but there is no getting away from the fact that my note therein is immediately followed by a reference to the Mistle-Thrush being frequently mistaken by *sportsmen* for an early arrival of the Fieldfare, so I can draw my own conclusions.

In the second case, I wrote as follows to 'The Field': "On the afternoon of Oct. 3rd I heard, saw, and could have shot (as the one closely pursued the other) two Fieldfares"; and the Editor appended the following note: "Although it would not be exceptionally early for Fieldfares to arrive, the action described points with more probability to the birds in question being Mistle-Thrushes, and the more so because there were only two of them instead of a small flock." This was rebuff number two.

The latest date I recollect seeing Fieldfares staying in this country was on May 12th, 1879. On that morning I walked within gunshot of a cluster of five which were winging their way northwards, and had settled for a few moments on the top of a lofty poplar. With regard to the bird seen on Sept. 2nd, 1878, was it a pioneer of others to follow, or was it one that had been wounded and passed the summer with us? At all events, there seemed nothing wrong with its flight or general appearance when I was gazing at it.

I have found this species roosting in tall thick hedges, but generally on the ground, and frequently in the furrows in the open fields, for I have two or three times walked nearly on to the top of them after 10 p.m. on dark nights; they cannot even then resist a chuckle when thus disturbed. I think, though, the more common roosting-place is on the ground in small woods and plantations, and, after wheeling about for some time in a flock, first alighting on one tall tree and then taking a flight and settling on another, they will finally descend on the point of dusk to the lower trees,—ash-pole spinneys being especially favoured haunts at this hour. After resting for a few moments in the branches, the birds drop silently down in quick succession to the

shelter and concealment afforded by the brushwood and undergrowth, and so bivouac for the night. I have been reminded that Mr. Seebohm, in a most delightful chapter on the Fieldfare, writes:—"Instances are alleged of these birds having been flushed from the stubbles or the pastures at dusk; but this is the Fieldfare's feeding-hour; and if shrubberies be near at hand, it is there they spend the night." This is a decided expression of opinion, and comes from a great authority; but though Fieldfares may feed at dusk, a statement I venture to question, I doubt their doing so between the hours of ten and eleven at night, at which time, I repeat, I have often disturbed them from the open grass fields.

Nevertheless, it is one thing to detect the slips and question the statements of previous writers, to whom we all owe so much; quite another to write a book; and I can only trust that any criticisms of mine, wherever they may appear, will not be regarded as written in a captious, cavilling spirit. I am too well aware that many of my predecessors, in whose footsteps I am humbly and laboriously treading, have forgotten more than I can ever hope to know.

It is, of course, notorious that this species frequently breeds in large colonies. I have had its eggs from Norway, and was much struck by their resemblance to plain as well as handsome eggs of the Blackbird and the Ring-Ousel, with which, I should imagine, they may very easily be confounded at times by even expert oologists. Fieldfares have little knowledge of economy, otherwise they would better husband their resources in the matter of food supply. They will strip bushes of hips and haws in open weather when an insectivorous diet would prove equally sustaining, and then when a spell of frost and snow is over the country and there is nothing to be extracted from the fields, the produce of the hedges which has been prematurely attacked is liable to run short.

I have dwelt at some length on this species, as it is both well-known and a favourite. In short, what the Swallow is to the spring, the Fieldfare is to the autumn,—they each in turn serve to mark an epoch in time's revolving wheel.

THE BLACKBIRD (*Turdus merula*).

As a songster this species stands high in my regard, and, though the statement may be treated as open to question, I am not at all sure that every lover of birds is able to discriminate between its notes and those of the Song-Thrush. This, however, by the way. It breeds early in the spring, and yet in actual priority of date yields, to my thinking, to such well-known birds as the Mistle-Thrush, Song-Thrush, Long-tailed Tit, and one or two others. At all events, though there may be very little in it,—a distinction without much of a difference, perhaps,—I have noticed that the earliest nests which meet my eye as year succeeds year are never those of the Blackbird.

It would be superfluous to waste time on a discussion of the nidification of so common a species, for its nest and eggs fall an easy prey to every roving lad, while, in addition, there is scarcely a book on the birds of these islands which does not thoroughly deal with the question. Though the sites chosen for building purposes exhibit an infinite and varied assortment, there is an uniformity about the eggs which is sadly disappointing to the ornithologist, always on the look-out for abnormal coloured specimens. Nevertheless, I have on occasions taken some most richly-marked eggs, approximating to the handsomest type of those of the Ring-Ousel; and in two consecutive years at the same spot in the same hedge I found nests containing five and four eggs respectively, the bold markings of which I have never seen equalled, certainly not surpassed. I mention this case, however, as much with a view of drawing attention to how addicted most birds are to repairing year after year to the same haunts for rearing their young, as to show how the particular type of an egg laid by any species may be pretty confidently looked for again. Because I quote only a single instance, I am not generalising from it alone; I have had proof in plenty of what I say.

The unspotted variety of egg is, I believe, not uncommon, though I have only once met with it, and that was near to Mortimer's Cross, in Herefordshire, in the year 1888. The bird was on the nest, which was placed in a thorn-bush on the brink of the river Lugg; it contained four fresh eggs of a pale apple-

green colour, which I transferred without a pang to my collection, and which are frequently pointed at as "Starling's" when the contents of my cabinet are on view to friends and acquaintances. I believe it was Pope who wrote "A little knowledge is a dangerous thing," and I shall make bold to add, "especially where birds' eggs are concerned." My ill-success in not meeting with more specimens of this unspotted variety does not arise from slackness or laziness, as I never pass a Blackbird's nest without inspecting its contents. Boys who meditate purchasing the eggs of Field-fares and Ring-Ousels will do well to be on their guard, as they bear a strong family likeness to those of the species under discussion.

Blackbirds are somewhat prone to rearing a second brood in the same nest, and I have known less than a week elapse between the departure of the young and the laying of fresh eggs. In the spring of 1883 a pair of these birds possessed themselves of a vacated Mistle-Thrush's nest for their second brood, and brought them off successfully. The earliest recorded date I have of an egg is March 16th, 1885.

Pied varieties are occasionally met with; my youngest brother shot a lovely bird at Plumtree, near Nottingham, the black and white feathers being most evenly apportioned. But, in this connection, it was my own star that was destined to be in the ascendant on Oct. 19th, 1893, on which date I was staying with my friend Captain Quintin Dick at Hinton St. George, in Somersetshire, he having taken Lord Poulett's extensive shootings thereabout on a lease. A strong contingent of us had just commenced warfare on the Partridges in a large field of turnips, when I espied a white bird skimming away over the tops of them in front of the "gun" on my left, who happened to be my host. I heard him say sharply to one of the keepers, "What the deuce is that?"; and, though simultaneously I fairly screamed "Shoot, shoot!" the bird was quickly out of range, and the responsive "bang, bang," came too late to be effective. As luck would have it, however, there were a brace of birds not picked when we reached the boundary hedge, for the turnips were of tremendous growth, and, as some little delay appeared inevitable, Capt. Dick very goodnaturedly let me go off in pursuit of this *rara avis*, an under-keeper accompanying me, as apparently my only chance of

securing a shot was to lie in ambush, and have it driven towards me. For half an hour it led us a pretty dance, and we repeatedly had to change our tactics; and, though I felt I did not want to set eyes on another Partridge until I had "bagged" my own particular bird, I must confess to feeling considerable qualms of conscience all the time as to what the rest of the "guns" would think of my desertion and apparent wild-goose—*alias*, white blackbird—chase. However, the end occasionally justifies the means, as it did in this instance; for, just as I was on the point of abandoning the pursuit as hopeless, the bird proving as averse to being driven as stalked, I chanced a snap-shot at what at the moment of firing I thought quite a prohibitive range, and down it came,—a prodigious fluke, yes, I freely admit,—a stray corn having severed its pinion-bone, and probably not another gone near it. A more beautiful bird of the kind I have never seen, and, though a similar specimen in the South Kensington Museum runs it hard, I prefer the one I was lucky enough to kill at Hinton St. George.

It is possible that someone or other will be found to blame me for what I have recorded in the light rather of a triumph—I deemed it one on the spur of the moment; but, though highly disapproving of the indiscriminate and senseless slaughter of rare species that might breed in greater numbers with us if left unmolested, I do not see that the capture of an abnormal-coloured Blackbird deserves reprobation, and especially when it was a marked bird, and the hand of almost every dweller in the district was against it. Indeed, considering the persecution it underwent, the wonder to me is that it managed to escape its doom for such a lengthened period. Had it been one of a pair of Golden Orioles nesting in the spring of the year in Kent, let us say, my action would have been most properly denounced as reprehensible in the highest degree. It is not after this manner, I have presence of mind enough to know, that the cause of Natural History is best aided. However, it is far from my intention to offer an elaborate apology for what I did, and should probably do again to-morrow if I had the opportunity; "collectors never know remorse, and seldom feel regret," and I am quite sure all my plunderings have not done one ten-thousandth part of the damage which a contrary wind inflicts at migration time.

The keeper on whose beat the white Blackbird was shot assured me that he had never seen it with a mate, and that he did not believe it had nested during the two years he had noticed it about the district. Such evidence as this is, of course, not conclusive on the point, though I think it extremely probable that his conjecture was right. Had it paired and assisted in the rearing of a brood, surely some of the young would have been abnormally marked, and, in this case, he would have observed them on his daily rounds. A young and intelligent gamekeeper would let very little escape his eye.

A word about pied Blackbirds, which, to my mind, are more subject to variations of plumage than any other species. I have seen it stated—I cannot say where, for I read pages and pages on the subject of birds almost daily—that the white feathers turn in time to black, and that even in the case of albinos nature in due course resumes her sway; the argument being that, if such were not the case, we should be continually meeting with abnormal-coloured species. Again, some other writer has recorded his conviction that albinos never revert to the normal plumage, and that natural white feathers always remain white; but that when resulting from disease they will resume the proper colours at the moulting period. The cause of preternatural plumage in birds need not be gone into here, but my impression is—once white or pied, almost always white or pied; while I view with some little incredulity the contention that disease is accountable for some of our pied birds, and that when they resume their normal health they also resume their ordinary plumage. What evidence is there in support of this? Surely it is more or less assumption? It is impossible to decide offhand about disease in a bird, especially when it is at large; while the few pied Blackbirds I have known kept in cages have never reverted to the normal colouring after moulting, although I have heard tell of an instance or two to the contrary. Of course, the obvious retort to this would be that none of them owed their white feathers to disease. So be it.

I have on a few occasions found six eggs in nests of this species, but five and four are more commonly met with, while it is quite the exception for a clutch to be represented by less than the last-named number.

There is one feature in the life-history of the Blackbird on which I have not commented, but to which I should like to just cursorily allude before bringing this particular sketch to a close. I refer to a tendency on the part of individual birds to indulge in mimicry; and though it has been very seldom indeed that I have without shadow of misgiving detected one uttering notes that were alien to the species, I met with a very noteworthy instance—quite recently in the Bala district—of a Blackbird copying the notes of a Curlew. The imitator sang from the same eminence on several consecutive afternoons during the month of May in 1895, and, though the reproduction of the borrowed tones was not so true to the original as that essayed by many a Starling in the same locality, it was impossible to close one's ears to the fact that for once in a way I had made the acquaintance of a Blackbird that not only took delight in mimicry, but modelled its refrain on the lines of that of which it had almost daily experience.

It may well be that the tuneful lay of the Blackbird is commenced at different seasons in different parts of the country,—I mean that the species will probably be heard in full song some days earlier in the spring of the year in a southern county like Hampshire, for instance, than in the more northerly regions of the British Islands. Considerations of this kind may not unnaturally be held to detract from the value of any given date respecting the first heard song of any particular species; but, as a comparative guide to my brother field-naturalists who take pleasure in noting the humblest details where birds are concerned, I may incidentally observe that I have never heard the Blackbird at the zenith of his musical powers in Leicestershire previously to February 20th, nor, I may add, the Chaffinch previously to February 19th. In this connection, however, much will obviously depend on the atmospheric conditions prevailing from year to year.

EARLY MAN IN BRITAIN.

SPURIOUS FLINT IMPLEMENTS.

BY W. G. CLARKE.

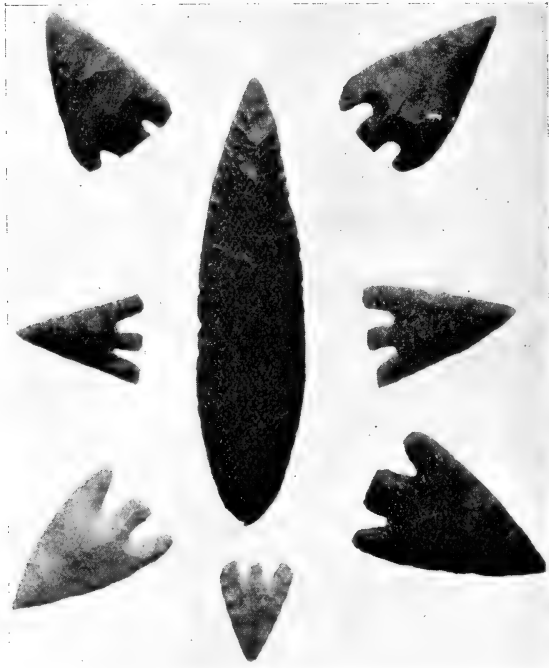
THE making of spurious flint implements is an industry by no means confined to the last few years. Practically as soon as it was found that the evidences of man's handiwork from the river gravels of England had a marketable value, men skilled in flint-knapping began to make imitations of them, "Flint Jack" especially obtaining notoriety for the skill with which he imitated prehistoric weapons. At a meeting of the Norfolk and Norwich Archæologists' Society in 1861, Mr. Pengelly stated that he knew there were some clever people in the neighbourhood of Caistor who could make ancient flint knives. And when the Suffolk Institute of Archæology met at Thetford in 1866, one of the workmen excavating gravel told the members that if they but gave him a few days' notice prior to their next visit he could procure as many implements for them as they wished. Need one doubt that he looked for assistance to the skilled knappers at Brandon? The natives of East Anglia do not as a rule try to sell spurious bronze or iron weapons to the unsuspecting archæologist: they limit their operations to imitations of flint implements. Rusty horse-shoe nails have, however, been offered me as iron spear-heads; and an egg-spoon that had been buried about ten years relegated to the Lake-dwellers. But in these cases the false descriptions were made through ignorance, and not of deliberate purpose as is the case with many of those who sell spurious flint implements. The district is so noted, and is visited by so many archæologists in search of flint implements, that there are unrivalled opportunities of foisting off forged specimens as genuine antiques. The Brandon knappers, with their marvellous inherited skill and constant practice in making gunflints, turn out specimens of prehistoric arrow-heads

and axes that might deceive even the elect. It is probable that this little Suffolk town turns out more modern imitations of ancient flint implements than does all the rest of England. One collector, to prevent deception, made it a condition of purchase that he should himself see the finding of the implements. This was all very well; but anyone that has tried it knows that this searching is a wearisome occupation, and the results are by no means always commensurate with the time employed. What did the knappers do then but manufacture their arrow-heads, and bury them overnight in certain marked spots. And how could the worthy antiquary have any suspicions when he saw the implements turned up before his eyes. Not long ago a certain landowner in Suffolk offered a premium for each flint implement found upon his estate. They came in units at longer or shorter intervals, until one of the men hit upon the happy expedient of buying the modern implements at a cheap rate and then selling them to his master, a course which he will doubtless pursue until that day when "comes the reck'ning, the dreadful reck'ning, and men smile no more."

Of late years there has been quite a revival in the manufacture of spurious implements in north-west Suffolk, and undoubtedly those turned out are beautiful specimens of the knapper's art. In fact they are too beautiful and perfect. Rarely indeed do we find an arrow-head, for instance, that was discarded or lost thousands of years ago, quite perfect. Either the point, the stem, or one of the barbs is damaged. But these modern implements are mathematically correct, with never a chip in the wrong place. The friction of the sand and the action of the atmosphere always causes a polish on the ancient implements, and to effect this on the modern implements, which are somewhat dull on being first chipped, they are buried for some weeks in hot sand, and care is taken when they are removed to leave some of this adhering. And when you express doubts as to the genuineness of the implements, the vendors triumphantly point out the soil which still adheres. Polishing with rags is also one of the methods of imparting an antiquated appearance to a spurious implement, and the process is more rapid than that of the hot sand.

There is more often than not a middleman between the knapper and the collector. He obtains the name of the latter

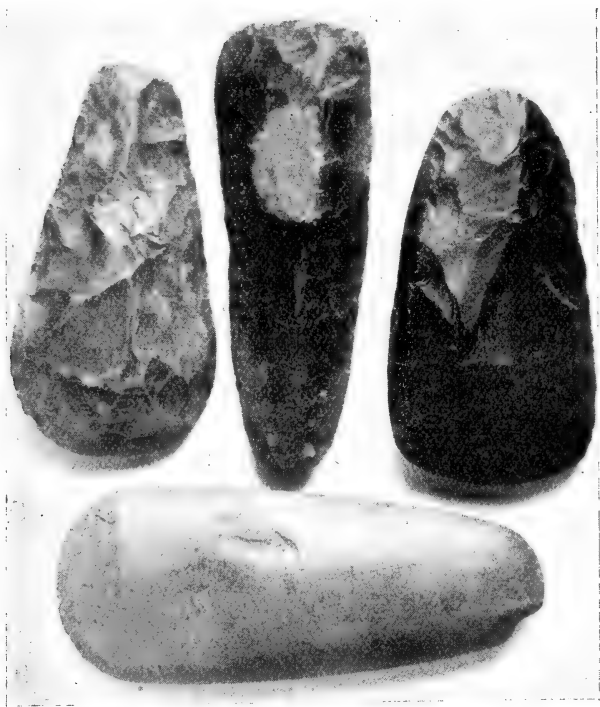
from some scientific directory, and offers to send some implements on approval. Some of them may be genuine; a few are almost bound to be spurious. If asked to guarantee the latter as genuine, the middleman will not do so, but will guarantee that they came from a certain town or village, the Suffolk men



Spurious Flint Arrow-heads.

working chiefly from Brandon, Lakenheath, Eriswell, and Mil-denhall. From 5s. 6d. to half-a-crown is generally asked for these arrow-heads; but, should the archæologist know them to be forged, one shilling or even sixpence will be taken, which is by no means dear, when it is considered that oftentimes two or three hours' skilled labour is involved in their production. As many as ten varieties of spurious arrow-heads are made, the most common types being leaf-shaped and barbed, the latter forming an almost perfect equilateral triangle. The workmanship is, as a rule, extremely beautiful. Mr. Frank Norgate, of Bury St. Edmunds, has some splendid specimens which he himself made. A bluish-white

coating to denote age is sometimes obtained by boiling the implement for weeks in a kettle, and then polishing on a polishing wheel, of course removing the distinctive character of the ridges. The greater proportion of these arrow-heads are made of French flint, yellow and semitransparent.



Spurious Flint Axes: chipped ones of flint; unchipped, of plaster.

Scrapers are very rarely made. Genuine ones are so common in the district as to render imitations unprofitable. I have a spurious flint dagger in my possession, which would deceive none but the veriest novice. Chipped axes are, next to arrow-heads, the implements most frequently manufactured. As they command good prices and are somewhat difficult of detection, their disposal to enthusiastic and unsuspecting collectors is a remunerative calling. A spurious Neolithic axe of grey opaque flint, ground and polished, was offered to a friend of the writer by a Brandon workman. It was stated to have been found in a gravel pit at a depth of twenty feet! It is worthy of remembrance that gum is

of material assistance in making a good polished surface. Lanceolate knives, partaking more of the character of the Danish specimens, are also most successfully worked.

The latest development of the spurious implement trade, however, is probably that by which ground and polished Neolithic axes are made of plaster. The seat of this industry is somewhat uncertain. The implements are remarkably well made of a plaster composition, cleverly coloured and coated with gum, and are difficult of detection if one is unsuspecting. A request to the would-be vendor to be allowed to cut the article in question will generally elicit an indignant denial, and thus open the eyes of the purchaser. These plaster axes have been offered for sale in the Suffolk villages of Eriswell, Brandon, and Lakenheath. Glass arrow-heads may also be purchased at Brandon; but few collectors would view these otherwise than as modern curiosities; and it is doubtful if (as has been suggested) collectors could be found who would purchase them as American weapons.

I am also informed, although without personal experience of the fact, that Paleolithic implements and weapons are made in Stoke Newington, and passed round among the labourers wherever excavations are going on. It is also stated that even the British Museum authorities have been deceived by some of these implements, so perfectly are they made. As specimens of a modern industry which is fast dying out, these spurious implements have a certain interest; but their value in furthering our knowledge of prehistoric man is of course nothing, and collectors would therefore do well to be on their guard.

The writer must express his indebtedness to Mr. F. N. Haward, of Chelmsford, for some of the foregoing information.

VARYING FECUNDITY IN BIRDS.

BY W. STORRS FOX, M.A.

IN a very interesting article in the December number of 'The Zoologist,' Mr. Basil Davies attempts to explain why some species of birds lay more eggs than others. Personally I feel grateful to him for suggesting this enquiry, and for the reasons he assigns for the remarkable diversity in the number of eggs laid by different species. If, therefore, I criticise to some extent the theory which he propounds, I hope that it will be understood that I do so in no unfriendly spirit.

Mr. Davies compares the reproduction of birds and mammals. He says: "Birds feel it their duty not only to produce a certain number of offspring each year, but also to bring a certain number to maturity." To illustrate this he compares the Cat and the Nightingale. The former breeds at stated periods whether you destroy her offspring or not; but the latter *at once* prepares to produce a second brood if the first is destroyed. The truth is that the main object of every organism is to reproduce itself. Each species has its own method of bringing this about. The Cat provides for the peopling of the world by future Cats as thoroughly as the Nightingale provides against the extermination of its kind. These facts are familiar to us, but it is not easy to explain them. Under natural conditions the Indian Elephant does not become exterminated, nor the Brown Rat exceed certain limits. On the one hand, with the former the period of gestation is about nineteen months, and rarely is more than one produced at a birth (Roy. Nat. Hist. vol. ii. p. 536; Darwin estimated that though a pair might live to be one hundred years old, their offspring would probably average only six, 'Origin of Species,' 6th edit. p. 51); whereas the Rat bears "four or five times in the year from four to ten blind and naked young, which are in their turn able to breed at an age of about six months, the time of gestation being about twenty days" (Flower and Lydekker's

'Mammals,' p. 475). The immense number of eggs laid by some fish, and the amazingly rapid increase of some lowly animals, are well-known facts. Each species has its own place in nature, and produces sufficient offspring to keep that place filled. But how this is regulated is another matter. We are sure that individuals are quite unconscious and regardless of the requirements of their species. Probably the food-supply itself is the chief factor, increasing fertility in times of plenty, and checking it in times of scarcity.

With birds is it not mainly the food-supply which confines the breeding to a certain season? Can it be supposed that our insectivorous summer visitants usually nest only once in the season because they feel that the time for migration is approaching, and a second nest is therefore useless? I understand Mr. Davies to suggest this. These birds leave us partly because the supply of insect-food is running short, and partly because a mighty impulse drives them to go. But they cannot be *conscious* weeks beforehand that the time for their departure is drawing near. If Finches as a rule go in for a second family, I would suggest two possible reasons, though I do so with diffidence, for I feel that I have not sufficient data as evidence for them. (1) Do not our resident Finches as a rule begin to nest earlier than the migratory Warblers, and so get the start of them? (2) If the particular food needed for feeding young birds is decreasing, the parent Finches can provide their own sustenance in the form of seeds, and so they will not need to draw upon the insect-food to such an extent as Warblers. Moreover, young Finches soon become capable of digesting seed. Nature as a whole keeps those numbers under control.

I take the rules which Mr. Davies gives to amount to this:—Every individual does what it can to produce offspring, and to increase the number of its species. We can only suppose that it is quite unconscious of what it is doing.

Now, as to the number of eggs laid by Finches and Warblers. Mr. Davies gives five as the average clutch; and then proceeds to show why this is the only suitable number. I cannot agree with him that a hen of small size could not well lay more than five. As he himself states, Tits may lay very many more. It seems probable, however, that the number may be limited by the catering powers

of the parents, and certainly by the covering capabilities of the sitting hen. Mr. Davies allows that the food-supply may affect the parents, for he says that the number of eggs is often less when insect food is not abundant. And, again, he gives as a reason for the two broods of Finches, &c., that "it is necessary for them to produce eight or ten of their kind in a season to aid in killing off from the cultivated lands the vast swarms of insects to which the summer has given birth;" which means that where the supply of insects is great there will be plenty of birds to prey upon them. But this ought to apply equally to the Warblers, &c.

Mr. Davies proceeds to give reasons why in one family of birds the usual number of eggs laid by the species of that family is large; whereas in another family the reverse is true. With regard to Game Birds, he suggests that the large number of eggs is to meet a large amount of destruction. It seems to me that not only with Game Birds, but with all birds, this is the secret of a larger or smaller number of eggs. Darwin wrote: "The Fulmar Petrel lays but one egg, yet it is believed to be the most numerous bird in the world" ('Origin,' p. 52).* And I should suppose that the causes which controlled the average numbers of eggs of different species were—(1) the supply of food; (2) the number of enemies; (3) the power of self-defence or escape.

It is not possible to accept some of Mr. Davies' reasons. For instance, he supposes that the Nightjar lays two eggs, because several gaping young birds would be a conspicuous object. As they only gape after dusk, no number of them would be conspicuous. I know no object less conspicuous than a Nightjar covering its young or eggs.

Again, is not the reason for the single egg of the Guillemot to be looked for in the special defences of this bird rather than in the shape of the egg? No doubt this shape is a protection. If Guillemots' eggs were shaped like those of most birds, very few would be hatched. But the one egg is laid in a place of comparative safety, and the bird itself is quick on the wing and an apt diver, and for part of the year lives far from land, and so is probably less subject than most birds to attacks of foes.

* Mr. A. R. Wallace has thus modified this statement:—"The Fulmar Petrel exists in myriads at St. Kilda and other haunts of the species, yet it lays only one egg." ('Darwinism,' p. 30).

Though Pigeons only lay two eggs, they produce several broods in the year,

But the number of eggs in a clutch does not only vary in different families or different species, but in different individuals of the same species. This is clearly shown in books on birds, where a varying number of eggs is nearly always given in the account of a species. I take this variation to be the result of—(1) the abundance or otherwise of the food-supply; (2) the age of the hen. But there are curious local conditions which are difficult to explain. For instance, Mr. Howard Saunders, in his 'Manual,' gives the number of a Jackdaw's eggs as four to six. But years ago I was birdsnesting in East Yorkshire and found two Jackdaws' nests each containing seven eggs. Whereas in North Derbyshire I have examined numbers of their nests, and have never found more than four eggs or young birds in any one of them. Also in the same district, with one exception, I have always found four eggs as the clutch of the Dabchick; but in the 'Manual' the clutch is given as four to six.

A most interesting example of the effect of food-supply upon the number of eggs of individuals is to be found in the official "Report on the Vole Plague in Scotland in 1889-1892." At that time the Short-eared Owl, which had hitherto been a rare breeding species there, became a common one, many of these birds laying ten to thirteen eggs; whereas six is the ordinary clutch. Moreover, in some cases there were second broods.*

Should Mr. Davies or others wish for another interesting study in connection with birds and their eggs, I am sure that they would find the meaning of colours an engrossing subject.

* No attempt is here made to discuss the relation of fertility to length of life. We are at present considering what are those factors which tend to limit or increase productiveness in birds. But length of life does not affect their egg-bearing powers; though the converse of this is probably true. Roughly, it may be said that the number of eggs laid by a species corresponds to the amount of destruction to which it is subjected. But it must be remembered that such destruction—by starvation, epidemics, or enemies—is more or less a fixed quantity, and therefore is not accidental so far as the species is concerned, though with regard to the individual it may seem to be so (*cf.* Weismann's 'Essay on the Duration of Life,' p. 11). If for a time more than the average numbers of a species are destroyed by enemies, the quantity of food per head will necessarily increase, and the birds of that species will become temporarily more fertile, as a result of more liberal feeding. But, should such additional destruction become a normal and permanent condition, it may be essential that the lives of the individuals of the species be prolonged, in order that the species may avoid extinction.

NOTES AND QUERIES.

MAMMALIA.

RODENTIA.

Climbing Powers of the Long-tailed Field Mouse.—During autumn and early winter Long-tailed Field Mice (*Mus sylvaticus*) eat the kernels of wild rose seeds in large numbers. To obtain the hips, the Mice climb among the briars, often travelling to the extremities of slender twigs in order to reach the fruit. The hips are nipped off with about a quarter of an inch of stalk attached, and if there be a bird's nest within easy reach are invariably taken to it. A search in the leafless hedgerows will result in the finding of many nests which the Mice have used. A Thrush's or Blackbird's is perhaps the favourite, but, failing this, a Hedge-Sparrow's or Greenfinch's, or even the fragile structure of a Whitethroat will serve. The Mice do not eat the fruit itself, but extract the seeds through a hole nibbled in the side, and, gnawing these with their chisel-like teeth, obtain the kernels. The empty seeds are left with the red pulp of the fruit, and I have seen piled up in a Thrush's nest as much of this *débris* as would fill a quart measure. In the neighbourhood of Alderley Edge I trapped several Long-tailed Field Mice in birds' nests last November—one of them in a Greenfinch's nest more than seven feet from the ground. The stomachs of those I examined were filled with a whitish mass of finely comminuted kernels, one containing in addition a small fragment of red fruit. It would appear that birds' nests are resorted to not merely on account of their convenient proximity to the growing fruit, for husks of acorns which must have been carried from the ground are sometimes present among the hips. A further reason may be that the Mice, when feeding in the nests, are comparatively secure from the attacks of their many enemies. — CHARLES OLDHAM (Alderley Edge).

AVES.

Flock of Crossbills at Yeovil, Somerset.—I received on Dec. 17th, from Mr. E. Little, gun manufacturer, of Yeovil, six Crossbills (*Loxia curvirostra*), shot from a large flock on Dec. 15th by a local farmer. Three of them were too much damaged to allow of preservation. — STANLEY LEWIS (Wells, Somerset).

Crossbill in North Wales.— Under date Dec. 7th, Mr. Arthur C. Parker forwarded an adult male of this species (*Loxia curvirostra*) from Bettws-y-coed for identification. He says "there are more cocks than hens, and the birds have now been hereabout three weeks." Subsequently Mr. Parker informed me the flock is only a small one, and that unfortunately many of its members have been wantonly destroyed. To the best of my knowledge, the last incursion of these birds in North Wales occurred in December, 1887; but a flock of them was seen in Delamere Forest, Cheshire, at the end of 1889. — ROBERT NEWSTEAD (Grosvenor Museum, Chester).

Nesting of the Goshawk in Yorkshire.— A beautiful fully adult female Goshawk (*Astur palumbarius*) has recently* been presented to the Norwich Castle Museum, which was shot at its nest a few days before the 13th of May, 1893, by Mr. W. M. Frank, a keeper on an estate at Westerdale, Grosmont, Yorkshire. Mr. Frank states that the nest, which contained four fresh eggs, was placed on the branch of a slender spruce-fir near the trunk, and about twenty feet from the ground. It was very large and flat, and the bird was very wild and difficult to get a shot at; he had to build a shelter of boughs to hide in, and enticed her by imitating her cry. Whether she had a mate, Mr. Frank is unable to state with certainty; he is under the impression that she had, but he did not see two birds together. Two of the eggs were sent to the Norwich Museum with the bird, but the other two are lost or broken. The Goshawk is in the present day one of the rarest of its family in eastern England, and in mature plumage so seldom met with that I only know of a single individual which has been procured in Norfolk, perhaps the county most favoured by its visits; and since the instance reported by Colonel Thornton, who received a nestling from the forest of Rothiemurchus "prior to 1804," I believe there is no authentic instance of its having bred in Great Britain, although it has been suspected of having done so. That this bird is not a more frequent visitor to this country is perhaps a matter of surprise, seeing that it is a common species in Central Europe, Germany, and Scandinavia, and there are still many apparently suitable localities for its nesting should it show an inclination to do so; but whether it would escape the attentions of the ubiquitous gamekeeper in such an event is very doubtful. Mr. Headley Noble, who was instrumental in bringing this interesting occurrence to light, suggests that the bird may have been an escaped trained Falcon, arguing from the facts that one bird only was seen, that the eggs were quite fresh, and that the bird was mutilated by the loss of a toe. As to the first suggestion, it has been stated by Mr. Frank that he was by no

* Note received Dec. 6th, 1898.—ED.

means certain that there was not a male bird—in fact, he remained till dark, after shooting the female, expecting its arrival, and spent the two following days in the wood with the same object, and suggests that the fact of there being several people working round the wood (a very small one) might have scared it away. As to the eggs being quite fresh, he says he did not allow the bird time to sit before shooting her. Mr. Noble's third reason—should the bird be an escape—may be of importance as a means of identification. The claw of one of the toes of the left foot is broken, which may have been done by shot, and the inner toe of the right foot is missing, evidently an old injury, as the stump is quite healed. Should such a bird have been missed about the time named, I hope this feature may recall it to the memory of its former owner. The question arises, would a trained Falcon, on obtaining its liberty, construct a nest and lay its complement of eggs unaccompanied by a mate? A female Goshawk has produced eggs in Mr. Gurney's aviary, but of course under circumstances which were not favourable to the construction of a nest. Prof. Newton, however, has called attention to a very interesting passage in Gairdner's edition of the 'Paston Letters' (see Lubbock's 'Fauna of Norfolk,' edition 1879, p. 225), which shows that these trained Falcons were so far sedentary in their habits that, provided the locality were suitable, a liberated bird might be expected to remain and nest. John Paston, writing to his brother in November, 1472, laments that a Goshawk sent him was so injured in transit that "she shall never serve but to lay egges." He therefore proposes to "cast hyr in Thorpe wood and a tarsell with hyr," that she might "eyer." This seems to indicate not only that the breeding of the Goshawk in the extensive woods which at that date surrounded the city of Norwich was not an unlooked-for event, but also, as Prof. Newton remarks, that the writer had some experience of a similar case; it will be noticed, however, that he proposed to supply her with a "tarsell."—THOMAS SOUTHWELL (Norwich).

Flamingo in Merionethshire.—Early in October last my brother, Mr. M. H. E. Haigh, wrote to me stating that, after a heavy gale from the south on the 26th and 27th of September, he had seen, on the 28th, a large bird on the estuary known as the "Traeth-bach," which, from his description, I had no doubt was a Flamingo (*Phœnicopterus roseus*). I was, however, unable to come down until the 20th of October, and on the following day succeeded in shooting the bird. It was excessively wild, rising, as a rule, nearly a quarter of a mile off, and flying round the estuary in large circles for quite twenty minutes each time it was put up. We finally got a shot at about ninety yards with a heavy shoulder gun by allowing the boat to drift with the tide. It was in good condition, and showed no sign of

having been in captivity. The beak was flesh-coloured at the base and black at the point; eyes brownish yellow, legs and feet bright pink. After being skinned the carcase was examined by Mr. Cordeaux, who tells me that it was excessively fat. The stomach contained nothing but fine gravel; the bird was, however, shot very early in the morning.—C. H. CATON HAIGH (Aber-iâ, Penrhyndeudraeth, Merionethshire, North Wales).

Scoters in South Hants (?).—Every Hampshire naturalist must have read with astonishment the statement made by Mr. Percival-Westell ('Zoologist,' 1898, p. 505) as regards Scoters (*Edemia nigra*) being common in Hayling Island and the Isle of Wight "all the year round, so doubtless breed there." Indeed a "record" for Hampshire. But, alas! the writer gave away his case when he said they were called "Isle of Wight Parsons," for, as it is well known, that is the local name for the Common Cormorant (*Phalacrocorax carbo*). Moreover, the Scoter is a very rapid flying bird, and never "lazily wings" its way. We have the best authority for saying that the Scoter is very rarely—if ever—in the south of Hants in the summer, and we are doubtful whether there is any record of its breeding here.—ALEC GOLDNEY HEADLEY (Portchester, Hants).

Nesting Habits of the Moorhen.—In the last number of 'The Zoologist' (1898, p. 506) there appears a note asking for the results of observations by other ornithologists of the nesting habits of *Gallinula chloropus*. In my own experience as a collector I never found the eggs of this species covered during the absence of the parent birds—in fact, in every case the eggs could be seen as soon as the nest was discovered. I remember a nest which I found in a small pit near here on April 29th, 1898, containing a full clutch of eggs. Although the eggs were boldly marked, and both nest and eggs perfectly visible from the bank, there was not the slightest attempt at concealment by covering them up. A few weeks later I came suddenly upon a pair of Moorhens in a small pit at Ashley, Cheshire. The birds, one of which I saw quite distinctly before it saw me, flew away, and I at once searched for the nest, which I found quite exposed on the opposite side of the pit to which I had seen the parent birds. As there were only two eggs in it, and not a full clutch, perhaps this latter instance does not furnish sufficient data on which to found an opinion; but I think other ornithologists will agree with me that at any rate in many cases the eggs of the Moorhen are left uncovered.—GRAHAM RENSCHAW (Sale Bridge House, Sale, Manchester).

I notice in the last issue of 'The Zoologist,' 1898, p. 506, a note by Mr. Hewitt on the nidification of the Moorhen, and an invitation to field naturalists to confirm or otherwise whether the sitting bird covers the eggs on leaving the nest. At a small lake in a thickly wooded district near

Bath, by invitation, I spent a delightful May day in 1897 with this species. Having procured the assistance of the gamekeeper, I was rowed to where the rushes grew, and examined a dozen or more nests, nearly all containing eggs; one with four eggs in it, I remember distinctly, would have been difficult to find by anyone but an experienced ornithologist, on account of the eggs being almost hidden from view by the decayed portions of the rushes. They had without doubt been carefully concealed by the parent birds, and probably by the female after depositing her egg. This nest, or rather more than receptacle for the eggs, was situated on one of the fallen and collected masses of reeds, &c., in the centre of the lake, and had I asked my companion I do not think he could have pointed the exact spot where the eggs were. At the several nests around the never-failing springs in the neatly arranged gardens of the Bishop's Palace, Wells, I have never found the eggs concealed. As a brief summary, I conclude that until the full clutch of eggs is laid they may or may not be hidden, according to the abundance of Jays or Magpies in the neighbourhood; but after incubation has commenced it would be an exceptional case to find the eggs concealed, by reason that the sitting bird would not absent herself long enough from the nest to allow of the visitation of an egg-sucker, although I have, in company with the above-mentioned keeper, watched a Magpie for hours, perched immediately over a sitting Pheasant, waiting patiently until the time arrived for her to feed.—STANLEY LEWIS (Wells, Somerset).

Mr. Hewitt asks for the experience of others with regard to the Moorhen's nest. May I state that I have never seen any covering over the eggs of this bird, though I have found numbers of nests in my own and other counties? I see no suggestion of such a habit in 'Yarrell' or Howard Saunders's 'Manual.' But in Seebohm's 'History of British Birds' (vol. ii. p. 561) there is this statement:—"The Waterhen generally covers her eggs, when she leaves the nest, with pieces of surrounding vegetation."—W. STORRS FOX (St. Anselm's, Bakewell).

Little Bustard and Great Shearwater at Lowestoft.—Early in May, 1898, a male Little Bustard (*Otis tetrax*), in full summer plumage—a condition in which it is very rarely met with in this country, and the first instance known to me in the eastern counties—was killed at Kessingland, near Lowestoft, Suffolk. For obvious reasons the event was not made public till after the close-time had expired, when a photograph of the bird was sent to me. On the 14th November, 1898, the fresh skin of a Great Shearwater (*Puffinus major*), which had been brought in by one of the Lowestoft fishing boats, was sent for my inspection by Mr. Bunn of that town, who also had three live Storm Petrels about that time. Both the above-mentioned birds are now in a local collection.—THOMAS SOUTHWELL (Norwich).

Avocet in Dorset.—On Nov. 12th, 1898, I received from one of my collectors a fine female Avocet (*Recurvirostra avocetta*). The bird had been seen in the district for several days, but was exceedingly wild; it was, however, eventually secured during a foggy day.—E. BAYLIS (Birmingham).

Terns in the Isle of Man.—Referring to former notes (Zool. 1896, p. 471), I may mention that a dead bird found this season at the Tern colony there described, and which is still occupied, proved, on examination of the beak and wing, to be *Sterna arctica*. But an even more interesting discovery was that of the nesting of *Sterna minuta*, a species, I believe, never before recorded in Man. On 22nd June last I found a small colony of this bird on a sandy barren close to the coast; I saw two clutches of two eggs each, and again a single egg. All these were laid on the bare sand, with no lining whatever, and scarcely any perceptible nest hollow. Many stones were scattered over the ground; there was little vegetation, and that very small and scattered.—P. RALFE (Castletown, Isle of Man).

Food of Grebes.—Two Slavonian Grebes (*Podiceps auritus*, Linn.) have been sent to me this winter, and when mounting the last one, on Dec. 19th, I found in its stomach, in addition to the feathers and elytra of water-beetles that I discovered in the first specimen, numbers of caterpillars, which I sent on to a well-known entomologist, who kindly tells me that they are the larvæ of one of the Crane-flies, which are well known as the destructive grubs of the Daddy Longlegs, or Tommy Taylor, as it is called in parts of the county (*Tipula oleracea*). These Grebes have been by no means uncommon this winter, and were on a large expanse of inland flood-water, where I have had some good shooting with the lessee in single-handed punts with big guns, when the water has been out and Ducks abundant. I take it that, the meadows being flooded, the grubs which generally feed at the roots of grasses, &c., climbed up into the fences, bushes, or anywhere they could, and so were secured by the Grebes; for, good divers as they undoubtedly are, I scarcely think they would pull up the grass by the roots in twelve or fourteen feet of water to hunt for grubs.—OXLEY GRABHAM (Chestnut House, Heworth, York).

NOTICES OF NEW BOOKS.

Colour in Nature, a Study in Biology. By MARION J. NEWBIGIN, D.Sc. (Lond.). John Murray.

THE colours of plants and animals, or rather their superficial colourations, have always attracted naturalists, generally exciting admiration, and sometimes provoking enquiry. In earlier days problems of this description were disposed of by the invocation of teleology, or the doctrine of design, which afforded no explanation, and simply demonstrated an unknown quantity. The Darwinian epoch introduced what may be called the Utilitarian Theory, by which animal colouration was controlled by "natural selection" for useful purposes in the struggle for existence. In each case design is implied, but in the one it is more or less a theological conception, while in the other it is represented as a natural factor. The result is that teleology has died a natural death, while the Utilitarian Theory has become rampant. The "simple primrose" which was "nothing more" to the amiable teleologist, has developed into the mighty Banian tree by the aid of current theory. We had almost forgotten that colour represented a physical or chemical process, in our estimation of its adaptive and protective nature.

The purpose of Miss Newbigin's book may be said to bring back the subject of colouration in nature to a technical treatment; to remove it from the domain of pure theory; to glance at it throughout the vegetable and animal kingdoms; and to describe its essence without either attempting to explain its purpose, or accepting some other very feasible and popular explanations now current. The differences between pigmental and structural colours are fully explained, and those colours classified. In the first, as is well known, hæmoglobin and chlorophyll play their great parts, while pigments, "which are definitely waste products, or are produced by the modification of waste products," are now

being seriously studied. When we remember the deadly effects of such "waste products" on the higher vertebrates, and that the yellow pigment found in the wings of many of the Pieridæ are due to "modifications of the ordinary waste products of the organism," we are forced with the authoress to suppose "that the wings of butterflies, being relatively non-vital parts, can have poisonous substances stored up in them without injury to the organism, and that therefore the utilisation of waste products as colouring agents can only occur in cases where the coloured structures are not intimately connected with the blood system."

The standpoint of this book is the physiological demonstration of animal colouration, the nature and elements of the colour itself, and not its evolutionary life-purposes. This treatment is neither sympathetic with, nor destructive to, the general conception of Protective resemblance and Mimicry. Colour alone must of course fall under the domain of Physiology and Chemistry, as, and in the same sense, all animal structure does, but this treatment does not explain its development in variety and markings; it only gives us its composites, and does not demonstrate its action as a force in the struggle for existence. In the last chapter, which is devoted to a discussion of "The relation of facts to theories," a rapid survey is given of the principal and perhaps most popular lines of modern speculation, and if Miss Newbiggin has not come to bless, at all events most naturalists will agree with her concluding sentences: ". . . in spite of the fluency with which so many people talk of the meaning of colour in organisms, the subject is as incomplete on the theoretical as on the physiological side. It seems reasonable to believe that the two deficiencies are related, and that a little more physiology will arm the theorists with better weapons. In the meantime, we cannot end a book on colour more fitly than by an appeal for more facts."

This volume contains many facts relating to animal colouration, and can be studied as well by a naturalist with a theory as by one who possesses it not. The bibliographical references at the end of the volume will assist a student of this fascinating subject.

Flashlights on Nature. By GRANT ALLEN With 150 Illustrations by Frederick Enock. Geo. Newnes, Lim.

THIS book is a happy combination of the literary versatility of the author—too little remembered as the writer of ‘*The Colour-Sense*,’—and of the conscientious illustrations of Mr. Enock, who as described by Mr. Grant Allen is “an enthusiastic and observant naturalist, who thinks nothing of sitting up all night if so he may catch a beetle’s egg at the moment of hatching; and who will keep his eye to the microscope for twelve hours at a stretch, relieved only by occasional light refreshment in the shape of a sandwich, if so he may intercept some rare chrysalis at its moment of bursting,” &c.

These sketches, or “flashlights,” are written in the clear and easy style which is usually termed “popular,” but which will well repay the perusal of “serious” readers. Under titles which smack of what is sometimes described as “sensational,” we find that “a beast of prey” is no other than our old friend “the common garden spider,” of which a very full and interesting account is given, and a female of which—“Rosalind”—was observed closely through the whole of a season. This spider was seen to attack and conquer wasps, a subject recently discussed in these pages. The doings of Shrikes are described as “A Woodland Tragedy,” and in discussing the capricious character of their distribution in this country, our author accepts a now very general view, “that this relative frequency or scarcity depends upon the distribution of their proper food-insects.” Indeed, just as we all know that “an army fights upon its stomach,” so we are beginning to understand that “commissariat lies at the bottom of most problems of animal life.”

It is a pleasure to meet with an interpreter of nature who can translate her record into plain and happy language, especially when there is so often a tendency to predicate profundity by obscurity; but Mr. Grant Allen’s pen is sometimes almost too facile, and literary accomplishments run away with the unadorned natural facts. Thus we read, “In the soft slimy mud, the shoots of the curled pond-weed lie by during the frozen period, hearing the noise of the gliding skates above them”; the mandibles of a “mosquito-larva” are not too happily termed a “big moustache,”

nor are the antennæ of a mosquito more adequately represented as a "beard." But a few pleasantries do not detract from the general accuracy of the book, which throughout runs the danger of being too well written and too entertaining. Nor does the author of 'The Woman who Did,' fear the lash of pseudo-scientific jargon in being termed a "neo-Lamarckian" for writing "Use brings structure."

The illustrations are excellent and instructive. The book has neither a preface nor index. The first is a very small matter, but the second is bad for both book and author if future reference is desired.

Animals of To-day, their Life and Conversation. By C. J. CORNISH. Seeley & Co. Lim.

"THE following chapters were originally contributed to the 'Spectator,'" is the opening sentence of the preface to this book, and we are reminded of a remark made by Addison in the first paper to the older 'Spectator,' "I live in the world rather as a spectator of mankind, than as one of the species." Substitute "animal life" for "mankind," and we reach the plane of Mr. Cornish in this very interesting volume, the record of life-history being alone contemplated. The reprint of these weekly contributions in a complete form is very welcome, though we question whether they do not lose some of the original force as when they appeared singly, confined to one subject in moderate compass. Their reprint, however, clearly bears witness to what is now an undoubted fact, that the British reading public are at present thoroughly interested in the details of animal life.

Many facts which are supposed to be well known are here brought to light and emphasised. The Bactrian Camel "is a beast made to endure not heat but cold," as experienced Mongol herdsmen well know. The austere Goat is said, when city-kept in parts of New York, "to flourish on the paste-daubed paper of the advertisements which they nibble from the hoardings." As to the number of Cats in London, Mr. Cornish quotes a writer in the 'Daily Mail' for an estimate of 400,000. Mr. Hudson, however, in his 'Birds in London,' inclined to a much higher ratio in metropolitan feline population, believing in a probability

of nearly three-quarters of a million, and a certainty of not less than half a million London Cats. In an interesting, but to the zoologist melancholy article on "Wild beasts' skins in commerce," it is stated, as generally believed, "that the last of the Quaggas was killed years ago." This is probably a fact, but the writer, quite recently when in South Africa, was told by a very high authority that strange reports had been received on this subject from the Western Coast region. Is it too late to restore the Beaver to our streams? Mr. Cornish thinks not, and their presence need not be much dreaded. "Shallow streams they *dam*; and to make this dam they cut down trees and do mischief. But on deep, slow streams, such as the Thames, they make burrows in the bank and 'lodges,' but do not attempt to build dams, because the water is deep enough for their wants. All they need is enough willow-bark to feed on. If anyone would turn out a few Beavers on the Thames, and let them have the run of an osier-bed, they would probably increase and multiply."

There are sixteen illustrations. That of "Rob Roy's Cattle" is an artistic success.



Catalogue of the Syntomidæ in the Collection of the British Museum. By Sir GEO. F. HAMPSON, Bart. Published by the Trustees of the British Museum.

THIS is really the first volume of a most important publication, being nothing less than the commencement of a descriptive and analytical catalogue of the Moths of the World. The method is so clear and simple, and the wealth of illustration so ample, that any ordinary student cannot fail to identify, both generically and specifically, such species as he may desire to know, and in a classificatory sense understand; while to the entomologist the result of an exhaustive study, based on the comparison of nearly all available material, is a boon. Of course Sir George Hampson cannot expect that his proposed classification will be universally followed; that is a proposition which, however reasonable, is still an open question with most lepidopterists, but it is probable that the great use that must be made of these

volumes in the future, in the determination of genera and species, and the demarcation of families, will carry very largely the classification along at the same time.

This classification is distinctly based on evolutionary principles, depending almost entirely on wing structure. The author, as an evolutionist, makes himself clear. "The present families and genera are not of course derived from other existing ones, but from their ancestors; and when a family or genus is said to be derived from another, all that is meant is, that in order to reach their present stage of specialization, their ancestors must have passed through a stage which would in essential points of structure come within the definition of the other family or genus. And as a corollary, the plan of the book is "to begin with the most highly specialized families, genera, and species, and gradually work down to the most generalized forms."

The Syntomidæ, as treated in this volume, number 1184 *actually described* species, of which a very large proportion indeed is figured, generic characters portrayed, and full synonymy given. The last does not represent the mere useless occupation of a specialist as some theoretical writers incline to stigmatize. A zoologist is supposed to know the animal kingdom and its members under one and not various names. This promiscuity is not altogether unavoidable by workers residing in different centres of activity, and of course absent from one general collection of types. To assist this work, material has been lent and given from all sides, which, added to the immense and almost unique Heteroceral wealth now contained in the British Museum and in private collections in the country, makes the specific verdict of this volume one likely to provoke little "appeal." These books mark a very prominent aspect of our age in all departments. "The rich are getting richer"; in commerce the large undertakings are swallowing up the smaller ones; everywhere we see centralization as a necessity exerting its sway; and so in the technical zoology of the future it will be understood that only large national collections worked by State aid can give the last words in the zoological nomenclature which will be accepted as a canon, and liberate naturalists for other work. If we compare this and other catalogues with the encyclopædic work

which appeared in zoological literature towards the end of the last century, we may well take heart and fresh courage.

A separate issue of seventeen beautifully coloured plates accompany the volume for those who wish to acquire the same, and we trust that the author may have health and strength to finish the colossal undertaking. Meanwhile, as years must elapse before the whole of these volumes can be issued, it would be advantageous to the classificatory scheme of the author, and most useful to workers who would fall in line with the classification, if the names of existing genera under new family arrangements could be published elsewhere, and at an early date.

EDITORIAL GLEANINGS.

THE 'Zoological Record' for 1897 appeared last December. This invaluable *vade mecum* to all working zoologists is again a bulky volume, and bears witness to the vitality of our science. Only the record of Cœlenterata is held over, owing to the Recorder having left England at too early a period to have thoroughly completed his work. Mr. J. A. Thomson's record of "General Subjects" is again—apart from specialization—one of the most valuable annual contributions to Biology. It contains 784 titles, and is a guide to a year's philosophy of animal life. Perhaps the number of contributions gives at least the standard of activity during 1897. In Mammalia, Mr. Lydekker records 343 separate communications; in Aves, Dr. Bowdler Sharpe enumerates 567 distinct titles; Mr. Boulenger gives 242 referring to Reptilia and Batrachia, and 259 for Pisces. Tunicata has a small record; in Mollusca, Mr. Sykes gives 527 references, and in Brachiopoda 41. Passing the smaller work done in Bryozoa, we come to Crustacea, where Mr. A. W. Brown enumerates 208 contributions, 151 in Arachnida, and 65 in Myriopoda and Prototracheata. Insecta again heads the list with 1205 articles, as given by the Editor, Dr. D. Sharp. For Echinoderma (1896 and 1897), Mr. Bather enumerates 358 titles; in Vermes, Miss Buchanan gives 267. Prof. R. von Lendenfeld is able to contribute 42 for Spongiæ, and Mr. Brown 171 for Protozoa. As usual, a formidable list of names proposed for new genera and subgenera complete another volume of a well-thumbed series.

IN the Proc. of the United States Nat. Mus. vol. xxi. No. 1163, Mr. Frederick W. True has contributed a paper "On the Nomenclature of the Whalebone Whales of the Tenth Edition of Linnæus's 'Systema Naturæ.'" Seven European species of Whalebone Whales are now currently recognized; Linnæus described four species. Of these, *Balæna boops* is here considered as a synonym of *B. physalus*. The complete list of European Whalebone Whales is given as follows:—

1. *Balæna mysticetus*, Linnæus.
The Bowhead, or Arctic Right Whale.
2. *Balæna glacialis*, Bonnaterre.
The Black Whale, or Nordcaper.

3. *Balænoptera physalus* (Linnæus).
The Common Finback or Rorqual.
 4. *Balænoptera musculus* (Linnæus).
The Blue Whale.
 5. *Balænoptera borealis*, Lesson.
Rudolphi's Rorqual.
 6. *Balænoptera acuto-rostrata*, Lacépède.
The Little Piked Whale, or Least Rorqual.
 7. *Megaptera longimana* (Rudolphi).
The Humpback.
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MR. R. HEDGER WALLACE has contributed a timely, lengthy, and well illustrated paper on "White Cattle: an Inquiry into their Origin and History," to the last part of the Trans. Nat. Hist. Soc. of Glasgow. These modern Park White Cattle are often described as descendants of *Bos primigenius*, and this opinion appears to be solely due to Prof. Rüttimeyer; Mr. Wallace's contention, however, is that "they are simply the descendants of Roman cattle imported into the country during the Roman occupation." The evidence for this view is very amply given, and total agreement is pronounced with the conclusions of Prof. T. McKenny Hughes that we may take it as pretty well established that "the Urus characterizes the Neolithic age, having first appeared in Palæolithic times with the Bison, and having become extinct in Britain long before the Roman occupation. The Celtic Shorthorn appeared with the Urus in Neolithic times, lived down and through the Roman occupation, and thus may be regarded as the characteristic Ox of the Bronze age. The Romans improved the Celtic Shorthorn by crossing it with cattle imported from Italy; the form of the Roman Ox, as inferred from contemporary art, being exactly what was required to produce the modification observed in the latter Romanized breed. The characteristics of the Urus nowhere appear among the Romano-British cattle.

The Kerry Cattle are the most typical examples in the British Isles of the Celtic Shorthorn, while the Chillingham Cattle are the nearest representation of the breed introduced by the Romans.

The Highland and Welsh Cattle are derived largely from the Celtic Shorthorn, with more or less mixture of the Roman breed. All the above are whole-coloured or shaded.

The Longhorns, which appear nowhere with Romano-British or early mediæval remains, are the offspring of the large breeds imported from Holstein and the Low Countries in later mediæval times. All these, and the stock crossed with them, are apt to be parti-coloured or sheeted.

The Mediæval Shorthorn, as found in the ditches, &c., of the eleventh, twelfth, and thirteenth centuries, is a reversion to the numerically predomi-

nant native breed (Celtic Shorthorn) after the legionaries had been withdrawn, and selection and breeding had become impossible."

ON Dec. 6th we received the following note from Mr. Rowland Ward:—"A few days ago a male specimen (adult) of the Golden Eagle was sent to me for preservation by Mr. S. Lewis, of Wells, Somerset. The bird had been trapped in the north of Scotland, and yielded the following measurements:—Wing, 25 in. in length; head to tip of tail, 32 in." This was subsequently published in 'The Field,' and the following note has also appeared on the subject:—"The Eagle mentioned by Mr. Tegetmeier in Saturday's 'Field' appears to have continued its peregrinations after its demise. It was sent from Scotland along with a couple of Buzzards to a Yorkshire natural history dealer, was offered to me, then sent down to Wells, in Somersetshire, and now appears to be finally reposing at Mr. Rowland Ward's. I did not see the bird.—OXLEY GRABHAM."

WE rejoice to read, in the January number of 'The Annals of Scottish Nat. Hist.,' of a proposed memorial to the late William Macgillivray, M.D., LL.D., who died in Aberdeen in September, 1852, and was buried in New Calton Burying-ground in Edinburgh. "To the present hour his grave is not marked even by an ordinary tombstone. There is nothing to indicate the spot save four low corner-stones, each bearing the letters 'W. M.'"

Some months ago a meeting was called of all who cherish the memory of Dr. Macgillivray, which resulted in the appointment of a Committee charged with the duty of issuing a circular to his surviving students and others likely to be interested in the proposal, collecting subscriptions, and erecting a memorial at his grave, any balance to be spent in commemorating him also in Marischal College.

It is proposed not only to erect a churchyard memorial—"simple if it would be in keeping with the character of the man to be commemorated," but also to found a Macgillivray Gold Medal in the University of Aberdeen, to be given as a prize to the best student in Zoology, Botany, or Geology; or to former students for the best original research work; or for the best series of specimens worthy of being placed in the Natural History Museum, or the Botanical Museum, of the University.

Subscriptions may be forwarded to the Rev. Dr. Farquharson, Selkirk, or to the Editors of the Ann. of Scottish Nat. Hist. Edinburgh.

OWING to the unique and extremely interesting nature of the fauna in Lake Tanganyika, the study of which was recently the object of an expedi-

tion, supported by the Royal Society, and led by Mr. J. E. S. Moore, a Committee has been formed, consisting of Sir John Kirk, Dr. P. L. Sclater, Mr. Thiselton-Dyer, Prof. Ray Lankester, and Mr. G. A. Boulenger, for the purpose of organizing another expedition to the same regions, to thoroughly survey the basin not only of Lake Tanganyika, but also the unknown portions of the northern extension of the great series of valleys in which Tanganyika, together with Lakes Kivu and the Albert Nyanza, lie; to collect specimens of the aquatic fauna and flora, and to study the geological history of this part of Africa. The latter object of the investigation should be of especial interest, for it was shown by Mr. Moore that almost without exception the shells of the singular series of whelk-like molluscs, captured by him in Tanganyika, are indistinguishable from those now found fossilized in Europe among the remains of old Jurassic seas. It would thus appear that at some remote period of time the great valley of Tanganyika was in connection with the sea, and that the strangely isolated marine fauna which still inhabits its slightly brackish waters has remained there ever since.—*Nature*.

THE effect of approaching storms upon song birds is the subject of an interesting contribution by Mr. C. E. Linney to the 'U. S. Monthly Weather Review.' It appears that during the night of Aug. 15-16th very severe electrical, wind, and rain storms prevailed over the northern district of Illinois. An observer in Henry County, Mr. W. W. Warner, noticed that for forty-eight hours before the storm not a sound was heard from the numerous song birds in the district. This observation was so full of interest that Mr. Linney wrote for additional information, with the result that he received numerous letters, some confirming it, others stating that birds sing louder and more persistently before a great storm, and nearly all agreeing that they are more restless than usual at such a time. Mr. Linney has found the following weather proverbs referring to song birds and storm:—When birds cease to sing, rain and thunder will probably occur. If birds in general pick their feathers, wash themselves, and fly to their nests, expect rain. Parrots and Canaries dress their feathers and are wakeful the evening before a storm. If the Peacock cries when he goes to roost, and indeed much at any time, it is a sign of rain. Long and loud singing of Robins in the morning denotes rain. Robins will perch on the topmost branches of trees and whistle when a storm is approaching. The restlessness of domestic animals and barn-yard fowls before an approaching storm is well known, and many of their peculiarities have been noted; but the actions of song birds do not appear to have previously received particular attention.—*Nature*.

THE Report of the Secretary of the United States Department of Agriculture for 1898 has come to hand. The excellent work done by this Institution is not confined to botanical subjects. "The Biological Survey is often called upon to determine the value of birds and animals to practical agriculture. It is in effect a court of appeal in which complaints are investigated concerning those species which are considered injurious to crops. A careful study is made of the food of useful and injurious birds and mammals, and thousands of stomachs of birds are examined in the laboratory. Two thousand three hundred and twenty-nine stomachs, mainly of Sparrows, Swallows, and Woodpeckers, were examined during the year. A report has been prepared on the native Cuckoos and Shrikes, and reports on Flycatchers and native Sparrows are in preparation. Several of the latter birds feed largely on weed-seed during the winter, and it is a matter of no little interest to determine how far they can aid the farmer in checking the increase of noxious weeds. The importance of this work is emphasized by the increasing demand made on the Department for information and publications on birds, in consequence of the recent widespread popular interest in ornithology."

THERE appears to be a considerable loss of avian life at Niagara Falls. The Rev. R. Ashington Bullen has contributed an interesting note on the subject to 'Science Gossip' for last December, from which we extract as follows:—"Through the kindness of Mr. David Boyle, Curator of the Archæological Museum, Toronto, Ontario, I have received the following list of birds which are washed over Niagara Falls. It has been compiled by Mr. Roderick Cameron, who has also added an account of how the birds are caught. The list, so far as I can ascertain, has never before been published:—Whistling Swans (*Cygnus americana*), Common Brent-geese (*Bernicla brenta*, Stephens), Canada Goose (*B. canadensis*, Boie), Mallard Ducks (*Anas boschas*, Linn.), Pintail Ducks (*Dafila acuta*, Jenyus), American Wigeon (*Mareca americana*, Stephens), American Green-winged Teal (*Nettion carolinensis*, Baird), and other varieties, American Eider-duck (*Somateria spectabilis* Leach), American Black-scooter or Sea-coot (*Pelionetta perspicillata*, Kaup), American White Pelican (*Pelecanus tachyrhynchus*), Shoveller, or Spoonbill Duck (*Spatula clypeata*, Boie), Grey Duck, or Gadwall (*Chaulelasmus streperus*, Gray), Black Dusky-duck (*Anas obscura*, Gmelin), Wood-duck (*Aix sponsa*, Boie), Canvas-back Duck (*Aythya vallisneria*, Bonaparte), Red-head Duck (*A. americana*, Bonaparte), Blue-billed Duck, or Scaup (*Fulix marila*, Baird), Whistle-wing Duck (*Bucephala americana*, Baird), Golden-eye Duck (*B. islandica*, Baird), Buffle-head or Butter-ball Duck (*B. albeola*, Baird), Eider or Spectacled Duck (*Somateria spectabilis*, Leach), Scoter or Surf Duck (*Oidemia americana*, Swainson),

Saw-billed Duck (two), (*Fulica americana*, Gmelin), and Mud-hens (*Rallus crepitans*, Gmelin), Sheldrake (*Mergus americanus*, Cassin), Red-breasted Merganser (*M. serrator*, Linn.), Hooded Merganser (*Lophodytes cucullatus*, Reichart), Common Cormorant (*Graculus carbo*, Gray), Ruddy Duck (*Erismatura rubida*, Bonaparte), Summer Duck (two), Coween Duck (three), Great Northern Diver, or Loon (*Colymbus torquatus*, Brunnich), Muffle-head Diver (*C. arcticus*). The scientific names are mainly taken from Samuels's 'Birds of New England and Neighbouring States.'"

At the meeting of the Zoological Society, on Nov. 29th, the disputed classificatory position of an interesting animal was considered, when Mr. F. G. Parsons, F.Z.S., read a paper on the anatomy of adult and foetal specimens of the Cape Jumping Hare (*Pedetes caffer*). In it the different systems—osseous, muscular, nervous, circulatory, digestive, &c.—were described in some detail, and contrasted with the corresponding parts in two Jerboas (*Dipus hirtipes* and *D. jerboa*). The author regarded the muscular system as furnishing the best clue to the position of the animal, and, considering all the evidence in his possession, looked upon *Pedetes* as being nearly akin to the Jerboas; but thought that, if a sharp line had to be drawn anywhere between the Mouse-like and Porcupine-like rodents, *Pedetes* should be placed on the hystricomorphine, and the *Dipodidæ* on the myomorphine side of that line. The radial ossicle in the carpus, described by Bardeleben as a præpollex, was found to answer accurately to that writer's description; but Mr. Parsons failed to find any proof which satisfied him of its digital nature.

At another meeting of the above Society, held on Dec. 13th, a communication was read from Mr. H. H. Brindley, on certain characters of the reproduced appendages in the Arthropoda, particularly in the *Blattidæ*. It was a continuation of a paper published in the 'Proceedings' of the Society for 1897 (p. 903), and contained observations on the process of regeneration of the legs in the *Blattidæ*. Some review of our knowledge of the regeneration of appendages in other Arthropods was attempted, from which it appeared that while certain appendages in certain groups when regenerated were always apparently exact replicas of the normal, in other cases, besides the legs of *Blattidæ*, regenerated appendages invariably differed from the normal in such constant respects that they should be regarded as alternate "normals" rather than as imperfect reproductions of the congenital normal structures. In the case investigated in detail there was evidence that the process of ecdysis involved reconstruction of the soft parts as well as of the cuticle of the appendage.

THE 'South Australian Registrar' complains of the wanton destruction of birds there, stating that it is an unforeseen effect of the legislation intended to ensure the destruction of Sparrows and other feathered pests; but it goes on to say that to the ruthless and indiscriminate extermination of birds which is now proceeding in almost every district some material check might be applied if Parliament would only spare an hour or two of its valuable time for the consideration of the Bill promoted by the Society for the Protection of Birds. When that Society was inaugurated four years ago many people described the movement as an evanescent fad which would have no result, but the local branch has now 525 members, and the parent society in the old country numbers 16,200. South Australia is apparently now concerned about the fate of the native birds, and it has good reason to be, not only from a sentimental, but also from a utilitarian point of view. In many ways different species of Australian birds may prove themselves to be the friends of mankind. Kendall, the most essentially Australian of all our poets, mentions not the best of these when he says—

“ Welcome as waters unvisited by the summers

Are the voices of Bell-birds to thirsty far-comers.”

But if only on the ground of pure sentiment, the agitation undertaken by the Society is fully justified. The days are surely gone by when in any civilized country a large proportion of the people, even in the needful work of extirpating pests, would wantonly prefer the cruel methods of slow torture to those of swift and painless destruction. No doubt one may find here and there wretches who would sit smoking a pipe and watching the struggles of a wounded bird without the slightest impulse to put it out of its misery. Some boys will actually pull the wings and the legs away from a living bird, and impale the suffering little thing against the trunk of a tree, in order to enjoy the spectacle of its agony. The practice of offering bonuses for the heads of Sparrows undoubtedly tended to harden the consciences of many young people, and the amount of wanton cruelty observed in the park-lands around Adelaide is quite disquieting. Unfortunately, the existing demand for wings for the trimming of ladies' hats leads to an immense amount of cruelty, and the boys therefore are not the sole persons responsible for the evil. In the case of those species of birds that are already in danger of extermination, the caprices of fashion are peculiarly unpatriotic and unwise, as well as cruel, for they perpetrate their worst ravages at the breeding season, when the plumage is at its brightest.—*Globe*.

SOME interesting facts are to be found in 'Angling Notes' contributed to the 'Westminster Gazette' of Dec. 30th. In connection with the details of a plan to increase the stock of Salmon in the Tweed and Teviot,

we read:—A hundred years ago, we are told, lands were not so well cultivated and drained as they are to-day. Then, when the rains came, the mosses soaked up the water, which formed itself into shallow lochs and pools. These gave out their contents slowly and gradually, and when the rivers were flooded they ran full for a long time. Now all this is changed. The hills are well drained, as well as all lands available for cultivation; and when the rain falls heavily the water rushes off at once to the rivers, which rise with wonderful rapidity, and then rush off with tremendous violence to the sea, tearing up the gravel, often altering its channel, and damaging the banks. The subsidence of the flood is as rapid as its rise. The damage which is done to the ova of Salmon when a flood of this nature occurs during or immediately following upon the spawning season, will be apparent to anyone. We have often seen whole banks of gravel washed away during such times, and of course, where these have been used for spawning-beds by the Salmon, the chances are that the greater proportion of the ova or undeveloped fry will be silted over and destroyed. The establishment of sufficiently large hatcheries where the ova and fry would be protected until the latter had reached a suitable age for returning into the river would counteract to a great extent these many adverse influences.

ACCORDING to a note in a late issue of the 'Daily Chronicle,' the recent practice of feeding the Lion in the Lincoln Park Zoo, in Chicago, with live Dogs has created something of a disturbance, the President of the Humane Society denouncing the practice, even though this method of feeding has been undertaken from a medical point of view. The Lion which has been thus fed is a big African specimen, which is afflicted with rickets, due, it is believed, to improper diet. During the past ten years twenty-seven African Lions, representing a loss of more than £2000, have died in this way, although hitherto the disease has been diagnosed as paralysis, and it is in the hope of preventing further loss that the Dogs, which were taken from the pound, were given to the Lion for food.

THE death of Mr. Christopher Sykes took place on Dec. 15th. This gentleman will not alone be remembered as the "grave young man of 'Lothair,'" and the friend of Princes, but, by British ornithologists, as one to whose untiring exertions we owe the Sea Birds' Protection Act.

AFTER a successful career of over thirty years, 'Science Gossip,' the favourite journal for amateurs devoted to Natural, Physical, and Applied Sciences, has just entered upon independent offices at 110, Strand. The editorial management is still under the control of Mr. John T. Carrington, assisted by Miss F. Winstone.

A VERY good set of the first five editions of Walton's 'Compleat Angler' came up for sale on December 1st at Messrs. Sotherby's, among the choice library of books on angling formed by the late Mr. Edward Snow, of Boston, Mass., U.S.A. These five editions were those which appeared during the lifetime of Izaak Walton, and the Snow copies are uniformly bound in olive morocco extra by F. Bedford. The set was knocked down to Messrs. Pickering and Chatto for £235. The Ashburnham set, unique as regards size and condition, realized £800 in May last, and some of the volumes possessed the further sentimental advantage of having the author's autograph notes written in them. The Snow copies were slightly "shaved" in some places, and some of the leaves in the first issue were defective, and the entire set was sold "not subject to return." A second copy of the second edition of the same work, with many of the headlines cut into, brought £19 15s., and three other copies of the third edition respectively sold for £12 10s., £35, and £11. Other angling books included an imperfect copy of 'The Secrets of Angling,' by John Dennys, 1652, £36. The total of the sale of 669 lots amounted to £1280.

MR. F. T. MOTT, of Crescent House, Leicester, has reprinted in pamphlet form two papers expressing his theories on the "Origin of Organic Colour," which were respectively contributed to 'Science,' and read at the Nottingham Meeting of the British Association in 1893. Mr. Mott predicates a "great concentrating wave of organic life in its progress towards an unknown climateric," as a result of which "the beauty of summer as we know it now, though it has never been paralleled in the past, will be as nothing to the blaze of brilliance which shall mark the summers of the future." "In the animal world brilliant colour is still comparatively rare, this branch of the organic wave being perhaps less advanced than that which rules the department of vegetation."

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WHISKERED BAT (*MYOTIS MYSTACINUS*) IN CAPTIVITY.

BY CHARLES OLDHAM.

THE observation of Bats in a free state is, owing to their nocturnal habits and peculiar mode of life, a matter of considerable difficulty, and but very little is known of the economy of even our common British species. Many of their actions may be studied in captivity, but it is not easy to maintain the supply of insect food essential to the welfare of the little creatures, which seldom survive confinement long. These considerations are perhaps sufficient excuse for the publication of the following notes on a Bat which I kept alive for nearly five weeks last winter.

On Nov. 27th I obtained a male Whiskered Bat, *Myotis mystacinus* (Leisler), from one of the tunnels of the disused copper mines on Alderley Edge. It would not eat some meal-worms I offered it, although it greedily lapped water from a camel-hair pencil and from the palm of my hand. Five days later, after many unsuccessful attempts to induce the Bat to feed, I procured some moths (*Scotosia dubitata*) from the copper mines, and placed them in a box with it; but no attention was paid to them. On the evening of the following day I placed the Bat under a bell-jar with six of the moths, and, on going to look at it an hour afterwards, found that it had caught and eaten them all, rejecting only the wings and legs. The available supply of moths was exhausted in a few days, and I began to despair of keeping my

little captive alive, as it still ignored the mealworms, even when they crawled over its face and wings. On Dec. 5th I fastened a moth's wing to half a mealworm, and moved it about just in front of the Bat's nose. This ruse succeeded admirably; the Bat made a dash at the imitation moth, and speedily devoured the mealworm. From that time it took the mealworms readily, and soon learned to look for them if I held my finger-tips near its face. I fed it nearly every day, and for so small a creature it had an enormous appetite. On one occasion, although it had eaten seven mealworms on the previous evening, it ate, between two and eight o'clock, eight mealworms, a large spider, and six *S. dubitata*; after which it merely snapped at the moths, but would not eat them. During the ensuing night, however, it ate seven more moths which I had left with it under the bell-jar. On another evening it ate two fragments of raw rabbit, seven mealworms, one *S. dubitata*, and two thick-bodied moths (*Gonoptera libatrix*). On Dec. 28th the Bat appeared to be in good health, and ate seven mealworms. I did not feed it on the 29th, and on the morning of the following day it was hanging as though asleep, except that its legs were straight instead of flexed; but, on touching it, I found that it was dead.

The Bat bit me viciously when I took it from the roof of the tunnel and warmed it in my hand, but it never showed any temper subsequently, and in a few days had become absurdly tame. It evinced little disposition for flight, especially after feeding, and if compelled to take wing would, after one or two turns round the room, drop on to the floor, or pitch on a curtain, chair, or my head or body. When settling on a vertical surface it used to pitch head upwards, then quickly shuffle round and hang suspended by its toes in a convenient position for taking wing again. It could rise from a flat surface by making a sudden spring upwards and expanding its wings immediately. Although loth to fly, it seemed never tired of running about among the papers and other objects on the table, and was seldom stationary unless it was eating. The bell-jar in which I kept it was raised above a stand on supports rather more than $\frac{1}{4}$ in., or, to be exact, just 7 mm. in height, and whenever the perforated zinc guard was removed from the intervening space the Bat would creep out at once. The bright light of the lamp on my table seemed to cause

it no inconvenience, for it used to sit, supported on feet and wrists, eating mealworms within a few inches of the flame, and never showed any desire to retire to dark or shaded places. Sometimes it would creep under my hand, or up my sleeve, but this, I think, was on account of the sensation of warmth it experienced in nestling against my skin

The sense of sight seems to be but feeble in the Whiskered Bat. The example under notice could not see, or at all events recognize, a mealworm or wet paint-brush if more than an inch from its face. As this species is more diurnal than any other British Bat, and may frequently be seen abroad at midday in summer, the inability of my captive to see objects an inch away cannot be attributed to the dazzling effects of too strong a light, especially as this inability existed equally in the daytime and in the artificial light of a lamp. Its hearing also appeared to be dull, as it never showed by any movement of its head that it perceived a sudden noise, such as the snapping of my fingers, or the click of a watch-lid being closed. It sometimes slept prone upon the floor with wings folded and pressed closely to its sides, at other times suspended by its toes to the rim of a wooden box. During sleep, which was always profound, its temperature fell considerably, and it felt, as all Bats do in this state, extremely cold. It usually wakened in the evening, but exceptionally in the daytime without being roused; while, as a rule, it was necessary to warm it into activity by holding it for a minute or two in my hand if I wanted to feed it by daylight. It was constantly thirsty, and would readily lap milk or water even when not sufficiently roused from sleep to seize food. Its voice, often used, was a feeble squeak, less shrill than that of the Long-eared Bat.

My captive used to tuck its head away under its body directly it had seized an insect, at the same time bringing its feet forward, so far indeed that it sometimes lost its balance and toppled over on its back. This habit, practised from the very first, was evidently one of old standing, and not a trick acquired in confinement. By feeding the Bat on a sheet of glass so that I could see it from beneath, or, better still, by giving it an insect as it hung suspended by its toes, the reason of its action was at once apparent. The tail being directed forward beneath the body, the interfemoral membrane formed a pouch into which the

Bat thrust its head, and was thereby enabled to get a firmer grip of its prey without any danger of dropping it. When the Bat was on a flat surface the lower side of this pouch was pressed closer to its belly than would be the case during flight, so that it sometimes failed to get its head into the pouch, and let a mealworm drop. When this was the case it never made any attempt to seize its prey again, and the mealworm would escape by crawling out from beneath its wings or tail. When the Bat was suspended, however, the bag was wide open, and the insect never escaped. Experience seemed to teach it that the mealworms were incapable of escape by flight, and latterly it did not always thrust its head into the interfemoral pouch after seizing one, but devoured it without this preliminary. In a free state Bats, capturing the greater part, if not all, of their food on the wing, must often fail to grip large insects securely at the first bite, and it would be a manifest advantage to have some means of adjusting their hold without alighting. An insect accidentally dropped during flight could hardly be recovered, and would probably be abandoned without further thought, as was the case when my Whiskered Bat dropped a mealworm. A Long-eared Bat which I kept for a few days invariably thrust its head into the interfemoral pouch on seizing a moth. Both Long-eared and Whiskered Bats have the tail curved beneath them during flight, although they are usually figured with it held straight behind them; and I have little doubt that when on the wing they actually use the method I have described for securing their prey. Further observation will probably show that this curious habit is common to all our British species, with the possible exception of the Horseshoe Bats, in which the interfemoral membrane is comparatively small, and the tail, during repose at any rate, is carried in a very different way.

Having firmly secured its prey, whether moth or mealworm, by the head or tail, my Whiskered Bat used to swallow it lengthwise, crunching it thoroughly by rapid movements of the jaws as it slowly disappeared. Neither foot nor carpus was ever used in any way to assist it in capturing or holding an insect. The use of either would of course be quite impossible during flight. Moths and spiders moving near it were pounced upon and captured, but mealworms dissociated from my fingers seemed to

puzzle it, and only once did I see it capture one itself, although the creatures frequently crawled just before its eyes and over its wings and feet. The wings and legs of moths were always dropped, but once or twice a wing accidentally encountered in the Bat's ramble about the table was picked up and eaten. The mealworms were, as a rule, entirely consumed, but sometimes the horny heads were left.

After being fed or handled, the Bat always went through a rather elaborate toilet. It used to hang by one foot and comb the fur of its face and body with the other, often sucking its toes first, and always moving the free foot with great rapidity. It would then change the foot used for suspension, and repeat the operation. It paid much attention to the wings and interfemoral membrane, licking them inside and out, and distending the membranes by thrusting its nose among the folds. When washing itself, as well as when securing prey in the manner described above, it displayed remarkable suppleness.

Despite its cleanliness it was the host, as every Bat seems to be, of some external parasites. I removed a large tick from the upper surface of the interfemoral membrane near the root of its tail, and caught two fleas (which Mr. Edward Saunders has identified as *Typhlopsylla hexactenus*) in its fur.

ORNITHOLOGICAL NOTES FROM NORTHERN
NORWAY.

BY J. H. SALTER, D.Sc.

THANKS to the numerous contributions to the subject which have appeared in 'The Zoologist' and elsewhere, the avifauna of most parts of Norway is as familiar to English naturalists as that of the Scotch Highlands. I have therefore, in writing the following notes of a month's holiday spent in the far north during the past summer, dwelt chiefly upon the points which appeared to be of interest, and have tried to avoid repetition. Tromsö, in $69^{\circ} 38'$ N. latitude, was selected as offering facilities for making the acquaintance of certain birds of a distinctly arctic type. Ten days spent in the birch woods and on the *fjeld* tended to confirm in almost every detail the account given by Mr. O. V. Aplin (Zool. Dec. 1896), to whom I am much indebted for this and for other information. A few species were noted which Mr. Aplin failed to meet with, his visit having been paid earlier in the summer, before the snow had fully melted. On the other hand, in mid-July we found many birds silent, and hence less readily identified.

In company with a friend, I crossed from Newcastle to Bergen, the latter place being reached early on the morning of July 7th. In the grounds of the Fishery Exhibition, the Nygaards Park, but few birds were to be seen, owing to the wet. I noted the Chaffinch, White Wagtail, and very tame House Sparrows. We left at 11 p.m. in the 'Sirius' for Trondhjem, and rose next morning to find, in place of the gloomy Bergen weather, bright sunshine and blue sea. A crowd of cackling Gulls, Lesser Black-backs, hovered over our wake. In the quiet channels many Shags were perched on the rocky islets. As we rounded the Stadland, justly dreaded for its rough seas, birds were numerous. There were many Common Guillemots. Kittiwakes appeared to be breeding on the white wave-worn rocks of the

headland, and the first Black Guillemot passed, flying low and fast just above the waves. Late in the afternoon we came to Aalesund. A stay of an hour and a half allowed of a hurried scramble about the grey rocky bluff behind the town. Here a Common Whitethroat was singing. Molde was reached at ten. We took advantage of the lingering twilight to run up to the fir woods. Robins were singing as we roamed through the forest, collecting plants and vainly hoping to stumble upon a Fieldfare colony. Next day, while passing the large island of Hiteren, haunt of the Red Deer, the first Eiders were sighted. At Beian, at the mouth of the Trondhjems Fjord, a White-tailed Eagle passed us, and was assaulted farther on by two Hooded Crows. Many of the latter species, with Common Gulls, were resting on the stones and posts of the breakwater as we came into Trondhjem Harbour. After visiting the cathedral there was time for a stroll through the town and suburbs. White Wagtails were feeding newly-fledged young upon the yellow-lichened roof of an old monastic building. A Willow Wren was singing, and the Spotted Flycatcher's note came from the black poplars. Magpies chattered from trees across the meadow. A Chiffchaff sang from a dingle below us, where in moisture and shade grew blue columbine, meadow cranesbill, and a wealth of ferns. A Whinchat was scolding as it carried food. Down by the shore many House and Sand Martins hawked about, with Swallows in smaller numbers. At 11 p.m. Robins were singing, and Swifts were still upon the wing. The sun was out of sight, but clouds in the north-west were still illuminated, and by midnight the short spell of twilight was fast giving place to daylight once more.

Next morning (July 10th) we left for the north in the 'Vesteraalen.' As we ran down the fjord a Richardson's Skua flapped low over the surface of the water. Just beyond Beian there were hosts of Eiders dotted about amongst the low grassy skerries. In the evening we were threading our way through the narrow sounds of Vigten, amidst a perfect archipelago of islets. Some of them were Eider-holms. One Duck, Eider, carried two young upon her back. Oystercatchers piped from the rocky strand. Upon two islands which were tenanted by Common Gulls, the glass showed several young in the down. As we passed Torghatten at eleven, sea and sky were still illumined with

the purple and golden hues of the northern twilight. Gulls were still playing above the shoals of fish, a Cormorant flapped along the water, and a Black Guillemot rose from a dive. Next morning, by contrast, was fresh and overcast, and as we crossed the Arctic Circle the snow-patches became more numerous. Arctic Terns passed us beating up the channel, as we neared the seaward front of the lion-like Rödö. Skuas were seen at frequent intervals, and I watched the amusing performance so often described by visitors to this coast. Screams of a Common Gull drew my attention: a Skua was hot in chase. Its tail was spread kestrel-wise, showing the projecting middle tail-feathers. It swooped and grappled, putting down its feet to tackle the Gull. The latter settled on the water, but the Skua kept making feints at it, till a Lesser Black-back joined in and chased the two. Finally the Gull reached a rock, and its persecutor sheered off.

As we steered to seaward to round the promontory of Kunnen, I heard a Whimbrel, and three Scoters flew past in company with Eiders. Numerous Puffins rose before the vessel. The islands just outside Bödö were swarming with Eiders. With them were Oystercatchers, Gulls of two or three species, and a pair of Red-throated Divers. As we anchored off the little town of Bödö, with its wharves and shipping, a Raven flew past. About 2 p.m. we saw the wild Matterhorn peaks of Kjaerring, outposts of the grand district of the Folden Fjord. The vessel steered through the Gissund, a narrow strait with clear green water. Here were whole fleets of Eiders, at least one of the old birds followed by young ones. Oystercatchers ran over the stones and seaweed; a White-tailed Eagle rose from the rocky shore, and flapped slowly past our stern. It was an immature bird, its back splashed with lighter colour, and its tail not yet white. We now steered out into the Vest Fjord, and tossed and rolled over thirty miles of open water to Svolvær in the Lofotens. Black-backs and a Skua followed the vessel. A short run ashore added only one species, the Wheatear, to our list. Later in the evening, as we skirted this lofty coast, Herring Gulls appeared. They seem to avoid the more land-locked waters farther south, where the vessel was followed by Common Gulls and Lesser Black-backs only.

On the morning of the 12th, as we neared Tromsö, the savage

mountains gave place to gentle slopes green with grass and feathery birch wood. We had seen nothing so verdant for hundreds of miles. There was moss-fjeld with melting snow patches aloft. A flock of Arctic Terns was fishing in the channel, and a Skua in mottled plumage passed us. In the course of the morning we landed at Tromsö, after just a week of travelling. Ten days were spent there, three of them being occupied by a trip to the Lyngen Fjord, where ice-clad mountains, separated by glaciers and snow-filled gorges, rise from the water's edge to a height of between five and six thousand feet. The small hours of an extremely wet morning were spent on shore at Lyngseidet; while, by taking advantage of the fact that the boat calls twice at Skjervö, we were able to spend rather more than twelve hours upon that island, which lies just north of lat. 70°. On July 21st we left Tromsö in the 'Röst.' Next day we got two or three hours ashore at Stokmarknaes while stopping to coal. The Raftsund, grandest of the Lofoten straits, was traversed, and Svolvaer reached on the evening of the 22nd. Three days were spent in making excursions in the neighbourhood of Svolvaer, and we finally left for Trondhjem and Bergen on the 26th. Much time was lost in steamboat travelling, or the following list might have been somewhat extended.

Cyanecula suecica.—We met with the Red-spotted Bluethroat frequently in the willow swamps. Apart from the slight difference in plumage, it appeared to be the counterpart of the white-spotted form which I had met with on the Rhine, though, as the males had ceased singing, I had no opportunity of comparing the songs of the two species. The females showed themselves more freely than those of *C. wolffi*, which, in my experience, are given to skulking. Skjervö appeared well suited to this species, as in moist hollows amongst willows and birches on the rocky slopes beyond the village we saw representatives of three pairs. On July 15th, in the Tromsdal, some distance below the Lapp encampment, a pair of Bluethroats scolded from willows by the stream. With them were the young ones, which had not long left the nest. They reminded one of young Stonechats or Robins, but were more richly coloured. On the 24th we saw a similar family amongst birch scrub a short distance inland from Svolvaer.

Ruticilla phœnicurus.—We only once identified the Redstart, in the lower part of the Tromsdal, to wit, on July 15th.

Erithacus rubecula.—The Robin seems to be a shy woodland bird in Norway. Several were singing at Lyngseidet about 1 a.m. on the 17th, as the dull morning light strengthened.

Saxicola œnanthe.—A pair of Wheatears, with their brood, on rough ground below the birch woods, were amongst the first birds that we saw at Tromsö. Two days later another pair upon the rocky shore of Grindö had young just flying. On July 23rd we met with this species on an islet off Store Molle, in the Lofotens.

Turdus iliacus.—Our first day at Tromsö, spent in the birch woods in pouring rain, introduced us to the Redwing's song of a few whistling or piping notes. Sometimes a young bird which had left the nest would bustle out of the top of a birch tree with a chuckle. The old birds which had young were exceedingly fussy. Thus on the 13th, in the woods at the base of Flöifjeld, a Redwing clucked and scolded persistently like a Song Thrush as it flew round us, but we could find nothing. A second pair, in a great state of excitement, led to a search, with the result that we put up some of their young ones just flying. Two or three Redwings were singing in the woods at Lyngseidet in heavy rain early on the morning of the 17th. Owing to its shyness, or to its habit of not breeding in colonies, this species appears to be far less numerous than the Fieldfare, but such can hardly be the case in reality, judging from the numbers which visit us in winter. While the Fieldfare sits boldly, the Redwing slips off its nest at the approach of an intruder; so that its eggs are not easily identified. A nest found on July 19th on the far side of the island was attributed to this species. The eggs, which were warm, were not to be distinguished with certainty from Fieldfares', but, though we watched for some time, no Fieldfare appeared to lay claim to them, while the Redwings were close at hand and vociferous.

T. pilaris.—We met with Fieldfares in every locality visited, even on Skjervö, where the birches were very small; but in Lofoten, where wood was scanty and of low growth, we only came across them upon one occasion. A first day in the woods at Tromsö, in steady rain, had yielded little, when the excited

scolding of a pair of Fieldfares called attention to their nest with three eggs, about seven feet from the ground against the trunk of a small birch. Several pairs were breeding in birches beside the track which led through the woods to Sandnaes, but in this and other cases the pairs were too few and too scattered to deserve the name of a colony. One bird was sitting upon three eggs, while two more were built into the bottom of the nest. Next day (July 13th), in the large woods at the base of Flöifjeld, we met with nests the contents of which varied from a single fresh egg to young birds which flew as we knocked the trunk of the tree. In one nest the four eggs were all above the usual size, one of them very decidedly so, measuring 1·35 by ·95 in.; while the average dimensions, as given by Howard Saunders, are 1·2 by ·85 in. But most of the nests were empty, probably in consequence of an earlier raid by collectors. Next day, upon Grindö, we found a nest with two fresh eggs. In the Tromsdal, on the 15th, leaving the track, which was thronged with tourists making for the Lapp encampment, we found a large colony of Fieldfares, but the birches were very awkward to climb, many of them being mere poles about thirty feet in height, and too slender to support a man's weight. On the 19th, on the far side of the island, nests still contained eggs or young in various stages of growth. Eggs from the same nest often showed very varied degrees of incubation, and sometimes no two young ones of a brood were of the same size. One nest was not more than 3 ft. 9 in. from the ground. Many birds, having finished breeding, were scattered over the clearings, feeding upon berries. On July 22nd, at Stokmarknaes, we climbed to many nests, but all were empty with the exception of a single one, which contained four well-fledged young. A few old birds were noisy, but many young ones were flying, and the breeding season was evidently over. I should much doubt whether in these latitudes the Fieldfare attempts two broods; it was difficult to form an opinion on the point at Tromsö, owing to the probability of the birds having been disturbed.

T. torquatus.—The Ring Ouzel was seen at Skjervö, about the high rocky part of the island, where, amongst crowberry and heather, Gulls were breeding. While waiting for a view of the midnight sun, we noticed that for about half an hour birds were

silent. Immediately after twelve the light improved, and the "tack tack" of a Ring Ouzel was heard. The influence of continuous daylight upon the routine of bird-life in the far north is worthy of further study. On July 25th we noted the Ring Ouzel on the top of a rocky bluff near Svolveaer.

Phylloscopus trochilus.—We share Mr. Aplin's view as to the Willow Wren being the most numerous bird at Tromsö. In mid-July many pairs were feeding young which had just left the nest. But the song was to be heard daily all through the month, while in this country the bird is silent for about three weeks before recommencing with its quiet summer song early in August. Thus I noted that the Willow Wren was still singing at Svolveaer on July 25th, and again at Bergen on the 30th.

Sylvia atricapilla.—On July 13th a Blackcap was singing in a sheltered gully on the lower slopes of Flöifjeld. Its presence seemed in keeping with the luxuriant vegetation of this favoured spot. Birch and mountain-ash hung from the steep banks of the little ravine, where water from the melting snow-patches above trickled over sheets of moss, amongst which grew *Parnassia*, *Geum rivale*, and quantities of that delicate and beautiful fern, *Cystopteris montana*. There were patches of a tall white-flowered umbellifer, and the rest was a rank jungle of meadow-sweet, wood-cranesbill, great valerian, and the blue alpine sow-thistle. The only sound beside the Blackcap's song was the note of a Northern Marsh Tit, which was busily investigating the rotten birch-stumps, some of which showed the marks of its bill. And all this in the latitude of Disco Island, and far north of Iceland! On the morning of the 17th I heard another Blackcap at Lyngseidet.

Parus borealis.—The Northern Marsh Tit was ranging the woods in family parties. The usual call is the familiar "chee chee chee" of our own bird, but on Grindö one puzzled me for a time by making use of a fresh note. In many places this species had been pecking and digging into the old birch-stumps.

Muscicapa atricapilla.—I saw a male Pied Flycatcher perched on a rail at Lyngseidet early on the morning of the 17th.

M. grisola.—Its note called my attention to a Spotted Flycatcher at the same time and place as the last. Lyngseidet would appear to be a favourite locality with the smaller birds.

Motacilla alba.—The White Wagtail was not very numerous at Tromsö, though on July 20th we noted eight roosting side by side on a sloop at anchor in the strait. There were several about the shore at Lyngseidet; two were seen at Skjervö, and one at Svolvaer.

M. borealis.—The Northern Yellow Wagtail was noted the day after our arrival, when one rose from the willow scrub by the shore of the strait near Storstennaes. Next day we saw several on Grindö. One much-excited pair led us to make a search, with the result that we caught a young one just able to fly, and saw another.

Anthus pratensis.—The satisfactory determination of Norwegian Pipits is well known to be a matter of no small difficulty. I examined some scores with the field-glass upon the bogs and crowberry "barrens" in the hope of detecting the Red-throated Pipit, but all appeared to be of the present species. Some Meadow Pipits were feeding young, but the majority had eggs, doubtless a second brood; and so numerous were they that in the Tromsdal we stumbled across three nests in the course of about half an hour. Upon Grindö a boy showed us a nest with six eggs in a clump of moss and *Empetrum*. We watched for the return of the bird, much bitten by Mosquitoes the while, and, though she did not turn out to be the wished-for Red-throated Pipit, it was interesting to note the artless and unconcerned manner in which the bird, under pretence of feeding, stole up to the nest.

A. obscurus rupestris.—The Norwegian Rock-Pipit cannot be numerous in the part of the Nordland which we visited, as, though constantly upon the look-out for it and frequently about rocky shores well suited to its requirements, I only met with it at Svolvaer.

Accentor modularis.—The Hedge-Sparrow seems to be a shy bird in Norway, keeping to the cover of birch and willow. One was singing at Lyngseidet on the morning of July 17th, and another the same day at Skjervö. A third, heard in Lofoten on the 25th, was also singing in an unfrequented spot far from the village.

Pyrrhula major.—On July 12th, a wet day spent in a first exploration of Tromsö Island, I twice heard the low piping note of this species as we pushed through the birch woods.

Linota linaria.—We never failed to meet with the Mealy Redpoll wherever there was birch or willow cover of any but the most stunted growth. The first nest found, on July 13th, was thickly and warmly lined with feathers (fowls') and willow down. It contained six eggs, which were incubated; but two others, found the same day, each contained three fresh eggs. Willows seemed to be preferred, and in some cases the nest was only three or four feet from the ground. On July 15th a crowd of tourists from the Hamburg-American liner 'Auguste Victoria' visited the Lapp encampment. In passing through the woods many of them brushed past, and must almost have touched, a Mealy Redpoll's nest, placed shoulder-high in a birch tree beside the track. The five eggs were warm, though the bird was not sitting. At Skjervö, on the 18th, there were many Redpolls about the village, pecking at dandelions, or perched on fences, fish-rails, or path. One or two of the cocks were brilliant little fellows, with blood-red forehead and crimson breast.

L. flavirostris.—On July 23rd, landing upon an island off Svolveaer, we soon recognized Twites by their note. The locality seemed well suited to this moorland species, for, though there was only a scanty growth of heather, the peat soil was covered with berry-bearing plants—*Vaccinium myrtillus* and *uliginosum*, *Arctostaphylos alpina*, and, in wet spots, *Rubus chamæmoris*, yielding the luscious *möltebaer*.

Fringilla montifringilla.—At Tromsö one could not walk in any direction beyond the outskirts of the town without hearing the Brambling's drawling note. A nest found just after our first Fieldfares' on July 12th was some eight feet from the ground in the fork of a birch. It was an untidy nest, with Willow Grouse feathers worked into it. The bird fluttered off her four eggs, squealing and tumbling about. The cock bird then appeared; his note was a sharp "kip, kip," which, often heard subsequently, always reminded me of the Meadow-Pipit. Another nest, higher up than the first, was thick-walled and deep, made of moss, bents, and lichen, lined with hair and "rype" feathers. On the 15th the young had just left a nest near the Lapp camp, leaving an addled egg. Both the old birds were much excited. Our last nest, found on the 19th on the far side of the island, had small young ones and an egg, the latter probably hatching.

Passer domesticus.—As Mr. Aplin remarks, House Sparrows are scarce at Tromsö. On July 14th I noted one in the street. Three days later, as we touched at Havnaes on the Ulö, half a dozen Sparrows were chirping on the roof of a warehouse by the landing-stage, and next day we saw plenty at Skjervö. Both localities are farther north than Tromsö; so that the reason of their scarcity at the latter place does not appear.

Emberiza citrinella.—Several Yellow-hammers were singing at Lyngseidet as we landed, shortly after midnight on the morning of the 17th. On the 25th I saw one amongst the birches not far from Svolvaer.

E. schoenichlus.—Young Reed-Buntings, not long out of the nest, were once or twice detected in hiding amongst the willow scrub. Thus, on the 15th, there were some just able to fly near the Lapp camp.

Plectrophanes nivalis.—On July 13th we ascended the Flöifjeld, a hill lying opposite to Tromsö just across the strait. It rises to a height of about 2500 ft. Above the zone of creeping birch we met with a great variety of small herbaceous plants of arctic and alpine type, including almost all the characteristic species of our Highland and Lake District summits. An Arctic Hare, in blue grey summer dress, was seen for a moment as it stole away, and amongst the grass were the runs and droppings of the Lemmings. After gaining the shoulder of the hill, our way led over bare stony tracts of *fjeld*, with a very gradual rise towards the summit. We had just passed a herd of about sixty Reindeer, when, as we came to a more broken rocky part of the slope, the Snow Bunting's call-note drew attention to a male bird of this species perched upon a boulder. We soon discovered that there were about two families of them,—the old cocks in full black and white livery, hen birds, and young ones which had not long left the nest. It has been remarked that, to one who has only known him in winter in the south, to come across the Snow Bunting in his summer quarters is like making the acquaintance of a new bird. Again, on July 25th, after a fatiguing ascent of one of the mountains near Svolvaer, under an almost tropical sun and through jungles of lady fern six feet in height, as we at length gained the ridge and rested on its northern side, where in the shade several large snow patches still lay unmelted, a twittered

call-note from the rocks below led to the identification of another pair of Snow Buntings.

Sturnus vulgaris.—At Lyngseidet, early in the morning of the 17th, several Starlings were passing to and fro, and just before we left Tromsö on the 21st, we noted a small party in trees close to the Museum.

Pica rustica.—Magpies were everywhere in evidence. They are more pert and familiar than with us. Thus at Lyngseidet, on the wet morning of the 17th, they were prying into fish-sheds, chattering on window-sills, gables, and church roof, tampering with the split Cod hung to dry on the fish-rails, and making mischief generally.

Corvus corax.—The Raven was seen so frequently that it must be a very common bird in the Nordland. It was often noted about the fishing villages as we came alongside in the coasting steamer. Four were seen near the top of Flöifjeld, and five came croaking overhead at Skjervö.

C. cornix.—The Hooded Crow was fairly numerous, and its large nests were sometimes seen in the birch woods. When the young had only recently flown, the old birds were very noisy, angry, and excited. At Skjervö there were Grey Crows about the houses and church.

Otocorys alpestris.—On July 14th, as we came down the Flöifjeld, I heard an unfamiliar note. The field-glass showed a pair of birds, which, from their black moustaches and the ear-tufts of the male, were identified in a moment as Shore Larks. They were very quiet, and gave no indication of having a nest. A pair of birds which puzzled us earlier in the day were no doubt of this species.

Dendrocopus minor.—Woodpeckers are scarce at Tromsö, and none were seen. But on July 19th I noticed a birch stump which had apparently been worked by this species, a Northern Marsh Tit having nested in the hole subsequently.

Cuculus canorus.—The Cuckoo, which at home had been silent for three weeks or more, was calling in the woods at Tromsö on the day of our arrival, July 12th. Another was heard at Lyngseidet as we landed soon after midnight on July 17th.

Falco æsalon.—Of the smaller birds of prey, the Merlin was the only one met with, but it appeared to be fairly numerous.

One passed over our boat off the southern end of Tromsö Island on the 14th. Three days later, when in the 'Lyngen' off Dybvik, one flew over, and we saw another early next morning at Skjervö. On the 24th, in a glen behind Svolvaer above the head of the lake, we again heard the shrill note of the Merlin. There appeared to be a whole family of them amongst the birches which covered the lower slopes of the grey granite peaks.

Haliaëtus albicilla.—On July 19th we saw a White-tailed Eagle on the far side of Tromsö Island. It was mobbed by Gulls.

Lagopus albus.—A first meeting with the Willow-Grouse during a walk through the birch woods at Tromsö on July 12th served to remind us that we were in northern latitudes. The white wings and white-tipped tail render it a much more showy bird than our own. A pair fluttered up out of the willow-scrub, pitched again, ran with their heads down, and scuffled in great excitement, as six or eight "cheepers" got up one after another, flew weakly, and dropped again into cover. On the 19th, at the spot from which a pair rose, we found a young one with its leg broken. It had probably been attacked by a Gull. The same day, in coming down from the higher part of the island over a bank deep in crowberry, we put up another pair with about thirteen cheepers, some of which flew, while others skulked. Several old birds and another brood were seen on Skjervö. When there were young, the tumbling and fluttering performance always occurred. On the 25th we climbed one of the peaks in the neighbourhood of Svolvaer. At about 1800 ft., while still struggling through the fern, something white appeared to fall from near our feet. It was a Willow Grouse tumbling down the hill-side. Two cheepers flew.

Numenius arquata.—The Curlew was sometimes heard about muddy or sandy shores, as at Lyngseidet on the 17th. On the 20th, when we landed on the large island of Kvalö, it appeared to be breeding on the moors in company with Golden Plover.

N. phaeopus.—We heard the Whimbrel's rippling note coming from the muddy shore at Lyngseidet, where it was feeding in company with Curlews and Oystercatchers.

Totanus calidris.—Redshanks seemed to prefer the far side of Tromsö Island, where they piped excitedly or ran amongst the

long grass just above the shore. One would sometimes perch on a tree. At Grindö, on the 14th, a boy gave us a "hard-sat" egg. On the 20th several were noisy about the Kvalö pools. I put up a young one just able to fly, and another swam out to avoid us.

T. hypoleucus.—The Common Sandpiper was seen on the stream in the Tromsdal above the Lapp encampment, and again on the 24th about the shores of the lake behind Svolvaer.

Tringa temmincki.—On July 20th we landed at Tisnaes, the point of the big island of Kvalö which is nearest to the southern end of Tromsö Island. Walking over the peat-bog where cloud-berry showed its ripening fruit, we roused a small wader, which flew round with a trilling note, then settled on a lump of peat. It was presently joined by the other one; no doubt they had young hidden somewhere close at hand.

T. striata.—A Purple Sandpiper was seen on July 23rd on the rocky shore of an islet off Store Molle in the Lofotens. It was excessively tame.

T. alpina.—The Dunlin was seen on the 20th on the Kvalö moors, and was from its manner evidently breeding.

Phalaropus hyperboreus.—Walking over these moors, which strongly reminded me of Wales, we came to higher ground, and reached the series of small lakes of which we were in search. From a pool margined with sedge, a small wader got up and flew anxiously round, with a noise like "wick wick," then settled on the water. We watched both birds, one, probably the female, being rather the larger and brighter of the two. They swam high in the water, with the neck straight, head well up and nodding. Nothing of bird life in Norway pleased us more than this introduction to these trimly-built and confiding little waders. My friend half swam, half waded, out into the pool, and on a spongy islet found a slight hollow in the moss, the empty nest. We then in two places noticed something moving on the water as if a fly had fallen in. The glass showed that the appearance was due to a couple of nestling Phalaropes, which were swimming with scarcely more than their bills above water.

Charadrius pluvialis.—There were many pairs of Golden Plover about these barren uplands; in fact, I have never seen them so numerous on any moor.

Ægialitis hiaticula.—On July 14th a boy showed us a Ringed Plover's nest with four eggs on the shingle at Grindö. On the 20th there were several of these birds about the beach at Tisnaes.

Hematopus ostralegus.—Oystercatchers were very noisy about the rocky point at the north end of Grindö. They had made many nest hollows on the beach, which was here entirely composed of broken shell, with bits of coral and of calcareous sponges. On the 17th, near Lyngseidet, a vociferous pair must have had young ones hidden close at hand. Others were feeding with Curlew on the mud-flats. We saw Oystercatchers on the 23rd on a little island off Svolvaer.

Sterna macrura.—On July 16th, just before the 'Lyngen' touched at Finkroken, on the Reinö, we passed a little island upon which a large colony of Arctic Terns was nesting. They filled the air like snowflakes. Others were seen on the 23rd during a boating excursion off Svolvaer.

Larus marinus.—A few Great Black-backs were seen. On the 23rd I noted a pair about an *æg-vaer*, or Eider hatchery, off Svolvaer.

L. fuscus.—A few Lesser Black-backed Gulls were breeding in company with the next species about the far side of Tromsö Island. The higher part of Skjervö Island, very rough ground, all crowberry and rock, was a gullery of these two species. Here on the 17th we caught three young birds of different ages, two of them nearly ready to fly. Others had already gone down to the beach.

L. argentatus.—Herring Gulls were very numerous on the 17th at Lyngseidet, where in the early morning they were pilfering split fish from the drying rails. The shore was littered with cod-heads and backbones, the usual refuse of a Norwegian fishing village. On the 18th we touched at the whaling station of Skaarö. Eleven freshly-killed Whales were floating at anchor alongside, two or three ashore were being flensed, and about a dozen carcasses which had been stripped were waiting to be made into fish-guano. The water was covered with oil and floating refuse, so that the place naturally had special attractions for Gulls, which were in countless numbers. At Tromsö we bought two Herring Gulls' eggs of the variety mentioned by Mr. Aplin. They are marked with red-brown and ash on a warm cream-

coloured ground. The locality given was Musvaer, behind Tromsö, and report said that in the whole colony, a large one, only one nest contains these red eggs each year.

L. canus.—The Common Gull appeared to be generally distributed, breeding upon the "egg-holms" in the sounds, about small pools upon the bogs, and on rocky islets in the lakes. Wherever we went, a few pairs cackled overhead. At Skjervö, on the 17th, I waded across the softest of spring bogs to a nest with three eggs. At the Kvalö pools several old birds were noisy overhead, and we saw two young ones swimming. On the lake behind Svolvaer two or three pairs had young ones just flying on July 24th.

Stercorarius crepidatus.—Richardson's Skua was frequently seen about the sounds and channels in the neighbourhood of Tromsö. At Grindö, on the 14th, I watched one amusing itself with a Common Gull, threatening it playfully. On July 20th, landing at Tisnaes on the Kvalö, and walking inland, we soon reached the moors already mentioned in connection with the Golden Plover. A Skua appeared on the wing some distance in front of us. Its long pinions and hawk-like flight reminded one of the Kite. It was evidently excited. After some search amongst the lichen and crowberry, my friend picked up a nestling Skua in dark smoky down, its quills and mottled scapulars just showing. The bird, first seen, which was of the lighter variety, tumbled about. It was soon joined by another, wholly dark. Both showed their flight to perfection, and were rather noisy. The young one was not in the nest, but the latter must have been close at hand. On the 23rd we noted a Skua of the light variety flying over one of the islets off Svolvaer. Another was chasing an Arctic Tern.

Alca torda.—At Tromsö, Razorbills were constantly on the move up and down the channel.

Uria grylle.—The same remark applies to the Black Guillemot. Several were noted on the 14th when we rowed to Grindö. On the 22nd, in the 'Röst,' we ran into the Troid Fjord, an inlet of the Raftsund, with grand surroundings. Here a few pairs of Black Guillemots were evidently breeding. Next day many were noticed in the course of a boating excursion to the islands off Svolvaer. Landing on a large rocky islet off Store Molle, we

scrambled along shore, and came to an inlet of blue-green water, framed by the scorched red granite rock, and with a dazzlingly white beach of broken shells and coral in places. The contrast of colours made a brilliant picture. Six or eight Black Guillemots were fishing, each one going off with its fish when caught to feed young. Others were certainly nesting on an islet upon which we were not allowed to land, as the wooden cross and watcher's hut proclaimed it an *æg-vaer*, or Eider hatchery. One of those seen was in the barred plumage; can it have been a last year's bird unusually late in assuming the adult dress?

Fratercula arctica.—Many Puffins were seen from the deck of the 'Lyngen' as we ran across from Kvitnaes on the Vannö to the mouth of Lyngen Fjord.

Colymbus arcticus.—We rarely met with a lake or pool of any size that had not a pair of Divers upon it, usually followed by their two young ones in the down. On the 14th we saw three settle upon the Praestvand, the lake in the woods behind Tromsö which supplies the town with water. At Skjervö they were constantly passing to and fro, uttering harsh cries while on the wing. As we watched the midnight sun a fine pair of Black-throated Divers with their young floated upon a pool just below us. Probably a dozen places were found where trampled water-weeds and pieces of egg-shell showed that young had been hatched. One pair had bred at the Kvalö pools. Others were seen near Svolvaer; one pair near Oos on the 25th had well-grown young.

C. septentrionalis.—The Red-throated Diver was not less numerous. Three were wailing in the inner bay as we landed at Skjervö on the 17th. As we came to one of the small sheets of water amongst the birch-clad hills, a pair were much excited, barking and rushing about the pool. We took this as an indication of eggs or young, but on returning an hour later the birds were gone. On the 19th we came across a string of lakelets in the woods towards the northern end of Tromsö Island. Upon the uppermost one floated a fine pair of Red-throated Divers amongst the flowers of the small yellow water-lily (*Nuphar pumilum*). They must have had young, as before taking flight they swam up to within twenty yards of us, and we could not but wonder how long they would survive if guilty of such temerity in less unsophisticated latitudes. A pair had a single young one at

the first of the Kvalö lakes ; another pair had two young on the sedgy pool where the Red-necked Phalaropes were breeding.

Phalacrocorax carbo.—Cormorants were seen on July 23rd on the rocks and skerries off Svulvaer.

Anser cinereus.—We did not actually meet with Grey-lag Geese, but, to judge from their droppings, they frequent the boggy margins of the forest pools on Tromsö Island. The pinioned Grey-lags in the courtyard of the Grand Hotel at Tromsö are said to have come from Karlsö.

Anas boscas.—One seen at a pool on Skjervö, another at the Kvalö lakes. A duckling which we caught on the 19th close to the water-lily pool above mentioned was probably of this species.

Somateria mollissima.—Eiders were common about Tromsö and the neighbouring islands, but we saw only ducks with their young broods ; the drakes appear to prefer more open water. On July 14th there were many off Grindö. One party numbered five old birds and about twenty young ; another duck had five, and yet another four under her charge. On the rocky point at the northern end of the island we found two young in the down washed up ; they may have been killed by the big Gulls. A maternal Eider grumbled “og og” as a Great Black-back settled beside her brood. There was a nest in a hollow amongst the rocks with the down still in it ; others amongst the rocky knolls, or just within the birch wood, had been cleared out, and were now mere hollows. A boy showed us a nest by the shore ; the bird was sitting in a little stone shelter, from which she bustled clumsily out. There were only two eggs ; one taken was on the point of hatching. On the morning of the 17th, as we walked to a rocky point near Lyngseidet, many Eiders swam out from the shore with their broods. It was very common to see two old ducks with five young ones between them : very many had none. Next day, at Skjervö, I noted two old birds followed by fifteen young ones, no doubt the produce of a couple of nests which had not been discovered ; we found one such still full of down on the less frequented side of the island. At Svulvaer semi-domesticated Eiders swam in the harbour amongst the boats, close under the hotel windows. When returning in the ‘Sirius,’ we lay to for some time at Kobberdal, on the island of Lökta, to take on board three hundred barrels of herrings. Close to us was a small islet

completely covered with huts for the Eiders to nest in ; they were made of slabs neatly roofed with turf.

Mergus merganser.—At Grindö, on the 14th, we saw a female or young Goosander in the channel just off the southern point of the island.

M. serrator.—The Red-breasted Merganser appeared to be numerous. On the 14th there were several off the southern end of Grindö. At Lyngseidet, in the early morning of the 17th, as we rounded a rocky point, a female Merganser plumped off a rock into the water, while nine young ones tumbled over after her, showing white under sides and fluttering paddles for a moment as they wriggled off a flat stone into the water. The same day, at Skjervö, four females, immature birds, were at rest on a rock in the inner harbour, and a pair rose from one of the Diver-frequented pools. On the 23rd, as we were exploring an islet off Store Molle, three alighted on the water near us, and next day there was a party of four on the lake behind Svolvaer.

NOTES ON SHETLAND BIRDS.

BY F. S. GRAVES & P. RALFE.

THE following notes were made during a visit to the Shetlands from 20th May to 4th June, 1898, when the breeding season of most species in these islands is commencing. Three days at the beginning and end of the time were spent among the shores and islands about Scalloway, and two days in Unst. The remainder of the excursion included a day on Foula, a hurried run to Papa Stour, and several days in the Walls neighbourhood, with whose dreary heather-clad waste and countless lochs we became very familiar. The weather, though dry, was for the most part cold, with high wind, which prevented much boating, and confined us largely to the land.

WHEATEAR (*Saxicola oenanthe*).—Very common everywhere. This and the Skylark are the characteristic small birds. Several nests with eggs found.

WHITETHROAT (*Sylvia cinerea*).—On the rocky edges of the little landing creek on Foula were a few warblers of this species. They were very shy and silent, and must have felt sadly out of their element, as there are no bushes there.

WREN (*Troglodytes parvulus*).—A few seen.

MEADOW-PIBIT (*Anthus pratensis*).—On the moorlands; common.

ROCK-PIBIT (*A. obscurus*).—The "Bank Sparrow" was numerous on the Scalloway islands, where we found a sucked egg. Under a detached piece of rock on Foula was a nest with two eggs.

SWALLOW (*Hirundo rustica*).—On the 25th May we saw two on Foula, hawking along the little sheltered burn which falls into the creek forming the landing-place. On the 28th we saw two near the Loch of Cliff, Unst.

COMMON SPARROW (*Passer domesticus*).—Seen in the neighbourhood of houses and outbuildings.

TWITE (*Linota flavirostris*).—Frequent; principally on the coast.

CORN-BUNTING (*Emberiza miliaria*).—About Walls and Baltasound, in the neighbourhood of cultivation.

SKY-LARK (*Alauda arvensis*).—Very numerous. The exquisite song, poured out amidst the high cold wind, enlivened the dreariest heaths of the country between Walls and Sandness. A nest with three eggs among the heather.

STARLING (*Sturnus vulgaris*).—Numerous on Foula and elsewhere. We found them nesting in a variety of situations, as below the eaves of a stable, on sloping ground between two boulders on one of the islands near Scalloway; and in Unst, in the loose stone base of a low sod fence within a few inches of a little stream. They seem to place their nests anywhere within shelter.

HOODED CROW (*Corvus cornix*).—Common. There was an occupied nest on the bell-gablet of the Wesleyan Church at Walls.

RAVEN (*C. corax*).—One on Foula, buffeted by an Oystercatcher. Two between Walls and Lerwick.

SHORT-EARED OWL (*Asio accipitrinus*).—One among the rocks near Braga Ness, Walls, persecuted by Hooded Crows.

KESTREL (*Falco tinnunculus*).—One seen in Unst.

CORMORANT (*Phalacrocorax carbo*).—Saw some birds, but no breeding place.

SHAG (*P. graculus*).—Common. Owing to the rough weather we visited no nesting place.

GANNET (*Sula bassana*).—A few seen off the coast.

MALLARD (*Anas boscas*).—Met with nesting both in Mainland and Unst, some of the nests being hidden in tall heather. In three cases the duck was sitting on nine eggs.

TEAL (*Querquedula crecca*).—Two on one of the Walls lochs.

WIGEON (*Mareca penelope*).—Two drakes on Hulma Water, 21st May.

GOLDENEYE (*Clangula glaucion*).—Two on a small lake near Walls; others noted in Unst.

EIDER DUCK (*Somateria mollissima*).—Nesting on the islands near Scalloway. In two cases where there were three fresh eggs the nests were lined with down. Abundant off Papa Stour; we saw, as mentioned by Mr. Raeburn, birds among the Great Black-backed Gulls on Lyra Skerry.

ROCK-DOVE (*Columba livia*). — Seen everywhere on rocky coasts. In a cave on Fore Holm, F. S. Graves, with great difficulty, reached a nest in which were two hard-sat eggs. Close to this was another with newly-hatched young (31st May).

CORN-CRAKE (*Crex pratensis*).—Five eggs taken on Foula in 1897 were shown us.

GOLDEN PLOVER (*Charadrius pluvialis*).—Only a few pairs seen, near Walls and in Unst; evidently nesting.

RINGED PLOVER (*Ægialitis hiaticula*).—Very common on holms and stony barrens; sometimes also on loch-sides inland. Abundant in the interior of Papa Stour, where the surface has been stripped of sods, leaving a waste of sharp-edged red and white shingle, with scraps of sickly vegetation. Nests found on the Scalloway islands. One on Hildasay was formed of the dry droppings of rabbits arranged in a well-shaped ring round the four eggs.

LAPWING (*Vanellus cristatus*).—A few here and there. Evidently breeding near Whiteness and Walls.

OYSTERCATCHER (*Hæmatopus ostralegus*). — Common everywhere on the coast. Nesting abundantly on the Scalloway islands. One nest contained *four* eggs. We saw the birds buffet the Raven and Hooded Crow.

COMMON SNIBE (*Gallinago cælestis*).—We saw one pair at Snarravoe, Unst.

DUNLIN (*Tringa alpina*).—A few pairs seen by grassy loch-sides. We repeatedly heard their reeling “song,” which was uttered when the bird was standing on a tussock, and not when on the wing. They were very tame. At one of the places they frequented were several small cup-shaped nests on the tufts of grass, but laying seemed not to have commenced.

COMMON SANDPIPER (*Totanus hypoleucus*).—Two pairs met with near Walls on inland lochs.

WHIMBREL (*Numenius phæopus*).—Heard the characteristic cry from the steamer while in Bastavoe, Yell.

CURLEW (*N. arquata*).—A few only seen, both on the moors and coast. One apparently breeding on Hermanness, Unst.

ARCTIC TERN (*Sterna macrura*).—Noticed none on our first visit to Scalloway islands (20th May); on second visit (31st May) they were numerous at their well-known stations, and noisy, although no vestiges of nesting were yet to be seen.

BLACK-HEADED GULL (*Larus ridibundus*).—Seen at two places ; a few perhaps breeding on the shore of a voe near Weisdale. There is a colony on a rocky knoll in the middle of a loch in another neighbourhood. This little island has steeper sides than is usual, and a luxuriant growth of *Luzula*. On 21st May there were about twelve nests, empty, or with one, two, or three eggs. The eggs in each nest agreed in colour.

COMMON GULL (*L. canus*).—Common, and nesting in many places, on the low rocky brows of the Scalloway islands, in swampy lowlands near Whiteness, and at the tide-edges at Littlure, near Walls. Most of the lakes of the Walls district had a few pairs, the characteristic sites for the nests being little knobs of rock or boulders rising a foot or two above the water-level, with a hollow on the top just large enough to accommodate a single nest. Few of these by the end of May contained their full complement of eggs. In a little shallow pond on the Chingies, Scalloway, were nests similarly placed. The cry of the Common Gull, a kind of harsh croak, is very characteristic.

HERRING GULL (*L. argentatus*).—Common on the coast ; we did not observe it nesting inland. Innumerable Herring Gulls, however, were resting on the Loch of Cliff. Opposite the Rusna Stacks, Walls, we saw nests with eggs on 23rd May ; at the end of the month others on the islands at Scalloway had also their complement.

LESSER BLACK-BACKED GULL (*L. fuscus*).—Common. A few pairs nesting on Hildasay, both on a loch which that small island contains and on its coast ; others on the cliffs near Walls. In many of the lakes of the Walls district are islands on which this species was gathered, sometimes in large numbers, for nesting purposes. These islands had lost the ling which carpeted the lake-sides and other islets, and were richly verdant, and in some cases delightfully adorned by flowering marsh-marigolds, at this season almost the only conspicuous wild flower of Shetland. (On verdure produced by Gulls, see Mitchell, 'Birds of Lancashire,' p. 253, second edition.) On one or two of these spots which we visited on 23rd May nesting operations had only just commenced ; we saw no eggs during our stay.

GREAT BLACK-BACKED GULL (*L. marinus*).—Odd pairs breeding on some of the Scalloway islands. We saw (across a chasm)

the colony of Lyra Skerry, described by Mr. Raeburn (Zool. 1891, p. 131), and great numbers of the birds, mixed with other species, were assembled on the shallow ponds in the interior of Papa. The darker colour of the mantle, as compared with that of *L. fuscus*, was very noticeable. We were shown some eggs, taken recently (25th May) on Foula, where, we were told, the bird is rather scarce.

KITTIWAKE (*Rissa tridactyla*).—Common. There are great colonies, as is well known, on Foula, and in Burra Firth, Unst. On the former island we saw innumerable Kittiwakes flying from a bit of wet ground inland to the cliffs, each with a morsel of moss in its beak.

GREAT SKUA (*Stercorarius catarrhactes*).—We saw the colonies both on Foula, and, by permission of Mr. Edmondston, on Hermanness. At the former laying had just commenced. On 25th May we saw a number of empty nests, others with one egg, and about twelve with their full number of two eggs. The nest was usually a scratched hollow about a foot across.

RICHARDSON'S SKUA (*S. crepidatus*).—Saw them nesting on Hermanness and Foula, on the latter in two places, near the Great Skua, and, in larger numbers, on the level not far from the landing place. On 25th May, on Foula, we saw one egg only, where a very large number of Skuas was collected; yet we were several times actually struck by the birds, which never occurred with the larger species, nor indeed with this species on Hermanness, where in a few cases two eggs had been laid on 28th May. In both colonies dark-plumaged birds seemed to be in the majority.

RAZORBILL (*Alca torda*). **GUILLEMOT** (*Uria troile*).—Abundant on the sea; we saw little or nothing of their breeding.

BLACK GUILLEMOT (*Uria grylle*).—Very common and abundant; quite the characteristic sea-bird of Shetland. Laying scarcely commenced by the beginning of June.

LITTLE AUK (*Mergulus alle*).—On the top of the brow near the Kaim, Foula, we picked up a part of a skeleton with the wings attached.

PUFFIN (*Fratercula arctica*).—Numerous; nesting abundantly on Foula; eggs seen. One we picked up had been carried some distance inland, no doubt by a Raven or Crow; it was undamaged except by a small dent, probably caused by the bird's bill.

RED-THROATED DIVER (*Colymbus septentrionalis*).—A pair on a small loch near Walls, 21st May. We afterwards probably saw one of the same birds, flying overhead with outstretched neck, and uttering its strange unearthly cry. These were the only Divers seen, except a single bird on the sea near Yell, which was perhaps *C. glacialis*.

STORM PETREL (*Procellaria pelagica*).—Their nesting-holes were shown on an island near Scalloway. We saw also some eggs taken in 1897 at Brindister.

MANX SHEARWATER (*Puffinus anglorum*).—We saw, on Foula, an unblown egg which had been taken on 18th May.

FULMAR (*Fulmarus glacialis*).—Multitudes on certain parts of the Foula cliffs, as at the Kaim and Smalie. They had just begun to lay; we saw an unblown egg taken about 25th May. The increase of this species, which established itself on Foula some time between 1870 and 1880, is very remarkable.

NOTES AND QUERIES.

MAMMALIA.

CARNIVORA.

Cats in London.—The number of Cats in London, and their depredations on wild birds in our parks, having been variously estimated, I applied for information to the manageress of the "London Institution for Lost and Starving Cats," who has obliged me with the following communication.—ED.

"I have much pleasure in replying to your letter, and in giving you the information you require. According to Mr. Hudson's book, 'Birds of London,' the number of Cats in our great metropolis cannot be less than three-quarters of a million, and the stray and starving ones certainly not under 80,000 to 100,000. The number of Cats we have taken in during the three years from the 22nd January, 1896, to 22nd January, 1899, is exactly 13,994. The first year we received 2450, the second year 4010, and this third year 7527, making a total of 13,994 Cats. We could increase the number tenfold but for want of means, and, in consequence, want of hands and premises. Depôts ought to be established in every part of London, with one headquarter to take the Cats collected daily at these various stations. Also a tax ought to be levied on Cats, so as to decrease the shocking number of stray and starving Cats which now infest our streets, and thereby lessen the abominable cruelties to which they are exposed. We are only in our infancy as yet, but I hope, with energy and push, we shall in a few years' time establish an institution on similar lines to the Battersea Dogs' Home, with the exception that we search for Cats in every available corner, and call for them at people's request free, but with the prayer for a little help. I should think the probable number of Cats in London could be easily estimated. There are few houses which do not shelter at least one Cat, and every tenement has, with few exceptions, one. Cats have on an average three litters a year of at least three kittens at a time, and the Cats breed at six months old. A Cat's age ought to extend to about ten years, but this is only when they have good homes and are taken in at night. Cats exposed to all the hardships of weather hardly live beyond five years, and stray Cats very few months after they are deserted. We have received Cats in one or two instances twenty-two years of age, and several over eighteen. These of course were great pets, with

every care lavished on them. A Cat is a delicate animal, with innumerable ailments. It easily becomes ill. It is a cowardly animal—if I may so express myself—and allows itself to die by not struggling against its malady, though at the end it dies hard. When a Cat gets a cold, or pleurisy, or distemper, it loses, through its nose being ‘bunged up,’ all taste and sense of smell. The moment it cannot *smell* its *food* it will not touch it, and dies of starvation even with a dish of food alongside it. Therefore a Cat, when ill, must at once be forcibly fed, or it will let itself die. Every one of these 13,994 Cats have passed through my hands, therefore I ought to know something about them.”

Polecats in Wales.—Last November I had two of these animals (*Mustela putorius*) sent to me from a certain district in Cardiganshire, where they are not so uncommon as is supposed. They were both males, and in excellent pelt. The larger of the two is a beauty, his total length 23 in., length of tail 7 in., weight 2 lb. 3 oz. The fur is of great length and thickness.—OXLEY GRABHAM (Heworth, York).

White Stoat.—Although the winter has been so mild, I procured, during the last week in December, the whitest Stoat (*Mustela erminea*) that I have in my collection; barring the black tip to the tail and a few brown hairs round each eye, it is pure white. Its dimensions were—total length, 12½ in.; length of tail, 3¼ in.; weight, 6½ oz.; female. As will be noticed, the tail is very short, and the black tip only measured half an inch. Now, in my small series of skins, this is the second short-tailed Stoat that I have procured. The assumption would be that they had met with some accident, and part of the member was missing; but they were both skinned by myself. The tail tapered off to a fine point as in normal specimens, and there was nothing to indicate that any injury had been received. I should mention that the other of these short-tailed Stoats is a male. A friend of mine has a theory that these white Stoats are in several ways different to the common form—more slender in make, fur more silky, &c.—but in this I cannot agree with him. Certain it is, however, that they differ *inter se* very considerably in the length of their tails, and in the size of the black tip at the end.—OXLEY GRABHAM (Heworth, York).

A V E S.

Great Grey Shrike in Warwickshire.—A specimen of *Lanius excubitor* was taken by a birdcatcher at Harbury Spoil Banks, near Leamington, on Dec. 27th, 1898. It was caught on the bird-lime, having made a dash at the stuffed decoy Goldfinches fixed upon a bush. Evidently a young bird of the year, as I noticed the markings on the edges of the breast feathers were very distinct. When I saw the bird a fortnight after it had been

taken it had become comparatively tame and accustomed to confinement.—
J. STEELE-ELLIOTT (Clent, Worcestershire).

Great Grey Shrike at Scarborough.—On Dec. 30th a Great Grey Shrike (*Lanius excubitor*) was killed on the shore a little to the north of Scarborough. The bird had apparently just arrived, and was making its way towards the cliff when first noticed.—W. J. CLARKE (44, Huntriss Row, Scarborough).

Strange Nest of a South African Bush Shrike.—I found a nest of the Pied Bush Shrike (*Bradyornis silens*) near the Fountains, Pretoria, Transvaal, on Nov. 6th, 1898. The nest was about eight feet from the ground, in the fork of the stem of a small thorn tree. It was built purely of *twine*. I examined it carefully, but could not find any other material used in its construction. The inside was lined with small white feathers. It contained three eggs of a pale green colour, splashed with red at the larger ends.—ALEX. ROSS (Johannesburg, Transvaal).

[Fountain Grove is a short distance from Pretoria, and is a favourite resort. There is a hostelry there, many picnics held, and many corks drawn. Hence the twine.—ED.]

Scoters in Hants and Isle of Wight.—Mr. Percival-Westell's note on these birds (*Edemia nigra*), appearing in your last December number (p. 505), rather puzzles me. Knowing the localities mentioned well for a number of years, I have found the provincial name of "Isle of Wight Parsons" applied to *Cormorants*, and though frequently having met with Scoters, their flight has been of such a character that a description of them as "lazily winging their way" would require some qualification. Since 1866 I could number the instances of having met with them on my fingers, but *out* of the breeding season they are met with frequently by the shore boatmen, who usually describe them to me as "some of them 'ere Scouter Ducks." In November last year I had one close to me diving amongst the rocks between Bonchurch and Shanklin, and a party of five flew by me out by the wreck of the 'Eurydice' in March, 1878. However plentiful Scoters may be, they are not generally known as "Isle of Wight Parsons," nor do they breed there.—H. MARMADUKE LANGDALE (The Vicarage, Compton, Petersfield).

Scoters in South Hants ?—When I wrote that the Scoter (*Edemia nigra*) was called the "Isle of Wight Parson" (Zool. 1898, p. 505), I was fully aware that the common Cormorant was subject to the same appellation, and I should have stated this in the first instance. In spite of Mr. A. G. Headley's assertions, I still adhere to the fact that I saw the common Black Scoter every day during my fourteen days' vacation in the

county in the middle of August last, either at Hayling Island, the Isle of Wight, or flying across the sea from one to the other; and that the drum-major at Eastney Barracks told me that they could *always* be seen *all* the year round. When I pointed one out to him, not twenty yards distant, he remarked, "We call those Isle of Wight Parsons"; and others confirmed this statement. I am a young ornithologist, and only too pleased to be corrected in any statements I may make, and I am much indebted to Mr. Headley for pointing out the error I made in regard to the Scoter's flight. Those I saw did fly *rapidly*, and it was a grave slip on my part to say they *lazily* winged their way. The word *regularly* should have been substituted for *lazily*. — W. PERCIVAL-WESTELL (5, Glenferrie Road, St. Albans).

Late Stay of Land-Rail.—On Dec. 3rd I had a freshly-killed specimen of the Land-Rail (*Crex pratensis*) brought to me. On dissection it proved to be a female, and showed no signs of having suffered any injury which might have prevented it migrating at the usual time.—W. J. CLARKE (44, Huntriss Row, Scarborough).

Nesting Habits of the Moorhen (Zool. Dec. 1898, p. 506; *ante*, p. 30). — We are well aware that birds differ somewhat in their habits in different localities, but this is often an adaptation to surroundings. My experience with regard to the species in question (*Gallinula chloropus*) is that it seldom, if ever, covers its eggs on leaving the nest, at least in this neighbourhood. In my birdsnesting days I have seen many nests and eggs of the bird, as I sometimes had the privilege of boating upon some three or four miles of the river Avon, which, being strictly "preserved," was a fine nursery for the reed-loving species, and I do not recollect ever finding a nest in which the eggs were even partially covered, except perhaps where the parent bird, alarmed at my near approach, had scuttled off, and in her haste had drawn a promiscuous reed across her eggs, with no attempt at concealment; indeed, the *number* of eggs in the nest was often discovered before a very near approach, and this notwithstanding the approximate hue of the ground colour of the eggs and the reeds of which the nest was made; it often seemed to me the similarity in colour of nest and eggs were protective items not to be overlooked. On one occasion, in particular, I remember finding a large branch of a tree which, during the winter flood, had been washed down and stranded in the very midst of a shallow and lagoon-like part of the river; on a projecting portion of this branch, standing up some two feet out of the water, the decaying reeds, &c., had accumulated, and on the top of it was a Moorhen's nest quite exposed, and the eggs were easily detected at a distance, as on account of the shallowness of the water at the time it was with difficulty the punt could be got to the spot; and I may

here remark that, although the river was unusually wide at this particular place, yet within two hundred yards of the site of the nest a wood came down almost to the water's edge, the higher trees of which were occupied by a "Rookery," which one would think would have been an inducement for the Moorhen to use every precaution to protect her home; so unlike the habits of the Little Grebe, the eggs of which are invariably covered more or less. It always seemed a mystery to me how the latter bird managed to cover up her eggs so adroitly, and, greater mystery still, how she managed to hatch them in such a situation. With regard to the nidification of the Moorhen, I have often found that a much larger number of nests seem to be constructed than are ever used; but for what purpose is this apparent waste of time and labour? We are well aware the same thing occurs with other species—the Lapwing, for instance; possibly some annoyance or unsuitable site is discovered after the work is begun, but in many instances another nest is made in close proximity to the one deserted. I have not found a large amount of variation in the eggs of this species, but on one occasion I discovered a nest containing three eggs which differed somewhat from the normal type, in that the larger end was much darker than the other portions of the shell, which was almost spotless except upon this darker zone.—G. B. CORBIN (Ringwood, Hants).

With reference to Mr. W. Hewitt's interesting note on this subject (Zool. 1898, p. 506), may I be permitted to give the results of my small experience? I have never found nests of the Moorhen with the eggs covered over, neither when the first egg only has been laid, nor when the clutch has been complete. Only last year (1898), I examined, in this neighbourhood, more than a dozen nests of the Moorhen, and not one of them had the eggs covered over in any way. It is a well-known fact, however, that the Little Grebe, or Dabchick, invariably covers its eggs over on leaving the nest. With regard to Mr. Hewitt's suggestion as to the local variations in the habits of birds, I may say that what Moorhens' nests I have found in other parts of the country—*e. g.* Essex, Middlesex, Surrey, Herts, Hants, and Suffolk—have never had the eggs covered over.—BASIL W. MARTIN (Darley Abbey, Derby).

With reference to Moorhens covering their eggs, I have one record of a bird of this species doing so, or partly doing so, after her full clutch was laid. This was near here, on May 21st, 1894, when a Moorhen I disturbed off her nest containing nine eggs, partly covered them with pieces of seaweed and a fresh green leaf or two. She had then laid her full clutch, but was only just beginning to sit, as the eggs were fresh. On July 19th of that year I found, close to the same spot and probably belonging to the same pair of birds, one Moorhen's egg lying on the bare ground, with a few bits of reed placed round it; on visiting the spot a few days later there were

four eggs in quite a respectable nest, as good as these birds usually make on land. On neither of these two latter occasions was there any attempt to cover the eggs.—A. BANKES (Beaulieu, Hants).

A Habit of the Roseate Tern.—I think it is not generally known amongst students of birds that it is alleged (and I have great faith in the allegation) that the Roseate Tern (*Sterna dougalli*) robs the commoner and allied species with which it associates, of its food, after the manner of the Skuas. Some time ago I asked a friend, although not a professed ornithologist, but who had lived near a colony of Roseate Terns for two or three summers, and had constant opportunities of observing the birds, to give me a few particulars of the habits of this species, and he told me as a positive fact that he had seen the Roseate Tern rob the other Terns of their food, “not once or twice, but hundreds of times,” generally whilst on the wing; but he has also seen them take food from the young of the Arctic Tern, with which their parents had just provided them. In fact my correspondent says:—“They fly a great deal swifter than the Common or Arctic Tern. They very seldom fish for themselves; if they see a Common or Arctic Tern with a fish in their bills, they pounce upon it just the same as a Hawk will upon a small bird, and take the fish clean out of their bills; they are very quick. I have even seen them take a fish out of a young Tern’s bill that has been in the nest. I can tell a Roseate Tern amongst a thousand Common Terns. When they are flying they seem to be longer in the body and longer in the wings than any other Tern, and they have a very hoarse cry, quite different to any other Tern’s. I have never seen three Roseate Tern’s eggs in one nest, nor even heard of their laying three eggs.” I visited the locality last season, but the majority of the birds had not commenced to lay their eggs, being unusually late in that respect. I did not actually see any Roseate Tern take food from the commoner species, although I watched several of the birds circling and wheeling about for minutes together. This may be accounted for by the fact that they were not busy with nesting operations, and that this robbery is practised much more when the eggs are hatched, even if they do not then obtain all their food in that manner. Whilst in the district I made all enquiries I could respecting this alleged habit of the Roseates, and could get nothing but corroboration, sometimes even without seeking it. One of the local names for this bird is the “Rosette” Tern, probably only a corruption or a misunderstanding of the word “Roseate,” and sometimes it is called the “Rosy” Tern; but another local name used more among the natives who know the species is the “pirate” bird, from its habit of robbing the other Sea-swallows. One man with whom I am acquainted, and who has lived near this habitat of the Roseate Terns for eight years, told me he was certain he had seen these birds snatch food from the other Terns very

frequently, but said it was chiefly done when they had young to feed. I do not know anyone who has had such opportunities of observing this species as my informant, or who is better acquainted with the bird or its habits in the summer season. I also questioned one of the oldest inhabitants—a seafaring man—who I have no doubt has been in the nesting locality of these birds more often than any other living man, and he is convinced the Roseate Tern does rob the other Terns of the small fish they carry in their bills from the sea. Several other men likely to know told me the same. Another striking piece of evidence is as follows:—Whilst I was watching a man repairing a small steam yacht, he remarked to me, “Well, have you been to see the pirates to-day?” That was just after my first visit to the colony in company with the owner of the above mentioned yacht, and it was the first time I had heard the birds spoken of as “pirates.” The term had to be explained somewhat before I really understood what was meant. I shall be glad to learn whether any reader can confirm or refute this allegation.—E. G. POTTER (14, Bootham Crescent, York).

Iceland Gull at Scarborough.—On Jan. 1st, while fishing from the rocks in the North Bay, I noticed a Gull fly past which I took to be *Larus leucopterus* from its small size and the absence of black on the primaries. A gunner not very far from me shot down the bird as it passed over him, and brought it to me. It was, as I had imagined, an Iceland Gull in the cream-coloured plumage, with the back inclined for slate-grey, which immediately precedes maturity. The tip of the lower mandible was missing, having apparently been carried away on some previous occasion by a shot. The bird had, however, not suffered by the injury, and was in excellent condition. The stomach was empty. I have only noticed this Gull on two previous occasions at Scarborough.—W. J. CLARKE (44, Huntriss Row, Scarborough).

Birds in Kensington Gardens, 1897–1898.—The gradual extermination of most species of birds in London makes it interesting to put on record from time to time those which still exist there, or are to be seen on migration. Mr. Yarrell has somewhere mentioned that in his day seventy-two species frequented Kensington Gardens. During the past two years I have kept a careful note of all the birds which I have happened to see in the Gardens. These I find amount to twenty-seven species. Of these, fourteen species still regularly breed there. The remainder are visitors, some appearing only at the season of migration, but with annual regularity. I have no doubt that more constant or regular observers might contribute to swell the list of visitors, but I have limited my catalogue strictly to birds which I have myself seen, only in Kensington Gardens, and clearly identi-

fied. Perhaps some other readers of 'The Zoologist' will send additions to the list.

Song-Thrush (*Turdus musicus*).—Resident and fairly plentiful, but decreasing gradually.

Blackbird (*T. merula*).—Resident, but somewhat less plentiful than the last.

Robin (*Erithacus rubecula*).—Resident and common.

Hedge-Sparrow (*Accentor modularis*).—A few pairs still resident.

Willow-Warbler (*Phylloscopus trochilus*).—Very regular visitor on migration, and may be heard daily at the end of April.

Great Tit (*Parus major*).—Several pairs still resident, but decreasing.

Blue Tit (*P. cæruleus*).—Resident, and the most abundant of the *Paridæ*.

Coal-Tit (*P. ater*).—Now only a visitor, I think.

Marsh-Tit (*P. palustris*).—A rare visitor. One specimen used to haunt the flower-walk in November, 1898, but, from its plumage, seemed fresh from the country.

Wren (*Troglodytes parvulus*).—Not uncommon; resident.

Starling (*Sturnus vulgaris*).—Abundant and resident. Nests in the hollow trees and buildings round the gardens.

Jackdaw (*Corvus monedula*).—A few pairs frequent the gardens, and nest in the old trees near the Broad Walk.

Carrion-Crow (*C. corone*).—A pair (and sometimes two pairs, I think) nest regularly near Speke's obelisk. In the winter I have seen parties of four or five in the morning before the gardens are disturbed.

Rook (*C. frugilegus*).—Only a visitor since 1893, when for the last time twelve nests were occupied at the north end of the Broad Walk. A few Rooks visit the gardens daily, and on Feb. 2nd, 1898, a pair began a nest in an elm on Palace Green, but soon gave up the work.

Spotted Flycatcher (*Muscicapa grisola*).—Still a regular summer visitor, and very interesting as the only summer migrant which still remains to nest. For the last two years a pair (and, I fear, the last) have had a nest somewhere near the Albert Memorial and Rotten Row.

Swallow (*Hirundo rustica*).—A regular and very common visitor on migration.

Martin (*H. urbica*).—A much less common visitor on migration.

Sand Martin (*Cotile riparia*).—Rare; but, I think, comes regularly every spring.

House-Sparrow (*Passer domesticus*).—Very abundant, and probably increasing. In these mild winters I have seen London Sparrows busy nesting on Jan. 25th. Partial albinos seem increasing in numbers.

Chaffinch (*Fringilla cælebs*).—Not long ago was resident, but now, I think, only an occasional visitor.

Pied Wagtail (*Motacilla lugubris*).—Fairly regular visitor on migration, but only in the early morning. I have seen them in March and December, 1898.

Yellow Wagtail (*M. raii*).—Very rare on migration. I saw a party of five near the round pond early on April 27th, 1898, but they had departed by 8 a.m.

Swift (*Cypselus apus*).—Rare visitor on migration. I saw four hawking over the pond on the afternoon of Aug. 8th, 1898, when the gardens were crowded with people.

Tawny Owl (*Syrnium aluco*).—A pair, I think, of genuine wild birds used to inhabit a hollow tree near the orangery, and hoot loudly at night. They disappeared in the spring of 1897, and I have heard none since.

Wood-Pigeon (*Columba palumbus*).—Abundant and fearless. A few pairs remain all the year, but most depart in winter. They are early breeders, and I noticed them in pairs and cooing loudly in January.

Moorhen (*Gallinula chloropus*).—Resident and nests at the Serpentine. I have seen sometimes half a dozen together, but often all disappear for a time, and, I suppose, visit the other London lakes.

Black-headed Gull (*Larus ridibundus*).—A winter visitor from October (or earlier) to April. Large parties often make their way from the Thames, but seldom stay long about the pond. Most of them are birds in immature plumage and very fearless.—HAROLD RUSSELL (Kensington Palace).

Fecundity in Birds.—I have to thank Mr. Storrs Fox for his kindly notice of this subject (*ante*, p. 23). Perhaps he will excuse me if I in turn touch upon one or two points he brings forward. He says, "Birds cannot be *conscious* weeks beforehand that the time for their departure is drawing near." If Mr. Fox was in the habit of keeping caged birds he would realize, I think, that a Nightingale, for instance, feels the approach of the period of migration weeks in advance; it is vaguely restless and unsettled. That it argues logically from this feeling of unrest, I could not venture to infer: what I believe is, that the bird is influenced so that it cannot quietly attempt to nest again. I have found in the case of both winter and summer visitors, that the migratory instinct begins to work upon the bird a month or more before it actually leaves. My caged Bramblings, to give a second example, begin to fret before February is out. Mr. Fox extends my suggestion, "a hen of small size could not well lay more than five eggs," from the Finches and Warblers to the Tits. Again I was relying on cage-bird experiences. I have frequently stimulated Finches to lay more than five eggs, with the result that I have subsequently lost the hen: I have had fourteen eggs from a hen Bullfinch in about five weeks, after which she has died. From a foreign bird, neither Finch nor Warbler, I have had forty and fifty eggs in a season with no apparent resulting injury to the parents.

What I said is, I think, true of Finches, but it can only be extended to other genera with care. Mr. Fox will, I hope, see in another article some notes I had prepared on the other subject he mentions towards the conclusion of his paper, for the kindly criticism of which I am very grateful.—BASIL DAVIES (Lincoln College, Oxford).

AMPHIBIA.

Toad in Nest of Titlark.—On the 14th June last year, when exploring some sandhills in the island of Vlieland, in North Holland, I put a Titlark (*Anthus pratensis*) off her nest, and, on examination, found it contained three eggs, and also what at a first glance I took to be a young bird, and, from its size, perhaps a Cuckoo. On stooping down to examine it closely, I discovered that it was a Toad, and that the bird's eggs were lying on its back. The Toad, on being touched, slowly and deliberately crawled out of the nest, the eggs slipping off its back into the hollow below, and began to bury itself in the sand outside. Inside the nest was an inner rim or ledge, which, from its appearance, looked as if the Toad had rested there some time. Curious to know the effect produced on the eggs, which formed the middle part of this strange sandwich, lying between the breast of a warm-blooded bird and the back of a cold-blooded reptile, I broke one of them, and found it nearly fully incubated and healthy. The Toad was a Natterjack (*Bufo calamita*).—W. H. M. DUTHIE (Row, Doune, Perthshire).

PALÆONTOLOGY.

A Monstrous Dinosaur.—Assistant-Professor W. H. Reed, of the Geological University of Wyoming, has made a great discovery by unearthing the petrified bones of the most colossal animal ever taken from the earth's crust. This fossil monster was a dweller in the Jurassic age, a Dinosaur, measuring nearly 130 ft. in length, and being perhaps 35 ft. in height at the hips and 25 ft. at the shoulders—an animal so terrible in size that its petrified skeleton alone is believed to weigh more than 40,000 pounds. Prof. Reed made the great find last August while prospecting for fossils ninety miles north-west of Laramie, and during the time which has elapsed since then the members of the University have been secretly at work in its restoration. The skeleton of the animal is so vast that its smallest bone yet found is more than a man can lift, and, with two men constantly at work, it is believed that many months will be required before the monster can be placed on the campus at Laramie. Although its restoration is as yet incomplete, still enough of its bones have been disinterred to establish its zoological position, and to place it in geological history as the king of all animals restored from fossil fields. In comparison to a Mammoth, this animal was in size as a horse to a dog. In the known fossil world there is

but one creature that can be compared at all with it, and this would be only as a child beside it. The famous Brontosaur at the Yale Museum, at New Haven, is its only animal criterion of measurement. This was an animal of its own kind, a fellow-creature in Wyoming, where for millions of years they have laid together in the same deposit. The skeleton at Yale was restored in 1879 by Prof. Reed, under the direction of Prof. Marsh. Beside this monster, the largest Dinosaurs of Europe, and indeed the world, have remained since its discovery as only pigmies. For years the geological students have made pilgrimages to New Haven to study and to marvel at its immense skeleton. This monster is believed to have been 70 ft. in length, and to have weighed perhaps 80,000 pounds in life. Prof. Reed says that, although it is practically out of the question to give an accurate idea of a living Dinosaur, he should think that the animal now being restored would weigh in life sixty tons, that it had a neck 30 ft. in length, and a tail about 60 ft. in length, and the cavity of its body, with lungs and entrails out, would make a hall 34 ft. long and 16 ft. wide; the head of the animal is very small for the size of the body. There is no building in Laramie large enough to hold it, and when taken there, it will probably be placed temporarily on the campus. The work of restoring has been greatly interrupted by snow, but it is being carried on as rapidly as possible. For a great number of years Wyoming has been known to contain some of the world's most wonderful fossil fields, the first discovery dating back to 1858, and since 1877 Wyoming has been known to have the petrified remains of the largest land animals that have ever lived.—L. SMALL (777, Lincoln, Denver, Colorado, U.S.A.).

NOTICES OF NEW BOOKS.

The Last Link. By ERNST HAECKEL (Jena); with Notes and Biographical Sketches by HANS GADOW, F.R.S. Adam and Charles Black.

ONE of the most interesting, and certainly most suggestive addresses delivered at the recent meeting of the International Congress of Zoology at Cambridge, was that of Prof. Haeckel "On our Present Knowledge of the Descent of Man." This has now been published in book form, as above; with many "additions and notes" by the Professor's old pupil, Dr. H. Gadow.

Man's place in Zoology is still, as Huxley described it, "the question of questions for mankind"; and if that remark was true in 1863, it is still more pressing to-day, when, as the author most truly observes: "At the end of the nineteenth century, the age of 'natural science,' the department of knowledge that has made most progress is zoology." The position of man in the animal world is now considered with calmness and discussed with urbanity. It was even quite recently, when brought into line with science, or discussed on an old and dear tradition, described, on one side, as "a tale told by an idiot," or, on the other, as a matter of "sound and fury signifying nothing." Both sides have come nearer to each other with further knowledge, and all who study the question now admit the evidence of an evolutionary plan. Whether that plan is simply the result of natural forces, or an evidence of a design beyond our cognition, is a question not for these pages.

We can only summarise Prof. Haeckel's views on this problem. He considers the celebrated fossil *Pithecanthropus erectus*, discovered recently by Dr. Dubois in Java, as a form which connected primitive man with the anthropoid apes, and as indeed the long-searched-for "missing link." That man was "known with cer-

tainty to have existed as an implement-using creature in the last Glacial epoch. His probable origin cannot, therefore, have been later than the beginning of the Pliocene. The place of origin was probably somewhere in Southern Asia."

In the evolution of man Prof. Haeckel is an advocate of the "heredity of acquired characters." In this he is in distinct antagonism with Weismann and his followers. That this is not the crime against Darwinism frequently advanced is to be gathered from the testimony of the Professor, who states that on the three occasions he visited Darwin "we discussed this fundamental question in complete harmony." The following observations seem incontestable. "If one denies with Weismann the heredity of acquired characters, then it becomes necessary to have recourse to purely mystical qualities of germ-plasm. I am of the opinion of Spencer, that in that case it would be better to accept a mysterious creation of all the various species as described in the Mosaic account."

Zoology has only fulfilled her mission in the discussion of this question. For a long time indeed will she foster the study of "man's place in nature." We are not concerned whether science ultimately solves the problem—absolute truth will probably be the ideal more than the goal of our enquiries; but we may rest assured that "the work done in the present century by Lamarck and Darwin will in all future times be considered one of the greatest conquests made by thinking man."

Zoological Results based on Material from New Britain, New Guinea, Loyalty Islands, and elsewhere. Collected during the years 1895-97. By ARTHUR WILLEY, D.Sc. Lond., &c. Parts I. & II. Cambridge: at the University Press.

THIS is what we venture to designate as a real zoological publication, restricting its scope as purely scientific and technical. Dr. Willey made an expedition to the Pacific in search of the eggs of the Pearly Nautilus, an enterprise, in a biological sense, as much, or more, important than many other belauded expeditions. But science is not justified in all her children. This publication is devoted to the description and elucidation of the general

collections made during this expedition, which, we read, "have no claim to completeness, since they were not part of my special object; but new facts relating to such forms as *Nautilus*, *Peripatus*, *Amphioxus*, *Ctenoplane*, *Balanoglossus*, &c., cannot fail to possess a peculiar interest."

The opening memoir is by Dr. Willey on a species of *Peripatus* which he obtained in the island of New Britain. One interesting fact is here brought out, that whereas formerly, and based on our then knowledge, it was a conclusion that the species of *Peripatus* could be arranged in three groups in accordance with their geographical ranges—*viz.* Neotropical, Australasian, and Ethiopian—the new species constitutes the type of a new group which may be designated Melanesian. The biological strength of this paper is beyond the aim of our pages; but it is not by new species that this journey will be alone remembered. Some animals were procured which, though known to science, were unrepresented in our National collection, such as the rare marine Snake *Aipysurus annulatus*, and Prof. Studer's Echinoderm *Astropyga elastica*. The work, as we announced in these pages (1898, p. 376), will comprise five or six parts; and the first and second have as yet only just reached our hands. Consequently, at present, a detailed review is impossible. Already a good staff of naturalists have commenced to contribute; and the names of Arthur Willey, Paul Mayer, G. A. Boulenger, R. J. Pocock, D. Sharp, Sydney J. Hickson, F. Jeffrey Bell, F. P. Bedford, Arthur E. Shipley, J. Stanley Gardiner, F. G. Beddard, and Isa L. Hiles are guarantees of special work by specialists. The work is beautifully illustrated.

Wild Life at Home: How to Study and Photograph it. By
R. KEARTON, F.Z.S. Cassell & Co., Ltd.

THE well-deserved success of the author's last work, 'With Nature and a Camera,' with its beautiful illustrations of animal life, has induced a wide-spread interest in the method of photographing glimpses of nature. In response to many enquiries, as we are told, the present book is intended to clear the way for the increasing number of those who wish rather to possess realistic photographs than the actual birds or nests. A "technical instructor"

would, however, be a misnomer for this publication, for it contains a host of good zoological observations.

Mr. Kearton has a fair word to say for London Cats. "I have recently seen it stated that the birds of London and its suburbs have decreased because of the Cats and increased population. Whilst recognising the folly of hating a dumb animal merely because it carries into operation an inherited liking for one particular kind of food, I must frankly confess that I do not love Cats; and it will be well to bear this avowal in mind whilst reading the following account of my experiences. This year I have known of the following species of birds having nests and eggs within five hundred yards of a Greater London farmhouse, boasting an army of no less than five adult Cats:—Pheasant, Partridge, Carrion-Crow, Missel-Thrush, Song-Thrush, Blackbird, Starling, House-Sparrow, Hedge-Sparrow, Robin, Wren, Barn-Swallow, House-Martin, Chaffinch, Lark, Whinchat, Red-backed Shrike, Yellowhammer, Moorhen, Lapwing, Great Tit, Blue Tit, Kestrel, Turtle-Dove, Whitethroat." Of course the retort is obvious, that these farm Cats were presumably well fed and housed, and that the worst feline marauders are those houseless and starving brutes which, ill alike for themselves and the birds, haunt the crowded abodes of man.

The author also gives his experience on a question now being discussed in these pages as to the nesting habits of the Moorhen. He states that during his residence in the neighbourhood of Elstree, owing to the depredations of Carrion Crows, "I do not think I can call to mind one instance of a Moorhen succeeding in hatching off her first clutch of eggs. The species has to depend for its perpetuation on the growth of reeds and rushes, which the old birds bend over their nests and thus hide their eggs."

The illustrations, as in Mr. Kearton's previous books, are again very charming: photography more than illustrates—it reveals—nature. No longer are her secrets to be portrayed by the imaginative artist; we have now reached the stage of actual representation. In time the traveller must illustrate his books by the aid of the camera, or not at all.

The Fishes of North and Middle America: a Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America, north of the Isthmus of Panama.
By D. S. JORDAN, Ph.D., and B. W. EVERMANN, Ph.D.
Washington: Government Printing Office. 1898.

IN 1897 ('Zoologist,' p. 178) we drew attention in these pages to the first part of this great publication. Part II. has now appeared in the shape of another massive volume, bringing up the pagination to a total of 2183, the number of genera described to 798, while the described species are now no fewer than 2510.

In reading the descriptions of the gorgeous and bizarre colouration of many of these fishes, one cannot but feel that some of our speculations as to the meaning and service of animal colouration will have to be qualified by much apparently different piscatory evidence. How suggestive is the following account of the young of the Garibaldi (*Hypsypops rubicundus*), which are of a dusky scarlet, with intensely bright blue markings. "These brilliant little fishes inhabit only large, deep rocky pools, hiding under the seaweed of ledges, and frequently swimming out into the open water of the pool. They are accompanied by the adult, the usual uniform scarlet colour of which appears a distinct lustreless yellow in the water." The fish is common on the coast of California.

Fossil Medusæ. By CHARLES DOOLITTLE WALCOTT. Washington: Government Printing Office.

THIS is one of the monographs of the United States Geological Survey, and forms vol. xxx. of that series. As the author remarks: "To the biologist the suggestion of silicified Medusæ is a violent attack upon his previous conceptions of such organisms, and the possibilities of their preservation as fossils in any other manner than as faint impressions on fine limestone, sandstone, or shale." They, however, occur in a silicified condition, and have been found to belong to the Jurassic, Permian, and Cambrian faunas. Their mode of occurrence in the Middle Cambrian of Alabama "suggests at once the habit of living on a

muddy bottom in great numbers." This monograph not only describes the American remains, but also those of the Jurassic lithographic limestones of Solenhofen, the Permian fossils of Saxony, and those belonging to the Cambrian age in Northern Europe and Bohemia. With the usual ample, we might almost say lavish, manner with which these American governmental publications are issued, this volume is embellished with no fewer than forty-seven plates.

Birds of the British Isles. Drawn and described by JOHN DUNCAN. Walter Scott, Limited.

THIS volume consists of a reprint of pen-and-ink sketches of British birds, with short descriptive notes, contributed by the author weekly during the last ten years to the 'Newcastle Weekly Chronicle.' From an introduction, written by Mr. Charles Dixon, we learn that the author from his childhood has been a lover of bird-life: "And this seems only natural, for he is the son of Robert Duncan, the Newcastle taxidermist, and was consequently brought up in an ornithological atmosphere, and in a house where the family talk was almost invariably about birds."

Consequently this is neither what may be called exactly a work of science, nor a book of reference. It is, however, a publication which in its lengthy serial form must have drawn many of the ardent Newcastle politicians who read the 'Newcastle Weekly Chronicle' away from the views of both Joseph Cowen and John Morley to a more peaceful study of bird-life.

It is a book that many will buy who have never heard of Howard Saunders or his 'Manual,' and therefore will reach a reading public to whom more scientific ornithology is a stranger.

The work has been revised by Mr. Dixon, and is a real standard of skill and industry combined with a true love of nature.

EDITORIAL GLEANINGS.

THERE will be few zoologists indeed to whom the name of Prof. Alleyne Nicholson is unknown, and by whom his text-books have not been used. We greatly regret to see his death recently announced, and to observe the ranks of the older zoologists gradually thinning. Henry Alleyne Nicholson was born at Penrith, Cumberland, in the autumn of 1844, his father being Dr. John Nicholson, who gained considerable distinction as a linguist and philologist, especially in Oriental literature. The son was educated first at Appleby Grammar School, subsequently at Göttingen, and finally at the University of Edinburgh. At the latter University he gained the Baxter Natural Science Scholarship, and when only twenty-five he was appointed (in 1869) Lecturer on Natural History in the Extra-Mural School of Medicine in that city, an appointment which he held till 1871, when he became Professor of Natural History and Botany in the University of Toronto. This post he relinquished in 1874, when he moved to Durham in the same capacity. In 1875 he accepted the Natural History Professorship at St. Andrews. This post he held till 1882, when he was appointed Regius Professor of Natural History in the University of Aberdeen, and here he remained till the end. We need not enumerate his special work, as it will follow him. For the facts and dates of the above appointments we have relied on "R. L." in 'Nature.'

GEORG HERMANN CARL LUDWIG BAUR was born in Weisswasser, Bohemia, Jan. 4th, 1859, and died very early and mentally exhausted on June 25th, 1898. As a palæontologist and zoologist, his life's work was done in America, and in the January number of 'The American Naturalist' Prof. W. M. Wheeler has given a sympathetic obituary notice of the deceased naturalist, with a list of his scientific publications. These number 144, and perhaps one by which he may be best remembered is that in which he expressed the opinion that "the Dinosauria do not exist." He believed that this group is an unnatural one, and is made up of three special groups of archosaurian reptiles which have no close relation to one another. His other most revolutionary enunciation—one since gaining the assent of many well-known workers—is the subsidence theory. "Dr. Baur rejected the hypothesis of the consistency of continents and oceans, and asserted

that the Galapagos, like the Antilles, were formed by subsidence and not by upheaval, and that they were at one time connected with Central America through Cocos Island. This contention Dr. Baur attempted to prove by showing that each separate island has its own peculiar and harmonious fauna and flora—a condition which could hardly exist if the archipelago were of volcanic origin, and had acquired its plants and animals through accidental importation by means of currents from the mainland.”

ALFRED HART EVERETT, whose name as a naturalist and collector is so connected with the Malayan region, died last June from fever, combined with dropsy, contracted during his last voyages. An obituary notice has just appeared in ‘*Novitates Zoologicae*’ (vol. v. p. 606), from which we extract the following particulars:—Mr. Everett “was born in 1848, on Norfolk Island, where his father held the post of medical officer; but in 1853 his family settled in England, where he was educated. He began to show a strong taste for natural history at an early age, and it was not long before he conceived the idea of becoming an explorer. With this in view he entered the service of the Rajah Brooke of Sarawak. His work on Borneo in nearly all branches of zoology is too well known to require description. From there he made his successful expeditions to the Philippines, and to Palawan and Balabac, collecting chiefly birds for the late Marquis of Tweeddale. Being aware of Mr. Everett’s abilities as a collector, the Editors of ‘*Novitates Zoologicae*’ felt great satisfaction when, during his stay in England in 1894, he offered his services to Mr. Rothschild, and they heartily regret that they are now terminated by his death. Besides collecting birds and insects for the Tring museum, he did much in other branches of natural history during his last voyages. There never was a more ardent zoologist than Mr. Everett, and when on the sick-bed a few days before his death he talked of nothing but birds and mammals, and of zoo-geographical problems and future trips to unexplored islands as soon as he should be strong again.”

ON the afternoon of January 23rd, a large Porpoise was to be seen swimming in the Thames off Blackfriars Bridge, which was watched by hundreds of persons.—*Daily Chronicle*.

“TAXIDERMIST.”—Who is responsible for the invention of this vile phrase? It is not in Johnson’s ‘*Dictionary*.’ I suppose we get it from the French. It would have been easy to suggest a more regular formation, such as “taxidermatist,” or more correctly “dermatotaxist,” or even “dermataxist.” But scientific people are above such matters, and seem to condemn them.—JULIAN MARSHALL (*Notes and Queries*, Jan. 14th).

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OBSERVATIONS ON THE COMMON TOAD (*BUFO VULGARIS*).

By G. T. ROPE.

HYBERNATION.—Toads generally prefer a dry retreat in which to pass the winter. I have several times at that season found them buried in the dry soil at the top of a bank, under a thick thorn hedge. During the summer the shallow tunnels made by the Mole are often appropriated by these batrachians as diurnal retreats, and it seems not improbable that those holes which penetrate farther into the earth may sometimes be utilized as winter habitations. In like manner the burrows of our smaller rodents, those of the Bank Vole in particular, which run for a part of their course in a horizontal direction just beneath the surface-soil, are often tenanted by Toads; and one of these creatures may often be seen comfortably seated within, with its head towards the entrance.

In East Suffolk the period of hybernation appears to begin about the latter end of October, though an occasional individual may be seen moving about later. In the year 1892, near Stalham, in East Norfolk, I observed a full-grown Toad abroad on the 25th of October; and in 1888 a male was noticed hopping about here* as late as the 29th of that month. As is the case with our Common Frog (*Rana temporaria*), the young remain active and lively up to a much later period than the adults, and hybernation

* Blaxhall, Suffolk.

with them appears to be far less complete; indeed, it is not very unusual to find them moving about well into November. In the year 1888, I saw a young Toad of the previous year climbing about among long grass and other herbage as late in the season as Dec. 3rd. Another on the same day, found secreted under a large stone, was quite brisk and lively. On Feb. 9th, 1891, a large female was turned out by the spade at a depth of about four inches, from ground which had been well dug during the previous winter, and was consequently in a comparatively loose state. This Toad sprawled feebly with all its limbs, at the same time alternatively opening and shutting its eyes. Three weeks or a month later it would probably have emerged and been making for water.

BREEDING HABITS.—Though the breeding season of *B. vulgaris* is rather later than that of *R. temporaria*, the former is to be seen abroad almost as early in the year as the latter. Toads have farther to travel to their breeding places than Frogs, as their winter quarters are often far removed from water. Males are often met with on their accustomed spring journey quite at the beginning of March. There is always a marked preponderance of that sex at the commencement of the breeding season, and all the time the Toads remain in the water the males exceed the females in number, though not to the same extent as at first. The former are the first to awaken from their long winter's sleep. In the year 1882, I observed a male Toad making for water as early in the year as Feb. 26th, and in the following year noticed one close to a pond in which many breed on the 28th of the same month. In 1885 one was heard "chirping"* or "piping" in the same pond on March 1st. In the years 1872, '84, and '93, I saw Toads in or near water during the first week in March; while in five other years (1886, '88, '89, '90, and '94) their first appearance abroad, or rather the occasion on which their presence was first detected, has been some time during the second or third week of that month. These dates can only, of course, be considered as approximately indicating the actual first appearance.

Toads usually remain in the water till the middle of April or even later; on one occasion (in 1884) I heard one in a ditch on

* The high pitched note of the Toad can hardly be called a "croak." The word "chirp" seems to express it more accurately.

May 9th. After the spawning season is over they seldom resort to water, except occasionally in very hot weather, or when they are suffering from the attack of a species of fly (*Musca*), which deposits its eggs under the skin or within the nostrils.

The case of the Toad after these eggs are hatched is wretched in the extreme, and has been fully described by the late Mr. Newman in one of the admirable series of articles entitled "Collected Observations on British Reptiles" ('Zoologist,' Sept. 1869, p. 1830).

An irresistible impulse drives these helpless and defenceless creatures forth every spring in quest of water, but a considerable proportion never reach it, but perish by the way from some mishap or other; while others, more or less injured by wheels, hoofs, &c., manage to reach their destination in a maimed and mutilated condition, minus a few fingers or toes, or even a whole limb. The wound soon heals, and, handicapped as they are, they nevertheless make shift to move about in some fashion, both on land and in water. In March the roads near their breeding places are sometimes so crowded with Toads that it is difficult to avoid treading on them. I once counted six males within three square yards, and the next day took four from a small underground cistern not more than a foot square. At this season, before they reach the water, there seems to be a tendency among the males towards assembling in small groups of from three to five or more.

The male at this season is easily distinguished from the female by his smaller size and spare attenuated figure, which presents a strong contrast to the bulky form of his mate. His skin too becomes much smoother and more shining than at other times, somewhat resembling in texture that of the male Frog at the same season, but is not loose and baggy. The muscles of the forearm become much enlarged, and the general colouring is lighter than at other times, often taking a more decided greenish or olive tint. Possibly this may be caused by recent casting of the skin. A hard warty excrescence also is developed on the inner surface of the thumb and first finger. The skin of the female remains rough and warty as at other seasons.

Among a number of Toads spawning in a ditch, I once found a male with two of his toes entrapped and held fast by a small

bivalve—some species of *Sphærium* or *Pisidium*. One of these molluscs had closed its valves upon the inner finger of one of the fore limbs, while another held tightly by the middle toe of one of the hind feet. Yet, seriously impeded as its movements must have been, the Toad was still able to swim after a sorry fashion.

At the same time and place I noticed a very small male which had only one hind leg; all the bones of the corresponding limb were apparently wanting, but the foot was present, though smaller than its fellow, and attached to the trunk by the skin alone.

Our Common Toad has a habit of swimming with the hind legs alone, keeping the fore legs or arms pressed against the sides. The Fire-bellied Frog (*Bombinator igneus*) often adopts the same method.

The casting of the skin frequently takes place soon after the arrival of these batrachians at their breeding places in early spring, but whether the operation is always performed at this season I do not know. In the year 1882, I noticed two females in the water casting their skin on March 20th; and in the following year met with another female thus engaged in April. I have never been so fortunate as to detect a male in the act.

The tadpoles of both Frogs and Toads are excellent scavengers, and the vast numbers which literally blacken the water of many ponds and ditches must be of great use in keeping it pure and wholesome. Decaying matter of almost any sort, animal or vegetable, is greedily devoured by them. I have seen them feeding on the dead bodies of Toads (possibly their own parents), Sticklebacks, and even of tadpoles, as well as on cow-dung which had dropped into the water; also on the soft parts of submerged and decaying leaves of trees and various plants, the veins being left untouched.

Instead of roaming about, as it were, at random in search of food, some degree of unity and method may sometimes be observed in the movements of these vast armies of tadpoles. In the marsh ditches, where they abound, it is not unusual to find two dense streams of them steadily travelling close alongside one another, but in opposite directions; an "up" and a "down" line, in fact, seems to be strictly maintained and adhered to, in order to prevent confusion. I once saw a number of tadpoles,

swimming in a long continuous line, which took the form of a figure of 8. As long as I watched them they kept on steadily tracing this figure, like the dancers in a Scotch reel.

After completing their metamorphosis the young Toads, then hardly larger than the common house-fly, and nearly black in colour, soon begin to change to various shades of brown or dark grey, being always lighter on the under surface. Many acquire a more or less rufous tint, a deep dull brick-red or rust-colour being very frequent. At this stage of their existence they are decidedly pretty and even lively little creatures. Numbers of them may be seen in early summer clambering actively about the wet grass-blades and herbage growing by the pond or ditch where they were bred, but not as yet venturing far from the brink. Owing, however, to their minute size, they often escape notice.

Notwithstanding that the breeding season of the Toad is rather later than that of the Frog (according to Bell the ova are deposited about a fortnight later), the general exodus of the tadpoles of both seems to take place almost simultaneously. For this a thoroughly wet state of the ground is necessary, and, though their departure sometimes occurs much earlier, it is often delayed until the first soaking rain in August. In 1889 some young Toads in this neighbourhood (Blaxhall, Suffolk) had left water by the 27th of June, remaining, however, up to that time among the wet grass close to the ditch from whence they had emerged. On the 11th of July, however, after a heavy rain, young Toads were swarming all over the low meadows, and about the roads and lanes leading from them; but as yet none were to be seen on the higher ground. As these hordes of young batrachians spread themselves abroad over the face of the country, they show a great deal of perseverance and determination in their attempts to surmount such obstacles as bar their progress. It is amusing to watch these little fellows striving manfully to climb an almost perpendicular bank; time after time they come slipping down, but at once resume their efforts with unwearied zeal, and, being good climbers, their perseverance is often rewarded with success. On these journeys their way is beset with many dangers, and their ranks are sadly thinned by numerous enemies—such as Rats, Hedgehogs, various members of the Crow family, Fowls, Ducks, Corn-Crakes, and many other

birds. In game-preserving districts, Pheasants probably clear off great numbers.

The small weak voice of the Toad is occasionally heard at other times than the breeding season, though much less frequently. I noticed it on many occasions in the year 1892, more especially from the beginning of August till October, and heard one calling in a pond in Norfolk as late as the 4th of the latter month. At almost any season, on being taken in the hand, a Toad will occasionally protest feebly against such treatment by means of its voice.

As a rule, batrachians of all kinds, as far as I am aware, breed but once in a year, having a "set time" in spring or early summer devoted to that purpose.* I have nevertheless once or twice at other seasons met with Toads having the altered appearance assumed by these animals at their spawning time.

On the 14th of October, 1882, on a sandy common in Suffolk, I met with a male showing at that time those marked characteristics which I supposed to be peculiar to the season of reproduction. The skin was smooth, shining, and of a greenish tint, the forearm exceedingly thick, and the thumbs furnished with knobs; but in this case they were whitish instead of black. It called out loudly on being taken up.

* There are, however, notable exceptions to this rule regarding the regular recurrence of the breeding season; particularly in the dry climate of Australia, where the spawning time of various Frogs seems to be regulated and determined by the rainfall. Cf. J. J. Fletcher, "Observations on the Oviposition and Habits of certain Australian Batrachians" (Proc. Linn. Soc. N. S. Wales, vol. iv. (ser. 2), p. 357 (1889).

NOTES ON THE SEAL AND WHALE FISHERY, 1898.

BY THOMAS SOUTHWELL, F.Z.S.

AT eight o'clock on the morning of the 10th of March, 1898, the steam sealing fleet left the harbour of St. John's, Newfoundland, under the most favourable auspices, the prognostications as to their probable success, as well as that of the sailing vessels which had preceded them, being cheering in the extreme. A local paper, speaking of the departure of the fleet, says, "never did the voyage begin under more auspicious circumstances." On the 27th of March these sanguine hopes were rudely dispelled, and the whole colony plunged into grief by the news of the most terrible disaster ever recorded in the annals of the Seal fishery. The s.s. 'Greenland' was reported sheltering in Bay de Verd, and the next day she arrived at St. John's with the bodies of twenty-five of her crew which had perished on the ice, and reported twenty-three others as missing, whose bodies were never recovered; many of the survivors being terribly frost-bitten. The cause of this disaster will be briefly explained farther on, but, as may be imagined, such a terrible commencement threw the deepest gloom over what was in other respects a fairly successful voyage. Nor was this the only fatality which had to be recorded, for the 'Leopard' also lost two men, and the 'Mastiff' became a total wreck, her crew, however, being happily rescued.

By virtue of an enactment which came into force in the past season, the steamers were allowed to commence killing on the 12th of March instead of on the 14th, as heretofore, and the season is prolonged to the 1st of May instead of ending on the 20th of April. The sailing vessels also, under certain restrictions, are granted a bounty of 4 dols. per ton; this, it is hoped, may prove beneficial in inducing many vessels which would otherwise remain idle at that time, to engage in the fishery, and thus find employment for both men and ships. By some it is

hoped great advantages may be derived from these concessions, but, as usual, there is considerable diversity of opinion.

Great uncertainty always exists as to the locality in which the breeding Seals will be found, and so entirely does this depend upon circumstances which it is impossible to anticipate with any degree of confidence, that the most experienced are often disappointed in their forecasts. What usually takes place on the east coast seems to be as follows:—Until the last days of February the breeding Harp Seals are found frequenting the neighbourhood of Greenbay and Whitebay, then, their time for reproducing having arrived, they all disappear, going off in search of suitable ice on which to whelp; this, as a rule, they find in about the latitude of Cape Bauld, sometimes comparatively near, at other times farther off the land; they then drift south with the ice borne by the southerly arctic current, which probably expands as its flows. But their progress is by no means an uninterrupted one: many and violent are the storms to which they are exposed, and the ice is driven hither and thither, sometimes comparatively open, at others rafted and piled in inextricable confusion, many of the young Seals perishing owing to the ice-fields on which they lie being broken up. Westerly winds drive the ice off the shore, and easterly winds in the contrary direction, or it may be broken up and more or less dispersed by northerly gales. The weather too is variable in the extreme, the changes being often sudden and unexpected. Hence the difficulty in forecasting the probable position of the breeding pack, and the great risks attending their pursuit when found. The Seals are very sagacious, and it is said of them that when Greenbay and Whitebay are full of ice at whelping time they will not go so far out to whelp as they would if the bays were free from ice, their object appearing to be to get a good stretch of ice between themselves and the land.

The steamers, many of which had deserted St. John's in favour of a more northerly point of departure, have in the past season nearly all returned to that port. Eighteen vessels in all (two less than in 1897) took part in the venture, five of them visiting the Gulf of St. Lawrence, the remainder fishing off the east coast. The latter found the Seals without loss of time some distance to the N.E. of Funk Island, but the state of the

ice was most unfavourable, it being compacted into vast sheets of great thickness, which the vessels were quite unable to penetrate except by occasional openings or cracks, in one of which the 'Mastiff' met with her disaster. An attempt was made by her, on the 14th of March, to reach the main body of the Seals about seventy-two miles N.N.E. of the Funks by passing up one of these lanes of open water, when a sudden change of wind caused the floes to close in upon her, and in less than two hours she sank, crushed by the ice, with 7000 Seals on board. Happily her crew were saved by other vessels in her vicinity.

The story of the 'Greenland' is a sad one. On the 21st of March she had four watches on the ice, consisting of 189 men (out of a crew of 207), recovering panned Seals, of which there were about 20,000; later on she took on board the first watch consisting of thirty-five men, and on proceeding to recall the others the steamer got jammed in sight of the men, who were unable to reach her owing to open water between them and the vessel; at 4.30 the storm broke with such fury that the ship barely escaped foundering. At five o'clock the next day the gale somewhat abated, and they succeeded in rescuing one hundred men, all of whom were frost-bitten, and some badly injured by falls on the ice. The wind then again increased to such a degree that it was impossible to get the boats out. On the 23rd six more men were picked up alive, and sixteen dead. Only one other dead man was subsequently recovered, and on the 26th the search was abandoned and the 'Greenland' bore up for home, seriously damaged, and with twenty-five of her crew dead on board, twenty-three others being missing. The two men lost from the 'Leopard' probably perished from exhaustion, or walked into the water through ice-blindness; a third man was fifty-nine hours on the ice, and in a deplorable condition when rescued. Such a chapter of accidents has never previously been known in the Seal fishery, and the circumstances under which the misfortunes occurred bring forcibly to mind the dangers and hardships owing to sudden atmospheric changes, as well as the personal toil and risk which are experienced in the prosecution of this arduous and perilous occupation.

The young Harp Seals were struck by most of the vessels on the 13th of March, which, falling on Sunday, killing did not begin

till the 14th; and, although found thus early, they were well matured. The patch lay E. and W. along the edges of the ice-sheets, not in the middle of the pans, as is usually the case; and the 'Algerine' reports that when she came up to the main body of the young Harps the noise was so great that orders given on board the ship were heard with difficulty; on the 14th her own crew killed 12,000. The 'Walrus' was equally fortunate in finding the Seals, but in the gale which followed she lost thirty-seven pans, containing some 5000 Seals. The 'Newfoundland' is also said to have lost over 3000 in the same way; and who can tell how many more were thus unprofitably sacrificed? The 'Terra Nova' was the only vessel which secured any appreciable number of Hooded Seals later in the season.

Of the four vessels which went to the Gulf fishery, the 'Panther' ran down the Newfoundland shore in loose ice with the hope of reaching the eastern Harps which are supposed to whelp near Cape Whittle, on the Canadian shore; but, finding the winds unfavourable and the ice getting tighter, ran back again, and was fortunate in finding the Hoods seventy miles E.N.E. of the Bird Rocks, and secured nearly 6000 old and young of these large Seals. The 'Nimrod' and 'Hope' found the young Harp Seals on the 22nd of March off Byron Island, but the 'Kite' and the 'Harlaw,' which went in search of the western Harps, did very badly.

With regard to the Gulf fishery, Mr. Thorburn was good enough to give me the following particulars:—"Westerly winds force the ice on the Newfoundland shore, and those from the east on that of Canada; so that the safest plan is, as a rule, to keep in the centre of the Gulf, where there is almost always a movement in the ice when the tide turns. Capt. Joy, who has been much in the Gulf, informs me that he thinks there are two currents, one going N.E., the other S.W., which meet off Cape Whittle, keeping that part of the Gulf more or less open. I do not think the masters of the Gulf boats make up their minds as to what Seals they are going after until they enter the Gulf and ascertain the state of the ice, and how the winds are. Owing to the prevalence of westerly winds, I do not think the eastern Harps were ever seen last year, and these same winds blew the western Harps, which are seldom got at, towards the Newfound-

land shore and the open Atlantic to the southward of that. They are supposed to whelp fifty miles or so to the westward of the Magdalene Islands on immense sheets, or possibly, even probably, on ice frozen to and extending out a long distance from the Canadian shore. Unless there is a prevalence of strong westerly winds, or an unusually mild spring, these Harps are seldom got in any quantities. Capt. Joy says that the eastern Harps whelp on the ice in the neighbourhood of Cape Whittle, and are driven by the winds up or down the Gulf, or from shore to shore; he also told me that the people on the Magdalene Islands told him that a good many small black [dark coloured?] Seals whelp near there, and that their young take to the water as soon as born. From what he heard, he believes that about 13,000 western Harps were taken by the people on the Magdalene and Byron Islands, and that many Seals were crushed by the ice rafting on these islands."

The total number of Seals taken by the fleet of eighteen steamers, of the aggregate capacity of 5595 tons, and manned by 3802 seamen, was 241,708, of a net value of about £80,000, as compared with 126,628, valued at £32,564, in the previous season; to these must be added some 30,000 taken by the sailing vessels and by the shore fishermen—a very considerable improvement on the last two years.

The 'Aurora' again headed the list with 25,633, closely followed by the 'Neptune' with 25,503. There were five others which secured more than 15,000 each, and another five had more than 10,000 each; the remaining six averaged 5088 each. The most unfortunate were the 'Kite' and the 'Harlaw' (1235 and 778 respectively) which went in search of the western Harps in the Gulf of St. Lawrence. No Dundee vessels were present at the Newfoundland sealing.

In my last year's notes (p. 77), I mentioned that a company called the "Cabot Whale Fishery Company" had been formed at St. John's to prosecute the Fin-Whale fishery off the coast of Newfoundland after the Norwegian fashion. This fishery has been carried on from Snook's Arm (near Cape John in Notre Dame Bay). The season closed early in November, and ninety-two Whales were captured by the 'Cabot,' the only vessel at present employed. Only the blubber and baleen are at present

utilized, and the carcasses are sent adrift; but the Company, Mr. Thorburn informs me, are fitting up premises in Hermitage Bay, where a winter Cod-fishery is carried on, for disposing of the Whales which are still in that neighbourhood, probably for the same reason which proves attractive to the Cod. From the east coast, where the Whales had been very numerous near the shore, they disappeared early in November, but in 1897 they are said to have been more numerous in that locality in November and December than at any other time. Three different kinds of Whale are said to have been killed by the 'Cabot,' but I have not been able to ascertain the species farther than that they are reported as "Finbacks" and "Hump-backed" Whales.

The Seal fishery in the Greenland Seas, so far as the Dundee vessels is concerned, has practically become a thing of the past, and, such as it is, has almost drifted into the hands of the Norwegian vessels. Only the 'Polar Star' and the 'Balæna' were present last season; the former killed fifty Seals, and the latter about 400, but later in the season this number was increased to 716. A total of 779 represented all the Seals brought home this season both by the Greenland and Davis Straits vessels. There were twelve Norwegian vessels at the Greenland sealing. I am not aware what the total number of Seals killed by them amounted to, but their success could have been little better than that of the Scotch ships, for I am told the largest catch of the fleet was only 700 Seals. Compare this with a total catch of 37,922, and an average of 2917 for thirteen Scotch vessels in 1883.

The 'Polar Star' and the 'Balæna' were the only two Scotch vessels in the Greenland Sea, and during the whole season not a single Right Whale was seen by either of them. From other circumstances, however, their experiences were of considerable interest. Capt. Davidson, of the 'Polar Star,' finding the ice quite unsuitable for whaling, early in June headed for the coast of Greenland in search of Hooded Seals and Walrus; seventy of the latter, fine old animals, he was successful in securing, but no Seals. "While in lat. 74° N.," says the report of Capt. Davidson's voyage, "with fine weather and light ice, he took his vessel close inshore, and without difficulty landed on a spot only one hundred miles to the southward of the farthest point reached by

the German expedition,* which partly explored this coast. The scenery was magnificent. It was a mountainous country, with smiling fertile valleys clothed with verdure and carpeted with wild flowers and grasses, the air summer-like and balmy; butterflies fitted here and there, bees and wasps hummed from flower to flower, and singing birds made the air resound with merry music. . . . In the valleys were seen large herds of Musk-Oxen† browsing contentedly on the green sward, and hunting expeditions were quickly arranged. . . . The total bag amounted to twenty-four head. It was with regret that a district so charming was left behind for the rigours of the Greenland Sea."

Although perhaps this description may be a trifle florid,‡ it can easily be imagined how charming this arctic paradise must have proved, in such perfect weather, to men who had been for so many weeks pent up on shipboard, anxiously threading their way through the ice-floes. Mr. Kinnes tells me the Musk-Oxen were very numerous,§ and that the crew of the 'Polar Star' killed only those they found straggling on the beach and islands, and did not molest those on the mainland. In latitude 74° 45' N., long. 20 W., an Esquimaux graveyard was discovered, containing the remains of a large number of bodies of both sexes, with implements and weapons; several of these latter were brought home by the crew.

The 'Balæna,' as already said, was equally unsuccessful in her search for Whales; consequently her captain determined to revisit Franz Josef Land in search of Walrus. He arrived at Cape Flora on the 25th of June, and, in spite of bad weather, killed 257 of these beasts; but they were of small size, and con-

* The Danish expedition in 1891-92, under Lieut. Ryder, is probably here referred to. He wintered in Hekla Harbour, Scoresby's Sound, in 1891.

† See also 'Zoologist' for 1890, p. 83.

‡ That this is not overdrawn we have the testimony of Lieut. Ryder, who, on the same coast, found a profusion of animal and vegetable life; Reindeer in "wonderful numbers," many Musk-Oxen, thirty-two species of birds. The richness of the vegetation and the size attained by the plants, he says, was "astonishing." One hundred and fifty flowering plants were found in Scoresby's Sound. In fact, we who have not witnessed it have little idea of the beauty and profusion of the Arctic flora in favoured localities.

§ Through the kindness of Mr. Kinnes, I have been able to secure a good head for the Norwich Castle Museum.

sequently of little value. Returning once more to the Greenland fishing, Capt. Robertson continued his search for Right Whales until the 22nd of August, but without success, and on that day bore up for home.

The absence of Right Whales in the Greenland Seas is to be attributed to the condition of the ice on their feeding grounds; it was not only too far north, but, when found, too light to be attractive to these animals. The fact of the landing of the crew of the 'Polar Star' on the east coast of Greenland, already referred to, is indicative of a very unusual absence of ice on that shore. Farther east, Dr. Nathorst, in the Swedish ship 'Antarctic,' not only made a thorough survey of Bear Island, to the south of Spitzbergen, but visited White Island, the mysterious Wyche's Island (misnamed King Charles's Land), and other islands in the N.E., and was enabled to circumnavigate the whole of the Spitzbergen group in one season, a feat, I believe, never before accomplished. In the longitude of Charles XII. Islands he reached $81^{\circ} 14' N.$ latitude, and is of opinion that had he been a fortnight earlier he might have attained a still higher latitude. Farther west ($4^{\circ} 9' W.$) he found the margin of the Greenland pack-ice in $78^{\circ} 1' N.$ latitude.

The fact of the 'Balæna' and two Norwegian vessels again reaching Franz Josef Land is a sufficient indication of the state of the ice farther east. Capt. Robertson says:—"When there is good ice on the east longitude, we have the best chance of fishing; when we cannot see Spitzbergen from the edge of the ice in lat. $79^{\circ} N.$ during May, it is a poor look-out." Such being the case, the failure of the Whale fishery in the exceptional ice-years we have had of late is not a matter of surprise. The 'Polar Star' brought home with her seventy Walrus, fifty Seals, yielding eight tons of oil, and seventeen Bears; the 'Balæna,' two hundred and fifty-seven Walrus, seven hundred and sixteen Seals, yielding thirty tons of oil, and twenty-two Bears, four of which were alive. The Bottle-nose Whale fishery, which was once so productive, is now quite discarded by the British vessels.

Three vessels, the 'Eclipse,' 'Diana,' and 'Nova Zembla,' left Dundee for Davis Strait, and the 'Active' made an experimental voyage to Hudson Strait, the result of which was one hundred and fifty Walrus and seventeen Bears. In May and June the 'Eclipse'

searched the east side of Davis Strait, working gradually northward; she experienced very adverse weather, gales of wind alternating with calms and dense fogs, and it was not till reaching the "middle-ice," that on the 16th of July she saw her first fish. Whales being abundant in this locality, she remained fishing there, but lost her first two owing to fog; better fortune, however, awaited her, for on the 18th she killed a fine fish of 11 ft. 6 in. bone, and between that date and the 27th had increased the number to five, all killed in the space of nine days. Further search proved vain, and no more Whales were seen by Capt. Milne after that time. Towards the end of August the ice began to mass in the Straits, and the 'Eclipse' had some difficulty in running south; but on the 7th September she bore up for home, accomplishing the passage in thirteen days. The 'Eclipse' had on board five Right Whales, twenty-three Walrus, and fifteen Bears (one of which was captured alive), producing 72 tons of oil and 90 cwt. of bone, a cargo worth something like £7000.

The 'Diana' was not so fortunate as the 'Eclipse'; she encountered the same heavy weather, and, after a visit to Melville Bay, put back to the "middle fishing," where she was successful in killing one good fish early in July; but, although several others were seen, this was the only one which fell to her lot. Proceeding to Elwin Bay, White Whales were found to be numerous, and 450 were killed up to the 16th of August, when search was made on the north side of the Sound for Walrus, but, owing to bad weather, with small success. Pond's Bay and Scott Bay were full of ice, and the 'Diana' was headed for Godhavn, which she reached on the 6th of September, and two days after bore up for home, reaching Dundee after a fine passage of fifteen days, with one Right Whale, four hundred and fifty White Whales, eighty large Walrus, and five Bears, one of which was alive. The yield of oil was 94 tons, and 22 cwt. of bone.

The 'Nova Zembla' was still less successful, and lost valuable time on two occasions beset in the ice; her only good fortune was in Prince Regent's Inlet, where she killed five hundred and thirty-three White Whales, five Narwhals, and nine Walrus. Finally her take was five hundred and thirty-four White Whales, eleven Walrus (one of which was captured alive), and four Bears—yielding 78 tons of oil.

The total catch of the Dundee fleet was 6 Right Whales, 984 White Whales, 591 Walrus, 779 Seals, and 80 Bears, yielding 297 tons of oil and 112 cwts. of bone. The produce is of so miscellaneous a nature that I am unable to estimate its total value, but may say that the present price of whalebone is £1450 per ton (that under six feet long half-price); the oil, all round, £17 10s. per ton; White Whale skins vary from 30s. to 35s. each; and Walrus hides, if very large, may be worth as much as £40 each, or, if small, as little as 5s. each; those taken by the 'Active,' 'Diana,' and 'Polar Star,' I am told, would average about £12 each; but the 'Balæna's,' from Franz Josef Land (as last year), being small and of light weight, were of little value. The Walrus ivory is said to be worth 1s. 6d. to 2s. 9d. per lb., according to size.

My best thanks are, as usual, due to Mr. Michael Thornburn, of St. John's, Newfoundland, and Mr. R. Kinnes, of Dundee, for their kindness in supplying me with the bulk of the statistics embodied in the above notes.

ORNITHOLOGICAL RECORD FROM NORFOLK
FOR 1898.

BY J. H. GURNEY, F.Z.S.
(ASSISTED BY OTHER LOCAL NATURALISTS.)

As usual, with the Editor's permission, I apply myself to the office of coroner for the birds of the county, but am glad to say an East Anglian naturalist's note-book is not such a death-roll as it used to be, except for Hawks and Owls, the law seeming to be a dead letter as regards these birds. A more self-opinionated race than gamekeepers does not exist. One of the fraternity remarked in my hearing that he did not think the Kestrel did much harm, but he added significantly, "It is all the same to me; if I have my gun, I shoot all Hawks." I think all masters should forbid indiscriminate shooting. Surely there is no preserver of game to whom it would not be mortifying to see a beautiful Kestrel swinging in a post-trap, which in its last struggles (perhaps with "Velveteens" looking on) has thrown up a large pellet of beetles' wings; and this was witnessed on the 16th of August, when there was no excuse for setting a pole-trap. The keeper's onslaughts on the Sparrow-Hawk may be pardoned, because this thief is almost entirely a bird-eater, and there is no fear of his exterminating that species while so many arrive both by night and day. They must still be very common somewhere. I do not wish to give the pretty Butcher-bird a bad name, but I have it on pretty good authority that our Red-backed Shrike was again convicted of killing some very small Pheasants at Cromer. This is no surprise to anyone who has seen this strong bird carrying off in its feet a prey half as big as itself, but keepers should know that the large yellow-tailed Humble-bee is its favourite food.

Another deadly robber of game-eggs is the Carrion Crow, but for all that I am glad to say they have again this summer nested by the river at Keswick, though not in their old plantation. We found the nest, which is always a large construction, with a very

substantial foundation of thick sticks, and I think it is more cup-shaped than a Rook's nest. A very few of these birds still keep to our river valleys, but before long they will be as extinct as the Raven. Mr. Caton Haigh tells me they are still abundant in Lincolnshire, as well as the Magpie, which is becoming very rare in Norfolk.

There is another class which is suffering greatly—I mean the marsh birds—which in the past have helped to render Norfolk Broads so attractive by their presence. This great diminution is no doubt in part due to the decreasing area of our Broads, most of which are gradually “growing up”; but still more owing to the number of river yachts and wherries which visit these attractive water-ways, and scare the birds, to say nothing of what has been done to compass their destruction by a well-known dealer in birds' eggs in the West of England.

It is now several years since the Reeve has bred in Norfolk, in fact, not since 1889, when, walking over “Rush-hills,” I found the nest, and was near treading on the four eggs. The last appearance, or rather re-appearance, of these birds in any quantity was in 1893, when for some reason there was an unprecedented passage of waders of all sorts through Norfolk. On May 24th of that year my correspondent, the Rev. M. C. Bird, observed more than twenty Ruffs and Reeves at their old home, some of the males with fine frills, a sight neither he nor any other naturalist is likely to see again.

Coincident with the increase of the Shoveller, the Garganey Teal has become very rare, and the reason is not obvious. The marshman at Sutton has not known of a nest for some years, and I doubt if 1898 saw two nests hatched off in the whole Broad district; while there is no other spot in England where these birds breed. I remember when their eggs were not uncommon at Hickling, but now Mr. Bird's notes from time to time only mention the Garganey as a great rarity compared to the Shoveller, and generally seen in April. Mr. Bird has not been able to definitely ascertain whether any Garganeys have bred in the Hickling district since 1891.

Of another species, the Spotted Crake, formerly very characteristic of the Broads, Mr. Bird, in a recent letter, writes:—“Spotted Rails have not been nearly so frequent of late years;

one at Potter Heigham, on the 5th of October, is the only one I have heard of being shot for some time." It appears that up to twenty years ago Spotted Crakes were pretty numerous, but since September and October, 1881, when there was a migration, they have been steadily decreasing in East Norfolk (*cf.* Mr. Bird's notes, Zool. 1890, p. 457). I am glad to see from Mr. Archibald's communication that it is not the same in Lakeland, and have no doubt the presence of so many visitors on our principal Broads helps to drive them away.

The annexed table is an approximate estimate of the decrease in the Norfolk Broads district of six species in the last forty years, drawn up from fairly reliable sources. The Short-eared Owl is included in the table, but what little evidence there is points to its never having been anything more than a scarce breeder among the Broads.

	1858.	1868.	1878.	1888.	1898.
Ruff (<i>Machetes pugnax</i>).	About 14 nests	About 5 nests	About 2 nests	About 1 nest	0 nests
Bearded Tit (<i>Panurus biarmicus</i>).	150 ,, ?	100 ,,	80 ,,	45 ,,	33 ,,
Garganey Teal (<i>Querquedula circia</i>).	20 ,,	15 ,,	12 ,,	7 ,,	2 ,,
Montagu's Harrier (<i>Circus cineraceus</i>).	6 ,,	5 ,,	3 ,,	2 ,,	1 ,,
Marsh Harrier (<i>Circus æruginosus</i>).	5 ,,	3 ,,	2 ,,	0 ,,	0 ,,
Short-Eared Owl (<i>Asio accipitrinus</i>).	5 ,,	4 ,,	3 ,,	2 ,,	2 ,,

With the extinction of the Ruff, Norfolk loses fifteen breeding species, or, if the Greylag Goose, Savi's Warbler, and Little Bittern are reckoned, eighteen. At the same time it may well be that Savi's Warbler, a bird which leaves its shelter very reluctantly, flying only a short distance, and, dipping down again, to be immediately hidden, is still an annual visitant in very small numbers.

The year has passed almost without a single occurrence of such regular migrants as the Glaucous Gull, Little Auk, Fulmar Petrel, and three species of Buzzard. No Eider Ducks are reported, although Mr. Paynter describes them as having had an unusually prolific breeding season at the Farne Islands. The chief occurrences of 1898 are a Roller, two Little Bustards, four Cranes, and a Ruddy Shelduck. In August there was a large migration of Crossbills, which are not, strictly speaking, autumn migrants. September was far too mild to delay rare birds on passage, which, according to previous experience in open weather, pass over Norfolk; but the common immigrants generally come to us as much in fine weather as in foul, that is, those like the Blackbird, Grey Crow, and Shore Lark, which have no intention of going farther than England.

In October there were marked arrivals of Scaup Ducks, Bewick's Swans, Greater Spotted Woodpeckers, and Goldcrests, the two latter extending far to the northward of Norfolk. Mr. Cordeaux reports "there has been no such arrival of Goldcrests at Humber mouth since 1892"; but it is probable that neither then, nor now, was Norfolk so largely visited as Yorkshire.

November was uneventful, but in December Blackbirds must have poured in, judging from the numbers seen when covert-shooting. A very considerable influx of Kingfishers and Wood-Pigeons took place, and at the end of the month some Woodcocks arrived, in good condition.

It might be expected that immigrants, on reaching our shores, would be more or less exhausted; but, on the contrary, no one who watches Sky-Larks, Crows, Jackdaws, Hawks, &c., coming in from the sea can fail to be struck by the methodical way in which they fly on, and never alight while the eye can follow them. Woodcocks and Blackbirds also, which have evidently only been in England a few hours, are found when shot to be in plump condition, and none the worse for their long voyage.

And now a few words on migration. Without doubt it is the wind and weather in Scandinavia which influence the start of the ordinary autumn immigrants, such as those we have referred to—Woodcocks, Blackbirds, Redwings, and Wood-Pigeons; but in the case of birds which set out from Eastern Russia it is different—*e.g.* the Greater Spotted Cuckoo, Macqueen's Bustard, and

Yellow-browed Warbler. With them it must be the nature of the weather when they arrive in Norfolk, Lincolnshire, and Yorkshire which determines whether they halt or pass on.

A certain number of Russian and Eastern Asiatic birds probably pass over Norfolk and the east coast every autumn, for the most part by night, and at so high an altitude as to be beyond the limits of human sight. As they are not seen their presence is never suspected. Migratory phenomena of this sort only become apparent when brought within our ken by unsettled weather and sometimes fog, as clearly demonstrated by Herr Gätke in his long course of observations on Heligoland.

There is no migrant whose movements can be better observed than the Blackbird's. They come from the east, for the most part in "rushes," from October to Christmas Day, first dropping into turnip-fields with an incredible number of Thrushes, and then swarming in plantations. It is in December and January that Norfolk obtains the old yellow-billed cock Blackbirds, which indicates either that the adults are the last to migrate from Scandinavia, or that, owing to dull plumage and brown bills, these old cocks are not recognized as such by English observers in October and November.

By the 1st of February the northward movement has begun again, almost before the southward movement of individuals nesting in the higher latitudes is over; and, under certain circumstances of wind and weather, it is probable the two streams sometimes amalgamate, or actually cross one another. If any ornithologist possessed of keen sight would go to sea in one of our Yarmouth herring smacks, or obtain the Trinity Board's permission for a week's sojourn on such a floating light-ship as "The Outer Dowsing," or "The Leman and Ower," in the month of October, he could not fail to identify a number of species in transit, especially if the wind was from the west. A wind which the migrants (nearly always to be seen at Cromer arriving from the east) would have to fly against would delay nine-tenths of them until sunrise, or later, when they could be easily identified. Its velocity must be an important factor, and it would probably be found that they choose a high or low stratum, according as they are thereby enabled to minimize its power. By anchoring a boat at a measured distance of half a mile from

the light-vessel, valuable notes might be further obtained on the comparative speed in flight of different species of birds as they passed along. Possibly the Green Woodpecker, Nuthatch, and House-Sparrow, which have not yet been proved to be migratory, would also be identified, and much more might be learnt than we know about the effects of wind. The light-ships of Ireland have added no fewer than six new species to the Irish fauna (Barrington), which shows what is still to be done.

JANUARY.

1st.—Flock of Mealy Redpolls near Cley (H. N. Pashley); a true winter migrant, but whose appearance has nothing to do with severity of weather.

3rd.—A very singular Rook with about half of each wing slate-coloured, including the greater wing-coverts and scapular feathers, which was flying about with other normal Rooks at Eaton, was at first sight rather suggestive of hybridism with a Hooded Crow; but this cross has never been detected in Norfolk or Suffolk.

8th.—Mr. C. Hamond met with two Black Guillemots in Holham "bay," near Wells, at no great distance from the shore.

25th.—A Little Bustard shot at Feltwell (Zool. 1898, p. 125), a migrant probably from the South of France or Spain, as the species is commoner there than in North Africa.

FEBRUARY.

8th.—A wounded Shag picked up at Stiffkey (Pashley), and another disabled by a stone, are almost the only records in my note-book for February.

21st.—Bewick's Swan on Breydon (B. Dye).

MARCH.

9th.—Three hundred Wigeon, with a few Pintails and Shovelers, on Breydon Broad (S. Chambers).

10th.—A thousand Wigeon now on Breydon (Chambers).

13th.—Shag found dead at Yarmouth (Dye).

15th.—A white Blue Titmouse, or nearly white, very busy at a cocoa-nut hung out for these birds in Mr. Digby's garden at Fakenham.

28th.—A Shag brought in from sea (A. Patterson).

APRIL.

2nd.—Jackdaws going seawards (Patterson).

7th.—Mr. Pashley, to whom these annual notes are always indebted, to-day announced the advent of four magnificent Cranes on their spring migration, which halted near the Glaven, and remained all the forenoon of one day (7th) in the same spot, and that within two hundred yards of a gang of men on the marsh side of Wiverton bank. Mr. Pashley had a good view of them as they were flying eastwards, and they were next reported as visiting a piece of water near the sea at Weybourne, where their great size attracted attention. They were again watched for several hours, and subsequently seen at Runton, after which they took their departure. We have not had a visit from a Crane since April, 1888, but the number of occurrences is now brought up to seventeen, of which only two were in the autumn.

16th.—A Spoonbill on Breydon since the 8th (Patterson), which, like the Cranes, escaped.

MAY.

2nd.—A Short-eared Owl's nest with five eggs (but said to have originally contained seven) discovered in a field of rushes not far from the sea in the vicinity of one of our Broads.

5th.—Only one Reeve seen on the Broads up to this date (M. Bird).

16th.—Six hundred Bar-tailed Godwits, in round numbers, and Grey Plovers, with a good many Knots, and fifty Whimbrel, on Breydon mud-flats (A. Patterson and Chambers), and a similar show of waders at Cley and Blakeney (H. Pashley) marked a strong May passage, hopeful for the return in autumn. Mr. Patterson believes that the smaller waders are in search of *Corophium longicornis*, a small crustacean which pushes its way out of the mud; but whatever they eat is difficult of detection afterwards. Simultaneously with the northward movement of waders, two Grebes, supposed to be Red-necked Grebes, were on Wroxham Broad (Capt. Sparrow), and Pied Flycatchers were in evidence at Cley, Holt, Northrepps, Sutton, and Framingham (S. Bligh).

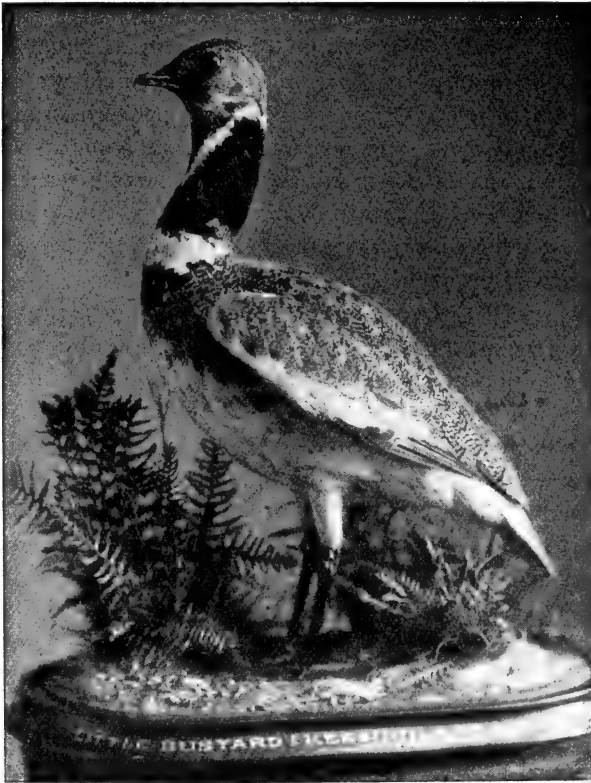
18th.—Lady Lothian has a hybrid Guinea-fowl, the produce of an egg laid at Saxthorpe. It is a very large bird, with some white on the breast, and a good deal of slate-colour about the

wings, and appears to be between a Domestic Fowl and a white Guinea-fowl. A similar hybrid living in the Zoological Gardens is decidedly whiter than the Norfolk one, and even uglier, and in both cases the Guinea-fowl's voice has been noticed. A third, given to the Museum many years ago by my father, and, I believe, not now in existence, was bred between a Game-cock and a Guinea-hen ; but these hybrids must be considered very rare.

24th.—Two Goosanders on Breydon (S. Chambers).

27th.—Two Spoonbills on Breydon (Chambers).

28th.—A Roller picked up at Yelverton (T. Southwell), the twentieth in Norfolk, and a female, as most of the others have been.



Otis tetrix, Linn.

30th.—An adult male Little Bustard, in full breeding plumage, shot, in spite of close-time, at Kessingland, in the north of

Suffolk (T. Southwell), (*ante*, p. 31), about five miles from our border, and since added to Mr. Connop's museum. As it has never been obtained in the British Isles in this attire before (though once taken on Heligoland in June), the accompanying reproduction of a photograph may be acceptable. It was sent to be preserved to Mr. Bunn, of Lowestoft, who, in skinning it, noticed that the neck was large, a seasonal dilatation which in some form seems to show itself in the male of all the Bustards, and which is shown in the cut. Three Kentish Plovers on Breydon mud-flats (Patterson), and a red or "hepatic" Cuckoo at Hickling (Bird).

JUNE.

1st.—Turtle-Dove caught on a smack (Patterson).

4th.—A pair of Avocets halted at Salthouse (their breeding-place up to 1825) for two or three days (Pashley).

9th.—By skill and dint of patience my correspondent, Mr. Bird, at last watched a Short-eared Owl to her nest, situate in a dry marsh of very wide expanse, doubtless similar to the site chosen on May 2nd, where the pointed rush prevails, and is everywhere higher than a man's knee. A few bents of *Carex* or *Juncus*, rather dropped than arranged, constituted the whole nest, which contained only one egg, and on that the female Owl was sitting close as late as 8 p.m.—so close that, being suddenly disturbed, she unfortunately forsook the nest. The nest, such as it was, measured 5 × 6 in., and the egg 1·2 × ·9 in., and by it Mr. Bird picked up two pellets of the bones and fur of a young Water Vole. Another nest subsequently found by Mr. Bird was a forsaken one, containing only a whole egg and a broken one, probably laid by the same pair of Owls. I learn from Mr. Bird that two eggs of the Montagu's Harrier were found at Horsey, and, when searching with him for Owls' nests, we came upon a trodden place in the marsh—in fact, the commencement of a nest—which contained what seemed to be the remains of a dropped or soft-shelled Harrier's egg. The spot was a rough circle within thirty yards of where Mr. Bird found eggs in 1896, and also near to where I was shown a nest in 1883. It is a great pity that these beautiful marsh Hawks continue to be so persecuted, but every man's hand seems to be against them, and I fear the day will come when they and the Owls will be both alike,

as local breeders, extinct. Forty years ago the Broad district could not have held less than a dozen Harriers' nests, but whether the Hen-Harrier bred there is uncertain.

12th.—Spoonbill at Swimecoots (Nudd), probably one of three which left the Blakenny muds on that day (Pashley).

22nd.—Green Sandpiper seen at Hickling by Mr. Bird.

23rd.—A very dark immature Stock-Dove—almost a variety—caught on Snetterton Heath, probably bred in a rabbit-hole; and a Wood-Lark seen at the same time. Although, at Keswick, Stock-Doves have the accommodation of tubs for nesting, a pair this summer chose an uninhabited dovecote in a very frequented place.

25th.—Of thirty netted adult cock House-Sparrows, twelve had the chest-feathers, which are ordinarily black, strongly tinted with chestnut-colour, a phase of plumage not accounted for in any work on British birds. Perhaps the *Passer rufipectus* of Buonaparte.

JULY.

9th.—Green Sandpiper at Intwood, a bird whose presence in summer evidently does not imply breeding.

14th.—A Green-backed Porphyrio, seen in Potter Heigham Sounds by Mr. H. E. Harris, was shot a few days afterwards on Barton Broad, and sent to Norwich. Sutton and Barton Broads are very much "grown up" now, and their dense reed-beds resemble the lagoons of Egypt, where this noble bird—"Dic Sultani" of the natives—used to be so common that thirty could be killed in a day. From Egypt I expect the supplies imported to this country by Cross, Jamrach, and Castang of late years come.

AUGUST. (Mean temperature, 62°6°.)

The first week in August brought bands of Crossbills from over the sea, which were seen simultaneously in four or five sea-side parishes, and immediately afterwards in various places a little farther inland, as from Sandringham (R. Clarke) southwards, and as far inland as Horningtoft. A medlar tree in Canon Venables' garden at Burgh was covered with them, from which they turned their attentions to a bullace and apple trees, and even gooseberry bushes and cherry trees were visited (A. Patter-

son). In one case some were seen on ragwort plants (Gunn). During the first six days of August the wind was west, and it was probably then that they crossed, but on the 7th it was E.N.E. with rain; so it is not very easy to follow their movements, but they seem to be commoner in England than they used to be. Their customary tameness and cry of "gip gip" on the wing was most likely to attract attention, but the recent extension of our county close-time to Aug. 31st saved many, though one or two fell a prey to cats and stones, and one was recovered from a muddy creek. They were not so fortunate on the coast of Suffolk, whence Mr. Gunn received several to preserve, and Mr. Lowne, of Yarmouth, had thirty-two, chiefly red males; but the flight soon passed on. The Crossbill is, and always has been, an irregular bird in Norfolk, even from the days of Sir T. Browne. From 1869 to about 1891 very few indeed appeared, but since then there have been a good many strolling bands, for the most part in June, August, and September. It appears that the present "wave" flowed in other parts of England, the west especially. With regard to the female which bemired itself in a creek, it may have been wounded, as it did not live long. But I remember some years ago hearing of Crossbills which got into a sluice at Swaffham, probably to drink, when the soft mud was like bird-lime to their plumage, and soon led to capture.

18th.—A good adult female Ruddy Shelduck sent up from Yarmouth? (Connop), and an old male Pintail, but in "eclipse" as to plumage, caught by Mr. Partridge on Saham mere. This is the third time Mr. Partridge has had a Pintail on his mere as early as August, significant of these birds breeding somewhere on British soil, unless they were migrants, which is not likely. Pinioned Pintails formerly bred on the lake at Stanford.

SEPTEMBER.

N. wind fourteen days, S. wind seven days, W. wind seven days. Less than a quarter of an inch of rain in the whole month. The 6th, 7th, 8th, and 9th were very hot days, with a fine aurora on the 9th.

The Pheasants, impelled by drought, scraped the dusty soil off potato-beds, and ate considerable portions of the potatoes; and, where turnips were in proximity to their coops, in some

places nothing was left but the ribs of the leaf by the thirsty game-birds. The turnips themselves suffered so much that there was not the requisite cover for Partridges, and beech trees had the appearance of being withered. Three Bearded Tits, driven from their usual asylum on the Broads, or wanderers from Holland, were seen on a pond near Holt, where I never remember any before; and three Egyptian Geese and some Canada Geese were moving about in the vicinity of Cromer, the latter probably from Gunton lake, where the young are seldom pinioned.

On the 31st House-Martins still had young not flown on the steepest part of Runton cliffs, and Mr. Patterson met with Sand-Martins' nests in a hole in the wall. I cannot say whether the drought had anything to do with the choice of such habitations, or with the fact that a Greater Spotted Woodpecker was hewing holes at Keswick as if it had been May. But much later than this there were Starlings' nests, with young in them, at Hellesdon and Keswick.

5th.—Shoveller at Hempstead.

16th.—A Norfolk Plover, with some Lapwings, close to the town of Yarmouth, where eight Spotted Redshanks have lately been shot (E. Saunders).

20th.—Two Ospreys at Filby Broad, the precision with which they caught fish being particularly noticed by the Rev. C. B. Lucas.

OCTOBER.

W. wind ten days, S. wind seven days, E. wind six days, N. wind four days.

Migration now set in with some earnest, and Kingfishers and Greater Spotted Woodpeckers were in evidence. One Woodpecker was among the Wells sand-hills (Col. Feilden), and I met with others alive, and in shops; but perhaps their migration was more marked higher up the east coast. From the observations of Mr. Boyes in 'The Field,' and Mr. Evans in the 'Scottish Naturalist,' Norfolk has not had so many Greater Spotted Woodpeckers since 1868, and that also was a great Crossbill year.

Luscinola schwarzi was shot in Lincolnshire on the 1st, and three *Dafila spinicauda* in Suffolk, but the latter must have

escaped. For the most part rare birds passed on to other countries farther south, but we had most of the regular sorts.

8th.—Seventeen Wild Swans settled on a pond at Felbrigge Park, doubtless all Bewick's Swans direct from Northern Russia, as one shot by Mr. Cremer was of that species, and Bewick's Swan has occurred once in October before. The same, or another, flock was soon after seen at Heigham Sounds, and one taken (Bird); another was obtained at Runton (Fitch), another at Salthouse, and another at Yarmouth (Dye). We have had larger flocks than this, but the date is early; and their tameness on first arrival, and their settling on such a small piece of water about two miles from the shore, points to their having made a long journey.

10th.—Received three live Scaup drakes from Saham decoy-ge, and about the same time there was a sudden abundance of them at the mouths of our rivers and similar places. A Yarmouth game-dealer named Durrant had forty-four hanging up, of which twenty-eight were killed on the 8th (Patterson), and on the same day five at Stalham (Bird). Two were shot at Felbrigge, two at Beeston (Cremer), and one near Keswick (all on ponds), and one at Holkham; and Mr. Pashley was able to account for fifteen, besides which Mr. Gunn received some from Suffolk, and the taxidermist at Lincoln told me he had seven brought him. I have never been successful in keeping the Scaup on my pond long, but one of the birds above mentioned is still in excellent health, and comes readily to be fed with bread.

16th.—Mr. Patterson picked up an immature Black Redstart under the telegraph-wire.

The following notes are from Mr. Patterson:—Golden-crested Wrens trooped in last week. St. George's Park, Yarmouth, was alive with them on Thursday; Cats were on the alert, and accounted for the demise of five on the 15th. The park-keeper saw many Fieldfares and Redwings passing over, and numbers of the latter alighting among the shrubs, exhausted. A Greater Spotted Woodpecker alighted on a fishing-boat, and Rooks and Grey Crows have been crossing plentifully. A Woodcock flew into a tavern in Albion Road, another flew against a window, one was caught in George Street, and another in Yarmouth Cemetery.

19th.—Little Gull at Breydon (B. Dye), the only one reported this year.

27th.—A chestnut variety of the Partridge shot at Bylaugh, and since presented to the Museum by Mr. D'Arcy; about the same time, I was told of three at Elmham, which apparently were not preserved. This is quite as curious and persistent a variety as the Sabine's Snipe, and, not constituting a melanism, is even more remarkable, an excess of red colour being more abnormal than an excess of black.

NOVEMBER.

Exceedingly mild weather all this month.

1st.—A female Scaup, in a very rufous state as regards breast, neck, and head, received from Mr. Patterson, had probably acquired that ferruginous colour from feeding in water where there was oxide of iron. It had been shot when making its last meal, for several *Cyclus cornea* (identified by Mr. Reeve) were in its gullet. On showing it to Mr. Caton Haigh, he said that he had seen one as rufous (*cf.* 'Birds of Norfolk,' iii. pp. 78, 190).

2nd.—Received a Great Grey Shrike which had pounced on a "call-bird" at Downham; this proved an amusing pet while it lived, and further presented an unusual continuation of the black lores in a line across the forehead. I may here mention that in the Museum there is one killed at Ranworth which is quite as dark on the head and back as *Lanius algeriensis*; but this is a genus of varieties. Another Grey Shrike was taken in Yarmouth Gardens (E. Saunders), but we have not had a real Shrike year since 1880.

4th.—Lapland Bunting at Yarmouth (B. Dye), the only one reported this year.

9th.—A Water-Ouzel with a chest-band of brown chestnut, shot at Hillington by Sir W. Ffolkes; the Scotch type is extremely rare in Norfolk, and, if it came from Scotland, is a proof that some migrants do not cross the sea.

10th.—Greater Shearwater at Lowestoft (T. Southwell).

13th.—A chestnut Partridge shot at Cawston (G. Herd), and on the 24th another near Dereham, making six in Norfolk this season, one last year, and three the year before. This is the erythrism—for it can hardly be called a race—which has been known as *Perdix montana* since 1760, and it is not unlikely that

the Norfolk specimens were from eggs laid by Hungarian Partridges, many of which have been turned out in Norfolk during the last few years, and may have produced this breed. On the other hand, as many as twelve were shot in Northumberland as far back as 1863-71, and another afterwards; Hancock does not suggest that they were introduced. It has also been shot in Ireland, and other parts of England and Scotland from time to time; and Mr. Cole tells me that one was killed in Norfolk about twenty-four years ago, which passed through his hands.

14th.—A Coot, which had probably lost its way in the fog, discovered in a horse-pit among houses in Northrepps Street.

16th.—Spotted Crake at Horsey (E. Saunders).

DECEMBER.

12th.—After a high wind from the west thousands of Wood-Pigeons were seen by Mr. Patterson passing over the town of Yarmouth, and on the same day Mr. Haigh noted their abundance in Lincolnshire. About this time there was a great accession to their ranks at Keswick, Hempstead, and other places, and nearly coincident with the visit of the Wood-Pigeons was the arrival of more Woodcocks.

24th.—The unusual sight of four Reeves's Pheasants in Norwich Market is an indication of the introduction of these long-tailed "rocketers" into Norfolk, but at Merton they are being killed off, as they drive about the common ones; and for the same reason I have found it impossible to keep Reeves's Pheasant in the same aviary with Amherst's. Occasionally Reeves's Pheasant will produce a very handsome cross with our Common Pheasant, if the plumage of the latter predominates, and we have a good specimen in the Museum. I believe as much as £50 was given for one of the first pairs of Reeves's Pheasants which came to Norfolk, and several hybrids were bred from them at Earham; but they are not popular, in spite of their long tails.

30th.—Four hundred and sixty-six Coots gathered after the annual Coot battue on Hickling Broad, said to be a record bag for nineteen boats (Bird); the art lies in keeping the line unbroken, and leaving the dead to be picked up afterwards.

31st.—The “Pagets’ Pochard,” taken last year, is still in excellent health, and the breast, which became a dull brown in summer, is again as red as the head. It has never been as tame as the Pochards, which will occasionally even take bread from the hand, and does not dive so much as they do, but has the same peak-like raising of the feathers on the crown. Its back is far darker than a Pochard’s now, and its beak not so white a lavender. Of its hybrid origin there can be no doubt. This cross has received the name of *Fuligula ferinoides*, Bartl., and *F. homeyeri*, Baed., and Suchetet thinks it may also be *Anas intermedia*, Jaubert (cf. Leverk. J. f. O. 1890, p. 223). That it is really between *F. nyroca* and *F. ferina* there cannot be the slightest doubt.

ON THE FIRST PRIMARY IN PASSERINE BIRDS.

BY ERNST HARTERT.

IN 'The Zoologist,' 1898 (p. 241), appeared a very interesting article by Messrs. A. Gardiner Butler and A. George Butler on the presence of the first primary in the *Fringillidæ*, *Motacillidæ*, and *Hirundinidæ*, in which it has generally been supposed to be absent. Most interesting as this fact is to those who did not know it, and valuable as some of the special observations made by Messrs. Butler are, the discovery that the first primary is present in these families is not new.

In 1888 (Proc. Zool. Soc. Lond. p. 664), Dr. Gadow says of those families in which the first primary has been supposed to be absent, "The tenth quill* is, as a rule, reduced to a tiny feather, which is hidden between the 10th covert and outer vane of the 9th quill." From this article we see also that an *eleventh* primary is frequently present in front of the tenth (our "first") primary, but that this eleventh quill is completely lost in many families of Passerine birds.

Dr. Gadow's valuable article has been, it seems, most frequently overlooked by ornithologists, and I myself did not read it before I had discovered the same facts about the first primary. In Novit. Zool. iii. p. 13 (1896), I said:—"I was rather surprised to find that in the so-called nine-quilled (or rather nine-primaried!) Passeres the tenth primary is not always, nay, not even as a rule, and very likely *never*, entirely absent, but only much reduced, and often difficult to find, because stiff and narrow and hidden by its longer covert. From these reduced little feathers to those of *Pholidauges*, *Sturnus*, or *Calornis* is no longer step than from the latter to *Acridotheres*, *Basilornis*, and *Gracula*." . . . On p. 14 I then acknowledged Dr. Gadow's article at length.

The failure to find our "tenth" primary in certain families

* Dr. Gadow calls it 10th, as he begins to count them in the middle of the wing, where they meet the secondary quills.—E. H.

is no doubt due to the impossibility of seeing it from below, and to a certain extent to an omission which is very frequently made in natural history, namely, that only a few forms of a supposed group are examined, and that conclusions about the whole group are made from such scanty observations; from the nature of the point in question, which served to characterize the groups, a certain species is afterwards classified, and thus an everlasting *circulus vitiosus* is entered.

The removal of the under wing-coverts cannot have caused the mistake, as the first primary in most cases where it has been supposed to be absent is lying somewhat above the first functional long primary, hidden by and somewhat assimilated to the primary coverts.

NOTES AND QUERIES.

MAMMALIA.

CHIROPTERA.

Some Habits of Bats.—I have been very much interested in Mr. Oldham's account of the habits in captivity of the Whiskered Bat (*Myotis mystacinus*). I have kept nearly all the British species at various times, and in most things my experiences tally with those of Mr. Oldham. There is one point, however, in which they are at variance. He says (*ante*, p. 52):—"Neither foot nor carpus was ever used in any way to assist it in capturing or holding an insect. The use of either would of course be *quite impossible during flight*." I thought that it was fairly well known that Bats do most certainly use the "thumb" to assist them in rending asunder their prey, and I have frequently observed it in the case of the Noctule (*Pipistrellus noctula*) and the Serotine (*Vespertilio serotinus*). In the case of the latter, which was numerous on the borders of a large forest in North Germany, and which used to come abroad long before twilight, I was often puzzled at first to account for a sudden drop in their flight of several feet, and I put it down to the fact that they saw some insect below them, and dropped on to it; but, on shooting several with a saloon pistol, I actually found the claw of the thumb on one side imbedded in the tough elytra of a cockchafer (*Melolontha*), and dung-beetles (*Geotrupes*), which were held in the Bat's mouth.—OXLEY GRABHAM (Heworth, York).

CARNIVORA.

White Stoat.—I had a white Stoat (*Mustela erminea*) brought in on Feb. 2nd. It is a very good white all over, with the exception of a small brown patch on the top of the head, and of course the tip of the tail. Considering the extreme mildness of the winter, the fact is perhaps worth recording.—W. J. CLARKE (44, Huntriss Row, Scarborough).

Grey Seal (*Halichærus gryphus*) at the Isle of Man.—In June, 1881, in a small unfrequented cove between Port Erin and Bradda Head, I came upon the almost entire skeleton of a very large Seal. I secured the skull, all the important teeth of which were missing, and have carefully preserved it ever since. I have not been able to identify it till a few days ago (February), when Mr. R. Lydekker was kind enough to compare it with

specimens at the South Kensington Museum. It turns out to be, as I had suspected, that of the Great Grey Seal. Mr. Lydekker writes:—"The specimen you have sent is *Halicharus gryphus*, and agrees exactly with one of our examples." Mr. P. M. C. Kermode, of Ramsey, informs me that it has not been hitherto recorded for the Isle of Man.—LIONEL E. ADAMS (68, Wolverhampton Road, Stafford).

RODENTIA.

Albino Squirrel in Wiltshire.—On Nov. 28th I happened to enter the shop of a north-country taxidermist to enquire whether he had had anything interesting in lately, when he produced the most beautiful Squirrel (*Sciurus vulgaris*) I have ever seen. It was pure white, without a dark hair anywhere, very long ear-tufts, and pink eyes. I should have very much liked to have secured it, but he told me that the owner would not part with it; and, on enquiring for data, all I could obtain was that it had been shot in Wiltshire, and the reason he gave for not telling me more, was that it had been shot by a keeper without his master's knowledge, and the man was afraid of getting into trouble.—OXLEY GRABHAM (Heworth, York).

AVES.

Winter Occurrence of Wheatear.—Having had occasion to visit the Nover's Hill Fever Hospital for the last four Wednesdays, beginning from the 1st of February, I have at each visit had the pleasure of observing a Wheatear (*Saxicola ænanthe*) haunting the newly laid-out grounds of that institution. I should imagine it to be a hen bird, as the mantle is still of a very sombre hue. On each occasion its movements have been such as denote complete satisfaction with its surroundings, and a very high distaste for man's proximity. The first time I saw it I made enquiries among the men at work on the grounds as to whether they had noticed the bird at all, but with no result. One man was interested, however, and, on being shown the bird alluded to, expressed his opinion that it was what he called "a Redsturt."—DAVID T. PRICE (2, Upper Byron Place, Clifton, Bristol).

Early Appearance of Chiffchaff in Warwickshire and late Stay of Whitethroat.—The district around the great city of Birmingham is not one which the average ornithologist would look to for unusual migratory movements on the part of birds, but when the fullness of time arrives, I shall, I think, have a tale to unfold which will surprise not a few. Two instances it may be of interest to the readers of 'The Zoologist' to relate now. The season of 1897 was marked in this district for the early disappearance of summer migrants, and long after the last straggler had left I was astonished, during one of my long rambles on the 14th November, to meet with a solitary

specimen of the Whitethroat (*Sylvia cinerea*). The day was warm and beautiful, and the bird busily engaged catching insects in a hedgerow near the water. Nov. 14th is, I think, the latest date on record for the appearance of the Whitethroat in Great Britain. The second instance is that of the Chiffchaff (*Phylloscopus rufus*), which has broken all previous records by appearing at Castle Bromwich this year on the 16th February. Mr. Ernest C. Tye was shooting Lapwings on that date, when he thought he heard the well-known note of the Chiffchaff, but uttered in a low key, and caught sight of a little bird skulking about a bush. Scarcely believing that it could be the Chiffchaff he heard, at such an extraordinarily early period of the year, he brought it down, but with a full charge of No. 6 shot (the smallest shot he had with him), from a 12-bore, with the result that the little bird was terribly mangled. Mr. Tye brought to me this little mass of blood and feathers as proof of his correct identification, and, although it looked like a hopeless case, I determined to save the skin of this record-breaker, and, by dint of much patience, I have made a good specimen of it. I consider the middle of March a very early date for the appearance of this bird in my district; but I have one previous record for the extreme end of February, when I saw a little bird skulking about the lower part of a hedgerow, but in such a manner that I could not get a sufficiently clear view to be absolutely positive whether the bird was Chiffchaff or Willow Warbler; and, as it remained silent, I had to trust to eyes instead of the more satisfactory ears. However, there need be little doubt that it was a Chiffchaff. That February was followed by a beautiful spring, and a hot, dry summer. All the spring migrants came early, and there was a good breeding season. I did not intend to go past these two instances, but I am tempted to add that on the 12th February last I saw Stonechats (*Pratincola rubecula*) at Earlswood. These birds cross this portion of the midlands towards their breeding haunts; and this again is the earliest date by far on which I have seen them here. This, in conjunction with the appearance of the Chiffchaff a few days later, led me to think that an extraordinarily early migratory movement was afloat; and on the 19th February I had a long ramble—I was walking for eight hours—hoping to get a glimpse of other migrants; but in this I was disappointed. However, I was rewarded with the grandest and most varied chorus of bird-song I can recall to memory for such an early period of the year. The following birds were in full and rich song:—Mistle- and Song-Thrushes, Blackbirds, Hedge-Accentors, Wrens, Starlings, Chaffinches, Reed Buntings, Yellowhammers, and Sky-Larks. Great, Blue, Coal, and Marsh Tits were all giving their low calls; while the Long-tailed Tits were paired. A flock of Lesser Black-backed Gulls passed overhead; Woodpeckers were preparing their nesting-holes; Kingfishers darted across my path, and sped before me in

plentiful numbers. The sun was so genially warm that lolling on the grassy banks was a pleasure. Add to this the fact of Stonechats hurrying across to their breeding haunts, and the Chiffchaff with us, and we get a picture for the middle of February, 1899, to which I can find no parallel. It reads more like the middle of April. I do not think that the few frosty nights we have lately had will cause much inconvenience to other Chiffchaffs which may have arrived, as I have seen these birds singing vigorously in backward spring seasons; also in late autumn, when every twig has been thickly covered with hoar frost.—F. COBURN (7, Holloway Head, Birmingham).

I have recently examined the Chiffchaff (*supra*) which was killed at Castle Bromwich by a friend of mine on Feb. 16th last. It was singing, but in very subdued notes. Possibly, owing to mildness of the present winter, it may have wintered with us, or at least in this country; if not, then it is a remarkably early occurrence, seldom being heard in Warwickshire before the third week in March. — J. STEELE-ELLIOTT (Clent, Worcestershire).

Pied Flycatcher in North Wales.—In Capt. Swainson's sketch of the distribution of this species (*Muscicapa atricapilla*) in Wales (Zool. 1893, pp. 420–424) no mention is made of Carnarvonshire, and only two instances of the bird nesting in Denbighshire are cited. To the woods—chiefly composed of oak, ash, and fir—in the Conway and Llugwy valleys, on the border of the two counties, at Bettws-y-Coed, the Pied Flycatcher is an abundant summer visitor. During a short stay in that neighbourhood in the middle of May, 1898, I used to see the birds daily, and so plentiful were they that on more than one occasion I encountered half a dozen pairs in the course of a morning ramble. On the 11th of the month I watched two birds carrying nesting material to a hole about eighteen feet from the ground in the bole of a tall oak in a small wood within a stone's throw of the village street, and saw two more pairs in the same wood. The deliberate but pleasing song of the male, reminding one of a Redstart's, is generally uttered when the bird is stationary, but sometimes during flight from tree to tree. When at rest both sexes constantly move their tails vertically, a habit common to the Whinchat and other birds. In its mode of feeding this species differs in several respects from the Spotted Flycatcher. Although I watched them for hours at a time, I never saw a Pied Flycatcher return to the same twig after darting out to catch an insect on the wing. The bird usually alights on a different branch, and often in another tree. Sometimes it clings Tit-like to a tree-trunk for an instant, and often feeds upon the ground. The chaste and beautiful colours of the plumage are never seen to greater advantage than when the bird hovers,

exactly as the Wood-Wren does, in order to pick off an insect from beneath a broad sycamore leaf.—CHAS. OLDHAM (Alderley Edge).

Regularity of the Greenfinch in beginning his Song.—The following table of dates may be interesting as showing not only how regular this bird (*Ligurinus chloris*) is in opening his song, but how little he is affected in this respect by the weather. Chaffinches, Yellowhammers, and Blackbirds are also fairly regular, but vary, according to my experience, more than this strong and hardy species. The song here alluded to is the familiar long-drawn snore, which is usually accompanied from the first beginning by the equally familiar twitter:—

- 1893, Feb. 18th.—Fine and warm.
 1894, Feb. 20th.—Very cold; thermometer 22° at 8 a.m.
 1895, Feb. 17th.—Bitterly cold, with hard frost.
 1896, Feb. 21st.—Warm and damp.
 1897, Feb. 19th.—Fine and mild.
 1898, Feb. 24th.—Mild, after a few cold days.
 1899, Feb. 25th.—Fine, with cold wind and early frost.

All these observations have been made in Oxford, either in Christ Church Meadow, the Parks, or the Botanic Garden, and before 10 a.m. I may add that, in my opinion, based on many years of observation during January and February, our resident species are not affected in any degree by the temperature, either in regard to pairing or singing.—W. WARDE FOWLER (Lincoln College, Oxford).

Observations on the Habits of a Cuckoo during the Breeding Season.—The case came to my notice last summer, by hearing that a Cuckoo (*Cuculus canorus*) had deposited her egg for a second time in a greenhouse at Gosden House; and, calling on Lady Sitwell, she very kindly took me to see the nest, in which the young Cuckoo was then sitting with open mouth, and evidently well cared for. The Wagtail's nest was in a flower-pot, not quite full of earth, which stood on a shelf about seven feet from the ground; but a short ladder stood by, on which it was easy to stand and look well on to the nest. I saw the gardener, and heard his long story, and I advised him to put it all in writing as soon as possible. He sent me eventually the following account, showing that he is much more observant than most of his class, who have peculiar opportunities for observing the habits of birds, and he deserves, I think, great credit for the record he has kept, which I trust will be supplemented by another visit this year of the same birds.—H. H. GODWIN-AUSTEN (Nore, Godalming).

“I found that the Water Wagtail had started making its nest again last year, in the early part of April. I did not disturb the nest in any way, and I found the old bird had laid four eggs, when she began to sit. One day, when she was off the nest, I looked in, and found that a Cuckoo had laid

an egg. I watched the nest then every day to see when the young Cuckoo was hatched. On May 18th I found the young Wagtails were hatching (there were two young ones and one coming out of its shell). Next day (the 19th) I saw the old Cuckoo around the greenhouse several times in the morning, as if she wanted to get in. I left the door open while I went to my dinner, and when I came back I disturbed the old bird, and I found the three young Wagtails and one egg lying on the shelf; one of the young ones was still alive, and a young Cuckoo in the nest not quite out of its shell. Some people have an idea that it is the young Cuckoo that turns the young birds out of the nest, but it is the old Cuckoo that comes and turns the young ones out; for the young Cuckoo was not quite out of its shell when the Wagtails were lying on the shelf. This is the third year the Wagtail has had its nest in the greenhouse. Last year she brought up two lots of young ones, and two years ago the same as this year. One day there were four young Wagtails in the nest, and the next day they all lay dead on the stage, but a young Cuckoo in the nest; though I did not know it was a Cuckoo's egg, as I thought the old Cuckoo was too shy a bird to enter the greenhouse to lay. When I found the egg this year I kept a good watch to see if I could detect the old Cuckoo feed the young one. It was a common occurrence two years ago to see the old Cuckoo going in and out of the greenhouse by myself and others, including two painters that were at work on the vinery. Close by we saw her with food in her mouth, and I have, with others, kept a good look-out this year to see if we could observe her feed the young one. We saw her many times very close to the door and lights; but I only saw her twice this year, *viz.* on May 22nd, when she came out of the top light at 8.30 a.m., and on June 1st, when I saw her come out of the door at 7 a.m. The old Wagtails still kept feeding the young Cuckoo until it was able to fly. — GEORGE WILLIAMS (gardener to Lady Sitwell, Gosden House, Bramley, Surrey)."

Notes from Reading (1898).—On April 4th I saw, in the flesh, a male Tufted Duck (*Fuligula cristata*), shot on the Thames at Sonning. Crossbills have been very abundant this year at Aldermaston, about eight or nine miles from here; I had a very young one brought to me on May 25th, probably one of a local brood. On April 30th a very fine adult Lesser Black-backed Gull (*Larus fuscus*) was shot at the Clappers, Caversham Lock. On July 27th I saw a family party of Weasels cross a road near Cane End, in South Oxfordshire. Otters seem to be fairly abundant in the river Kennett; I saw a young one alive, caught about Jan. 11th last, which is now at the Zoological Gardens. I have also seen a young and an old one in the flesh lately. On December 16th I saw a young male Garganey (*Querquedula circia*), shot the day before at Theale, a few miles from Reading; weight, 11 oz.; the blue speculum was a lovely bright colour. I presume it was

one of last year's birds from Norfolk. — GEORGE W. BRADSHAW (54, London Street, Reading).

Fecundity in Birds. — Respecting Mr. Basil Davies's very interesting article on the Fecundity in Birds ('The Zoologist,' 1898, p. 495) I should like, if I may, to make a few remarks, and to ask some questions, hoping that Mr. Davies will not resent the liberty I am taking in doing so. In Section I. (dealing with Finches, Buntings, and the larger Warblers) he writes:—"It is not, I think, difficult to see why they respectively lay their five and ten* eggs a season. These birds, resident and migratory alike, feed their young on various forms of insect-life. . . . The two parents would be unequal to catering for the wants of a larger brood than five. Neither could a hen of this size well produce more than five eggs." Now, the fact that insectivorous birds can rear a considerably larger brood than five is clearly demonstrated by the Tits, Wrens, and small Warblers (Chiffchaff, &c.), as is also the fact that a bird of half the size of a Bunting can and does produce more than five eggs. Lower down, in Section II., he writes:—"Another point is that eight young Tits would hardly require more food than five greedy little Robins, and so the labours of the parents in the two species would not differ appreciably." And again, in discussing the smaller Warblers:—"Here again it is no more difficult to feed eight small Warblers than five large ones." Now, it seems to me that, though ten young Golden-crested Wrens (for instance) might not require altogether a greater *quantity* of food than five young Robins, yet, as the minuteness of the food would be in proportion to the smallness of the bird, each young Gold-crest would require to be fed the *same number of times a day* with gnats as a young Robin would with caterpillars (or even more); therefore the ten of them would give their parents twice as much work to do as would the five young Robins. In the introduction to Col. Montagu's 'Dictionary of British Birds' an account is given of a female Gold-crest feeding its eight young ones, which were placed in a cage upon the window-sill. The bird brought food every one and a half to two minutes during sixteen hours of the day. A friend once timed a Robin to and from its young, and found that there was an interval of about ten minutes between the visits. So that, as far as catering powers are concerned, it would seem that a Robin might easily rear more than five young ones. Mr. Davies suggests that our migratory Warblers do not produce a second brood, owing to the near approach of the migration period. This argument is broken down by the Swallow kind, all of which produce a second brood. In Section VI., on Doves and Pigeons, Mr. Davies says:—"I have only the old hackneyed explanation for the unvarying pair of

* The ten here refers to two separate broods of five.—B. R.

eggs laid by these birds, *i. e.* that they are conspicuous among birds for their tender affection for their mates, and that the eggs always hatch out male and female in the same nest." Why should this affection to their mates, or the fact that the two eggs usually hatch out male and female, cause them to lay only two eggs? As a matter of fact, I have frequently known the two eggs of Domestic Pigeons hatch out two males. In discussing Plovers, Mr. Davies makes the statement that in species in which the young are hatched fully formed and able to run, the egg is abnormally large for the size of the bird. Is this so? Roughly speaking, the Pigeon and Partridge are about the same size. The young Pigeon comes into the world blind and perfectly helpless, while the young Partridge is hatched well-formed and able to run; yet the Pigeon's egg is if anything rather larger than that of the Partridge. Again, the young of the Guillemot, which lays as big an egg in proportion to itself as almost any other bird, are hatched in a helpless condition. In Section VIII. I find:—"Owing to the cover afforded by the stems, the young (of Crakes and Rails) need not be so large when hatched as the young of the Plover, consequently the eggs are much smaller, and the hen can incubate a greater number." Why need they not be so large? I should think it would be of more advantage to a young Plover, hatched out in the open, to be small, than it would be to a young Water-Rail, which among the reeds and rushes would not be so easily seen. And then, is a newly-hatched Rail much smaller in proportion to the adult than a young Plover? Lastly, in Section IX., Mr. Davies writes of game-birds:—"I should not be surprised to learn that they were originally less prolific before they were persecuted under the name of sport." It is well known that game-birds are not only not "persecuted" during the breeding season, but that they are perhaps better preserved than any other bird. Are not the large clutches produced by Pheasants and Partridges rather due to the almost semi-domesticated life they lead, and to the artificial feeding, where they are very strictly preserved. This would account for the least-preserved species, *i. e.* the Ptarmigan, laying the smallest clutch. But this is only a suggestion. As an example of a local variation in fecundity, I may quote the Yellowhammer, which hardly ever lays more than three eggs in Fifeshire. I hear that clutches of three are not uncommon in Gloucestershire also. Seebohm gives four to five as the usual clutch of this bird.—BERNARD RIVIERE (St. Andrews, N.B.).

Some interesting Variations in the Plumage of certain Birds.—Chaffinch (*Fringilla cœlebs*).—Plumage white, with the exception of rather more than half the tail-feathers, upper tail-coverts, one primary and one or two secondaries in one wing; also a few feathers scattered over the head, neck, and wing-coverts, which are normal. Besides this there is a faint tint of canary-yellow on the back and secondaries, and the rump is de-

cidedly yellow; bill and legs pinkish horn-colour, and iris dark. The bird (a female) was shot at Poole by Mr. Alan Bengough. Could this be a hybrid between Chaffinch and Canary; and would any of your readers who have seen hybrids between these two species kindly state whether the plumage was anything like this?—Bullfinch (*Pyrrhula europæa*). Plumage pale grey, top of head and the tail dark grey, rump white, iris dark. The bird (a female) was shot at Stoke Gifford by Mr. J. V. Hewitt.—Pheasant (*Phasianus colchicus*). Male; plumage a warm grey, pencilled with a darker shade of grey, very dark on the head and neck; collar white, iris dark grey. The plumage was not at all abraded or worn, but had all the beautiful gloss characteristic of the Pheasant's plumage. It was shot in North Devon.—H. J. CHARBONNIER (Redland, Bristol).

Notes from Point Cloates, North-west Australia, December, 1898.

—As the weather and seasons greatly influence the scarcity or abundance of most birds, I give, first, a brief account of this year's weather. January, until the 20th, was one violent gale of cool south winds. The next four days were extremely hot and close, and on the 25th one of our north-west hurricanes, or "willy willy," brewed up, and spent its greatest violence immediately over here, accompanied by floods of rain. It subsided on the 26th, and was followed, in February, by heavy thunderstorms and rain, so that there was abundance of vegetation and insect-life throughout this locality. Quiet weather succeeded until September, when the usual heavy south winds set in. With the exception of a few light showers there was no rain in the winter. On Jan. 25th, as the wind and rain of the hurricane were commencing, I saw a flock of strange birds hovering over the house. I shot two, and they proved to be Frigate Birds (*Fregata minor*), the first I have seen here. The natives knew them, and said they were the sure sign of violent weather. There were a number of these birds for a few days after the storm. There were countless numbers of Swifts, Pigeons, and other birds flying at a great elevation the day the "blow" commenced. Feb. 21st I shot a Sacred Kingfisher (*Todirhamphus sanctus*) at the house, which, by the way, is situated among sand-hills about a quarter of a mile from the sea, the nearest fresh-water pool being thirty miles distant. Every year I notice one or two of these birds about that date. The same day a native picked up and brought me a Little Eagle (*Hieraëtus morphnoides*) in an emaciated state. It had one small yellow land-crab in its gizzard. The previous night had been one prolonged thunderstorm. I have not seen this bird before March 3rd. I had to pay a visit to an out-station of mine about sixty miles south-east. The intermediate country, where I had never seen water lying, was in many places flooded and boggy. At one spot was a large swamp with numbers of Wild Duck (*Anas superciliosa*),

and Terns (*Hydrochelidon leucoptera*?). Many of the Ducks had young, and I found nests in hollow white gum trees. When returning, I shot a Nankeen Night Heron (*Nycticorax caledonicus*) in a patch of trees some miles from water; the head-plumes were black for three inches from the tip. Gould describes them as white. Next day I found a nest of the Tri-coloured Ephthianura (*E. tricolor*), containing three eggs, and an egg of some sort of Cuckoo, not identified. March 24th, flocks of Swifts (*Cypselus pacificus*) were travelling south. Pied Honey-Eaters (*Lichnotentha picata*) and White-fronted *Glycyphila albifrons* were in abundance; also the Tri-coloured Ephthianura, and a few Yellow-fronted *E. aurifrons*. Swift-flying Turnix (*T. velox*) were everywhere in the luxuriant grass, and I saw several young in down on the 29th. From March 31st to April 2nd countless numbers of Swifts were flying south; and I may mention Cossack and Roebourne, farther in the north-west, were partially destroyed by another hurricane on April 2nd. Turkeys (*Choriotis australis*) were abundant, and often varied our bush meals. April 5th, I visited the nearest pool which is permanent, and situated in a deep rugged gorge in the ranges thirty miles north of this locality. Here I shot a Painted Finch (*Emblema picta*), the first I have seen, and so far this is, I believe, the farthest south and west record. I was climbing up the precipitous cliffs out of the gorge, when it alighted on a ledge below me, and I was obliged to shoot there and then to secure the bird, and unfortunately smashed it; but there was no mistaking the species; its crop was full of small seeds. Gould says he thought its food might differ from other Finches, as its beak is of a different shape. Immediately after I shot a Yellow-bellied Shrike-Thrush (*Collyriocincla rufiventris*) and White-bellied Owlet Nightjar (*Ægotheles leucogaster*), but was unsuccessful in securing another fine Nightjar, though I flushed it several times. April 14th, I shot a male and female Emu-Wren close to a patch of mangroves; they were in company with immature Superb Warblers, and are the only ones I have seen. My correspondent, Mr. A. G. Campbell, of Melbourne, to whom I am much indebted for naming numerous birds, thinks it may be a different species to *Stipiturus malachurus*, as this is such a usually dry country; and I have forwarded him the skins, but not yet heard his decision. April 25th, shot two Sanderlings (*Calidris arenaria*). May 19th, shot a Black-eared Cuckoo (*Misocalius osculans*) on a rocky range here, the only specimen I have seen. May 27th, secured one out of two Barred-tailed Godwits (*Limosa melanuroides*) on the beach. May 29th, shot three Narrow-billed Bronze Cuckoos (*Lamprococcyx basalis*), and saw a considerable number of these birds evidently migrating. Flocks of Yellow Zosterops (*Zosterops luteus*) and immature *Campephaga leucomela* were often seen. The former were to be found until September, and I have no doubt were breeding, but I was not

fortunate enough to find their eggs, nor could I spare the time to hunt for them. The *Campephaga* disappeared in July; they were exceedingly shy. The White-winged Superb Warbler (*Malurus leucopterus*) was abundant this year, and I secured specimens of the Graceful Superb Warbler (*M. elegans*), but they were rare.

On June 10th a curious and, to a flock-owner, startling circumstance occurred. One of the natives brought me a live Rabbit, to know what the strange animal could be. Rabbits are now over the western bush border in numbers in the far south-east; but that is some nine hundred miles distant, and it is strange if they have crossed the continent from east to west without being observed east of here. I went to where the Rabbit was caught, and some distance away found a shallow burrow with numerous recent tracks and beaten roads, with heaps of dung radiating from it. We dug it out, but it was empty, and since then have seen no further sign of this pest. There have been numerous wrecks on the dangerous reefs here both before and after the country was opened out, but the last wreck was fifteen years since, and if Rabbits have been here since then it is extraordinary if the numerous natives never noticed them. Altogether it is a very puzzling affair, but it seems most probable the single specimen secured, which caused much alarm and correspondence, came from some vessel. Practically no visitors call here, so it could not have been turned down by a passing traveller on the road. Towards the end of June I went to look at some wonderful trees of which the natives informed me in a patch of unexplored country. We found them in a small basin of good soil surrounded by bad ranges. They were few in number, but remarkably interesting, being a species of palm tree about forty feet high. I am informed they are the cabbage-tree palm, which only grows in one other part of this colony, so far as is known. I shot on this trip a Delicate Owl (*Strix delicatulus*), and a Boobook Owl (*Spiloglaux boobook*). The former seemed to have fed mostly on beetles. I noted and shot a Collared Parrakeet (*Platycercus semitorquatus*); Rust-coloured Bronze-wing Pigeons (*Lophophaps ferruginea*) in some numbers. Also secured a beautiful clutch of three Osprey's eggs. The Black Honey-Eater (*Myzomela nigra*) and Red-capped Robin (*Petroeca goodenovii*) were not uncommon. Gould thought the latter was only found in the interior. I have several times shot it close to the beach. Delicate and Boobook Owls were often seen in June and July.

July 15th, I secured specimens of Red-backed Kingfishers (*Todiramphus pyrrhopygius*) and Pallid Cuckoo (*Cacomantis pallidus*), and two Jardine's Harriers (*Circus jardinii*). I had long tried to identify a fine slate-coloured Hawk that is fairly plentiful here in good (*i.e.* wet) seasons, but extremely shy. This year I have proved beyond doubt it is that

beautiful bird (Jardine's Harrier), having shot several specimens, and secured nests with eggs and young. As early as April I noticed a pair of these birds building a nest in a small tree about eight feet from the ground. This nest I visited regularly, always seeing the birds, which made slow progress with their work until the end of August, when they forsook it, although the nest was just completed. Aug. 17th, I found a nest of this bird about seven feet from the ground, in a similar tree. It contained three fresh eggs, laid on a lining of green leaves. Aug. 27th, I took one egg from another nest, considerably incubated, and next day took two young, half-grown, from a nest about twenty feet from the ground, in a white gum tree. They would have made most interesting skins, but as my native boy and I were desperately hungry and hunting for food, we lunched off the unfortunates. I always found the crops of those I shot contained Lizards only. My friend Mr. Keartland, who was naturalist for the late unfortunate Wells Expedition, says he found this bird nesting in desert gums in the far interior. Close to the last mentioned nest was a pool of some size, on which were numbers of Coots (*Fulica australis*), Teal (*Anas punctata*), and small Grebes. I shot three Rollers (*Eurystomus pacificus*). This pretty bird is very abundant on the Gascoyne River. Asiatic Dotterel (*Cirripidesmus asiaticus*) appeared in flocks about the middle of September, which is earlier than usual, and are still here on the open plains, and occasionally on the beach. Sanderlings (*Calidris arenaria*) were quite common on the beach since October; I shot five on the 13th. I saw Grey Plover (*Squatarola helvetica*) on the beach in November, but almost always singly. I shot a Golden Plover (*Charadrius orientalis*) last month. On Nov. 23rd I saw a White-bellied Sea-Eagle (*Polioaëtus leucogaster*) busy with something on the beach. On my approach it flew heavily away, with a long object trailing from its talons to the ground. This it eventually dropped, and I found it to be some species of sea-snake new to me, about 5 ft. 6 in. in length and 3 in. in diameter, still alive. I am sorry to say this noble bird will kill lambs and weakly ewes; I have caught it in the act. The same day, after some careful stalking, I shot a wader new to me. It appears to me to resemble a Purple Sandpiper, but it is many years since I last saw this bird in Iceland, when the Rev. H. H. Slater secured a specimen, and we took a nest of eggs on snow-covered mountains. Gould's handbook does not mention this bird, so I am in doubt. One day last winter I picked up, side by side, a dead White-breasted Sea-Eagle (*Haliastur leucosternus*) and Western Brown Hawk (*Hieracidea occidentalis*); they appeared to me to have fought a bitter fight, terminating fatally to both.—THOMAS CARTER (Point Cloates, N.W. Australia).

MOLLUSCA.

Helix cartusiana in Suffolk.—In September, 1898, I found a single shell of this species at Little Glemham, Suffolk, in a small pit where there are veins of chalk in the soil. It was a "dead shell," but in excellent condition, and so fresh looking that it must have been living very recently. To make certain of the species, I submitted it to Mr. G. B. Sowerby, who pronounced it to be a typical specimen of *Helix cartusiana*. The place where it was picked up is some six or seven miles from the coast, and the character of the surrounding country very unlike the usual habitat of this species, it being rather enclosed and fairly wooded. *H. cartusiana* is not included in the Rev. Carleton Greene's list of the Land and Fresh-water Shells of Suffolk, and has not, so far as I am aware, been hitherto observed in any part of the county. In the adjoining parish of Marlesford a small obscurely marked variety of *H. ericetorum* occurs in some numbers. The ground colour is rather darker than in the type, and the banding either entirely absent or only faintly indicated. I have a single shell from Woodbridge of a similar variety, but much thinner, more fragile, and semi-transparent. Throughout a great part of East Suffolk this species rarely, if ever, occurs; Witnesham, near Ipswich, however, is given as a locality in Mr. Greene's list, on the authority of the Rev. J. W. Horsley.—G. T. ROPE (Blaxhall, Suffolk).

BIBLIOGRAPHY.

The Vertebrates of Berkshire.—Are there any lists extant of the vertebrate fauna of the royal county? If so, I should be greatly obliged to any reader or contributor of 'The Zoologist' who would kindly inform me in what publication or publications such lists are to be found. I noticed in the 'Field' a week or two since that in the class Aves upwards of two hundred and fifty species have occurred, including, of course, the rarer visitants.—W. H. WARNER (Fyfield, near Abingdon).

EDITORIAL GLEANINGS.

MR. W. F. R. WELDON, Professor of Zoology at University College, London, has been elected Linacre Professor of Comparative Anatomy at Oxford, in succession to Professor Ray Lankester, resigned, but now directing the Natural History Department of our British Museum.

THE Manchester Microscopical Society does not limit itself too severely to microscopic work. Its 'Transactions,' of which the last Annual Report for 1897 (issued July, 1898) is now before us, contains a number of most interesting natural history communications. Mr. W. F. Keeble gives his "Impressions of Tropical Life" during a stay in Ceylon, from which we extract the following quite original observation:—"One of the strangest sights I ever witnessed was an ant-army marching beneath shields of butterfly wings. The heavy tropical rain which prunes so vigorously the trees, and breaks down branches, leaves, and flowers, had no doubt surprised a flight of butterflies and destroyed them; the ants had found them, disarticulated each wing, and were bearing off the gaudy treasure, though for what purpose I do not venture to suggest."

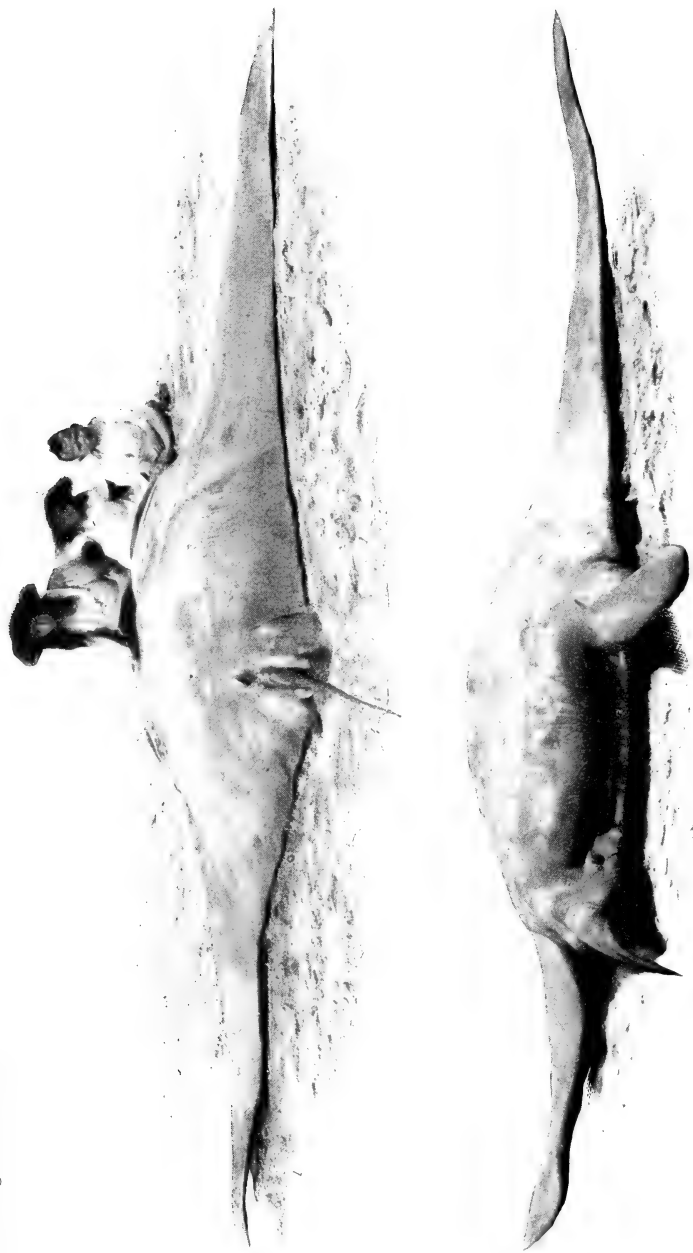
WE extract the following note from 'The Halifax Naturalist' and Record of the Scientific Society, vol. iii. 1898-99:—

NATURAL HISTORY NOTES FROM CHURCHWARDENS' ACCOUNTS.—The following extracts, quoted in the Rev. Mark Pearson's 'Northowram' from 'Ye Olde Towne's Books,' show that Foxes and Polecats formerly existed in the parish, though they are now, and have probably for a long time been, exterminated—

"May 11th, 1677.—The account of Joshua Crowther, Church-warder for ye yeare just past:—June 7th, paid for a Fox head, £00 01s. 00d.

"May 30th, 1688.—John Morris, who was Church-warden last year:—For 8 Urchins (Hedge Hoggs) and 1 Polecat, £00 01s. 06d."

"Hedgehogs, it might be mentioned, are still not uncommon in the district, though not often seen. In the grounds at Warley House they were recently so numerous as to be a pest, and they may be met with in woods in the Ryburn Valley, and about Hebden Bridge."



EAGLE RAY. *Dicerobatis* sp. ?

THE ZOOLOGIST

No. 694.—April, 1899.

ZOOLOGICAL NOTES FROM NATAL.

BY ALFRED D. MILLAR.

(PLATE I.)

A MONSTROUS RAY OR DEVIL-FISH.—In April, 1898, a crowd was seen on the sea-shore at Durban, drawn together by the interesting object represented in the accompanying Plate (I.), a reproduction of a photograph taken by Mr. Burn, of the Natal Drug Company. Some Indians were fishing with their net on the sea-coast when they discovered that something unusually large had come within their grasp, whereupon these men, with great excitement, quickly drew the net shorewards, and, as the waves receded, an enormous Eagle Ray, with its single young, was disclosed to view. The captors smartly fastened ropes to their prize, and anchored it to the shore, gradually drawing it out of the water, but with considerable difficulty.

The measurements taken of this fish were 14 ft. 6 in. across the disc, 6 ft. from head to root of tail, and with a tail 6 ft. in length. In order to turn this enormous creature to be photographed on its reverse side, no fewer than twenty natives were required, thus giving some idea as to its weight, which was roughly estimated at about 15 cwt.

Although several of these monsters have been observed disporting themselves about Durban, this is, I believe, the largest, if not the only specimen of its kind that has been landed on our shores, and it is now preserved and contained in the Durban Museum.

[This is not the first time that attention has been called to these gigantic fishes in the pages of this magazine. In 'The Zoologist' (1849, p. 2358), the late Edward Newman gave an account by Capt. Hamilton of the capture of a specimen in the Gulf of California, which measured nineteen feet across the back. For this unidentified species Mr. Newman proposed the provisional name of *Brachioptilon hamiltoni*, which by Jordan and Evermann, in their 'Fishes of North and Middle America,' is placed as a synonym of *Manta birostris* (Walbaum). This fish, generally recorded under the name of *Ceratoptera vampyrus*, attains a width of twenty feet. Gosse, in referring to this animal under the generic name of *Cephaloptera*, gives a sensational narrative:—"Col. Hamilton Smith, in the neighbourhood of Trinidad, had the pain of witnessing a fellow-creature involved in the horrible embrace of one of these monsters. It was at early dawn that a soldier was endeavouring to desert from the ship by swimming on shore. A sailor from aloft, seeing the approach of one of these terrific fishes, alarmed the swimmer, who endeavoured to return; but, in sight of his comrades, was presently overtaken, the creature throwing over him one of its huge fins, and thus carrying him down." The same writer also gives the following extract from a Barbadoes paper:—"On the 22nd of August [1843] the brig 'Rowena' was lying in La Guayra Roads, the weather perfectly calm. I discovered the vessel moving about among the shipping. I could not conceive what could be the matter. I gave orders to heave in, and see if the anchor was gone, but it was not; but, to my surprise, I found a tremendous monster entangled fast in the buoy-rope, and moving the anchor slowly along the bottom. I then had the fish towed on shore. It was of a flattish shape, something like a *devil-fish*, but very curious shape, being wider than it was long, and having two tusks, one on each side of the mouth, and a very small tail in proportion to the fish, and exactly like a bat's tail. The tail can be seen on board the brig 'Rowena.' Dimensions of the fish were as follows:—Length from end of tail to end of tusks, 18 ft.; from wing to wing, 20 ft.; the mouth 4 ft. wide; and its weight 3502 lb." ('The Ocean,' pp. 193-4).

According to Prof. Seeley, the Ox Ray, or Sea-Devil (*Dicerobatis giorna*) has been captured in the Mediterranean, 28 ft. wide and 21 ft. long, and estimated to weigh a ton. Mr. Lydekker has stated that an Indian representative of *Dicerobatis* is known to measure 18 ft. across the disc, and a weight of over 1200 lb. has been recorded.

Mr. Boulenger (Ann. & Mag. Nat. Hist. ser. vi. vol. xx. p. 227, 1897) has described a new genus and species from Jamaica, allied to *Ceratoptera* (*Ceratobasis robertsii*). The specimen was a young one, but the species is said to grow to a very large size; "but specimens are almost impossible to obtain, owing to the superstitious fear of the fishermen."

The species here figured probably belongs to the genus *Dicerobatis*, but as dentition principally separates that genus from *Cephaloptera*, absolute certainty cannot be obtained from a photograph alone.—ED.]

AN ANTELOPE PROTECTING ITS YOUNG.—There are many instances recorded in which animals have displayed remarkable courage in the protection of their young, and they will frequently expose themselves to imminent danger, though this is common alike

in the higher as well as in the lower orders of animal life. An interesting incident was observed whilst Snipe-shooting at Claremont, near Durban, on the 1st November last. My pointer-dog started a young Reed-buck (*Cervicapra arundinum*), and immediately gave chase. The little buck was apparently but a few days old, and rushed off frantically in the long grass; but the dog soon gained ground, and was just about overtaking it, much to my regret, when the little buck, fearing capture, started bleating. This gave warning to the mother, who, watching us approach, had remained concealed in cover only eighteen inches in height. Immediately the bleating was heard, a fine doe Reed-buck rose within one hundred yards from us, and rushed off gallantly to rescue her young. The dog, not noticing the doe, was in hot pursuit, and within a yard or two of the little fawn, which in a few moments must have fallen to its pursuer. The doe now rushed at full speed, answering her little one's call in a deep guttural note, and, on overtaking the dog, deliberately jumped over it, and whilst in the air kicked out with her hind legs. The dog fell, but whether from fright or through being kicked over—probably the latter—I was unable to detect; however, be that as it may, the dog was so startled at such an incident that he immediately pulled up, and stood staring in wonderment, whilst the mother proudly cantered off with her young, a sight that any sportsman would delight to see.

STRANGE MESSMATES.—In October last I had occasion to watch a pair of Black Saw-winged Swallows (*Psalidoprocne holomelæna*), in order to discover their nest, and was soon rewarded by seeing one of the birds suddenly disappear in the ground carrying grass. On approaching I found a deserted hole of an Ant-bear,* into which the Swallow had gone. These birds frequent the holes of Ant-bears in preference to an embankment when nesting, and the reason may be readily understood when it is seen what protection is thus afforded against their many enemies. Having observed that the bird was then only constructing its nest, I decided to revisit the spot shortly afterwards, when, to my surprise, I found that the Ant-bear had returned home to his old haunt, taking up his abode inside. The ground being much disturbed, with the hole partly closed, it struck me

* Ardvaark (*Orycteropus capensis*).

that the Swallow would not return; consequently I determined to dig down to the nest. Entering the excavation head first, I soon found a small hole about two inches in diameter leading upwards about three feet from the entrance. I started burrowing, when the first thing discovered was a spherical white egg recently deposited on the bare ground. This was identified as the egg of the Natal Kingfisher (*Ispidina natalensis*), the clutch usually consisting of four eggs; and, on going a short distance further in the same hole, I came across the Swallow's nest, with a clutch of three small pure white elongate eggs, the nest being constructed wholly of minute grass-tufts. Both the Swallow and Kingfisher had made use of the same entrance. The Ant-bear I did not attempt to burrow after, this being a task usually ending in fruitless results, as these curious animals can dig faster than any two individuals provided with spades.

A CURIOUS DEPOSIT OF EGGS.—For some time past a pair of Brown-hooded Kingfishers (*Halcyon albiventris*) have frequented my garden, but I was unable to locate their nest. At last, however, I came across one of the birds carrying a grasshopper, which at once led me to understand I was too late, and that the birds were feeding their young. They had nested in the bank of a pit, as is their wont, generally penetrating into the earth about three or four feet. Down this pit an old ladder had been left projecting several feet above the pit's mouth. About a week later, when revisiting the spot, to my surprise and delight I observed four large round white eggs lying on the ground immediately below one of the bars of the ladder, from which the eggs had evidently been dropped. The bird, having young in its nest, was apparently on the horns of a dilemma; it was useless depositing her eggs with the young, and hence the bird quietly disencumbered herself of the superfluous eggs in this easy but somewhat remarkable manner. The clutch of this bird consists of four round eggs, the shells being very thin, while the newly-laid egg has a salmon tint, the yolk reflecting through; but when the egg is blown it becomes pearly white. October is the nesting season.

NOTES ON THE BIRDS OF BELGIUM.

BY O. V. APLIN, F.L.S.

I SPENT a few days in June, 1898 (2nd—10th), in the valley of the Meuse, staying at Dinant, and exploring the main valley from Houx up to Givet just over the French frontier, and parts of the beautiful valley of the Lesse up to Houyet. As the distribution of birds on the European continent has not been very minutely worked out for English readers, a list of those that I saw may be worth printing in 'The Zoologist.' The valley of the Meuse about Dinant and about as far up the river as Hastière is generally narrow. In places the river is closely hemmed in by high ground, rising sometimes so abruptly as to form towering cliffs inhabited by numerous Jackdaws. At other places the high ground falls back, and leaves space for meadows, a stately *château*, a farm, or a village. Where the slopes are gradual their sides are covered with scrub wood of hazel, beech, oak, and juniper; and box and other shrubs clothe the broken parts of the cliffs, which are further brightened, except on their smoothest faces, by trailing ivy, yellow lotus, viper's bugloss, campion, marjoram, wallflower, hawkweed, and rock-rose. Fine plants of blue columbine form an attractive feature on stony banks, while the stinking bear's-foot (*Helleborus fœtidus*), only a doubtful native with us, grows in profusion. Above the valley stretches a rolling, rather bleak arable country, with some resemblance to parts of the Berkshire downs, save that it is ruled here and there with long lines of roadside poplars and pines. Villages nestling among orchards and paddocks are frequent, and the country waved with rye and corn, and was sweet with sainfoin and trefoil. Above Hastière the heights sink away, and the valley spreads out into rich wide meadows, corn fields and orchards, varied by some wooded rising ground. This part of the district is very favourable for many kinds of small birds; at that season it was looking its best, the hawthorns

and some late apples in bloom, and the flowery meadows more sweet with the scent of clover than any I had ever noticed elsewhere. Winding valleys leading from the main one penetrate the high-lying land, their sides thickly clothed with woods of oak, elm, ash, and hazel, with alder in the bottoms by the streams, and varied by birch, rowan, beam, and the lines of spruce firs where the roads cut through the woods. The wild and winding valley of the Lesse, with its rapid river now flowing under spreading branches at the foot of wooded slopes, dashing over boulders or washing the base of some cliff, like that on which the Château Walzin is perched; now passing more peacefully through little meadows where the high ground falls back and leaves space for farms and orchards of apple, walnut, and cherry, is not easy to get about in; like all the wooded valleys and scrub-clothed heights, it abounds in Nightingales. I went to Houyet in order to walk through the Royal Forest of Ardenne (now, I believe, turned into a game preserve for the inhabitants of the hotel, once a royal palace) by the glorious road which winds with bold sweeps to the high ground at Sanzinne (about 260 metres). The forest is of oak, birch, hazel, some beech, a kind of elm, ash, and some patches of spruce. Very fine spruces line the road; the undergrowth is very thick, and there is a fair number of large trees. The forest clothes the sides of a valley rising rather steeply from a tiny stream. Where the stream widens out into ornamental water near Houyet, swarms of Edible Frogs (*Rana esculenta*) were holding high carnival; and on the stony banks of the road, as elsewhere, Lizards were not uncommon on the side which caught the sun. I caught one in another part of Belgium, which appeared to be a brown form of *Lacerta muralis*. It escaped in my garden here; and I turned up another (the green form), bought in London, to keep it company.

Some of the birds which I did *not* see in the district are worth remarking upon; for although I may have overlooked some of them, others are, from their habits in early June, so conspicuous, that I do not think I could have failed to detect them had they been present, or present in any but very small numbers. I failed to see the Missel-Thrush, Redstart, Lesser Whitethroat, Long-tailed Tit, Nuthatch, Spotted Flycatcher, Pied Flycatcher, Gold-

finch, Corn Bunting, Rook, and Kestrel. The Missel-Thrush might have been present, for at that season, with young flown, it is rather a quiet bird. The Nuthatch also becomes much quieter at that season than it is in the spring; I have seen it in October in the woods about La Roche, some thirty miles to the eastward. And the Long-tailed Tit is not usually numerous enough for one to make sure of seeing it during a search of only ten days' duration. The Rook seems to be anything but generally distributed on the Continent. The Kestrel certainly could not have been otherwise than scarce; I expected it would be common about the cliffs. But I hardly think I could have overlooked the other six species. The conspicuous Pied Flycatcher, which to all appearance would have been exactly suited by the hanging woods coming down to a dashing river and orchards in the Lesse valley, is so local in its distribution that one must never wonder at *not* finding it. But I was astonished not to see the familiar grey friend of our gardens. Gardens there were in abundance, but I did not see a single Spotted Flycatcher in the district; at all events it must have been rare, for its ways make it conspicuous. When staying a few days at Mechelen, later on, I found it in the Botanic Garden there. The Common Redstart would not easily be overlooked, but I did not see it in Belgium; though *R. titys* was common. The Goldfinch—conspicuous alike in plumage, song, and call-note—I did not meet with; and the Corn Bunting—which one would at first expect to find enlivening the high-lying, open arable land with its skirling song—remained true to its character of a curiously local bird by shunning the land. But, on considering the matter, I remember that there is an absence of low hedges and walls, as of tall thistle and dock, on this well-cultivated field, so that the Corn Bunting would have no suitable perch whereon to alight after one of those wobbling flights which it delights to take, with its legs dangling. Woodpeckers were scarce. I never saw either the Spotted or Barred (the former I saw once at La Roche in October); and though I occasionally heard a *Gecinus*, I could not even decide for certain upon the species. The Ring Dove and Stock Dove were both scarce; the former curiously so.

Turdus musicus.—Here, as in some other parts of the Continent, a shy forest or woodland species. Three were singing in

the upper part of the Forest of Ardenne; and another on the wooded slope of the valley of the Molignée about Montaigne.

T. merula.—Its haunts are similar to those in this country; common.

Saxicola oenanthe.—A pair on high, open ground, near Sanzinne (about 800 feet), perched several times in young walnut trees and an apple tree in an orchard. I saw a female about a marble quarry close to the Meuse below Dinant.

Pratincola rubetra.—Numerous in the meadows along the Meuse, some way above Dinant.

P. rubicola.—Quite common along the Meuse above Dinant; perhaps drawn away from the bushy hillsides and cliffs by the railway and telegraph wires. Also seen in a bushed gorge leading up from Bouvigne.

Ruticilla titys.—Common, and generally distributed in suitable localities. It is quite a house-bird, frequenting even considerable towns; and during this visit to Belgium I only twice saw it away from buildings. In one case an old male sat on a projecting rock on the cliff face a long way from any houses; in the other, a male was perched on a dead branch of a low bush in the middle of the refuse bank at a marble quarry. In Givet three were singing; one of them from the steeply-pitched roof of the church in the middle of the town. At Hastière one sang from the roof of the old inn; and another from the new brewery chimney. At Hermeton-sur-Meuse, a farm—with its odoriferous cowhouses and yard deep in manure, which it loves so well—had its pair, for each pair seems to have its allotted location, and does not, in the country at least, often admit of very near neighbours. When dwelling in a town amid a waste of steep roofs of all sizes and pitched at all angles, they are rather less exclusive. Stately *château*, vile modern villa, and humble white-walled cottage are alike favoured by this most domestic bird. It dearly loves one of those typical Ardenne villages like Houyet; or long, straight, one-streeted Sommière, where the cowhouse can hardly be distinguished from the owner's green-shuttered dwelling, and the doors of each are alike and side by side, while a rude ladder conducts the hens to a hole in the wall; almost every house is provided with a midden-place in lieu of a front garden, the manure neatly supported by a low wall or a wattle fence. All this results

from the almost universal plan of house-feeding the cows, and is to the advantage of the Black Redstart, for flies and other insects swarm. The male occasionally, when flying from one spot to another, finishes its flight with wings thrown up and tail somewhat spread. Seen thus against a dark background it is a pretty object, the red tail being very conspicuous. Although more than one male was located within easy earshot of my bedroom window in Dinant, it was only in the very early hours of the day—before the dog-carts and trolleys and long, narrow country carts began their frightful rattle and din on the sharp-edged rough stones with which the streets are so vilely paved—that I could hear the song well. But if you are awake at dawn, while it is yet too dark to see the birds, you can hear the song to perfection. The song of one bird, written down there, was sometimes “chy wy wy wy wy (quickly) chee e eo,” or “chich wich wich tich (quickly) itchyty (confused and internal) cheeo weo dee” (clear and sweet). It is, perhaps, the crystal clearness and brightness of the song, with its rather shrill tone, which makes this pure, sweet song carry so far. And it is this characteristic purity and clearness which constitutes its individuality. It is probable that two broods of young may be reared by some pairs. On June 4th full-fledged young sat with quivering, hardly fully-grown tails, on a heap of ancient stones piled up in an angle between the Norman church and the wall in the neglected churchyard at Hastière.

Erithacus rubecula.—A good many seen and heard in the woods; also some in the gardens at the back of the Casino at Dinant, which include a piece of the steep wooded rocky hillside.

Daulias luscinia.—Could be heard from the hotel at night and early in the morning; haunted the Casino gardens and the rest of the wooded cliffs at the back of Dinant, and all possible localities. In the woods it was abundant, and really rather a nuisance sometimes when one was trying to listen to other birds. I listened in one wood to a babel of sound produced by three Nightingales, a Garden Warbler, a Robin, a Chiffchaff, and a Chaffinch, all singing at once, and not far apart. Some young birds were probably hatched by the 3rd, as I heard the sharp “whit” and the croak from one anxious pair, and the croak

from others. Nightingales could often be seen on the roadsides, and were wonderfully tame.

Sylvia cinerea.—Not very common.

S. atricapilla.—In the woods and Casino gardens, &c. The song of some birds seemed exceptionally fine and powerful.

S. hortensis.—Common in the woods, and noticed on the wooded slopes. In fine rich song.

Regulus cristatus.—Appeared to be tolerably common in spruce firs.

R. ignicapillus.—I had a good view of a bright male in a spruce by the side of the road passing through the Forest of Ardenne. It looks rather a longer bird than the last, and is very quick in its ways.

Phylloscopus rufus.—Common in woods, gardens, and wooded cliffs.

P. trochilus.—On the 3rd I noticed several in song in a wooded part of Lesse valley near Walzin; but it was not observed elsewhere.

P. sibilatrix.—In the Forest of Ardenne there were two or three about some oak trees, and I listened for some time to the curious “chit-it-tit-titereeeeeee,” beginning rather slowly and going into a trill. There was another in song in a little oak wood by the Lesse at Houyet.

P. bonellii.—I had a long interview with a pair of Bonelli's Warblers in the Bois de Roquet, near Dinant. The male sang often. The song is a quick, rapid outburst, louder and fuller than a Wood Wren's, but shorter, and with no preliminary slower syllables. It might be lettered “chititereee”—a short outburst, shorter and more rapid than the Lesser Whitethroat's, which it somewhat resembles, but than which it is less loud and metallic. A call-note (that of the male) I noted down on this occasion as a kind of “creech creech creech,” followed by one or two sharp little notes, only sometimes heard. I first became acquainted with this curious note in the high-lying cork and oak forest on the spurs of the Atlas in western Tunisia. It puzzled me greatly at first; but finally I shot a male in the act of uttering it. I find that at that time I noted it down as the call of the male, consisting of five notes, and rendered it thus: “aych aych aych chit chit.” The pair I saw near Dinant frequented some oak trees, and came

low down, so that I got good views of them. Bonelli's Warbler is a coldly-coloured little bird when seen against fresh, young green leaves, and at a little distance shows no yellow tints. The range of this little bird in Central Europe does not appear to be fully worked out at present.

Hypolais icterina.—I met with about half a dozen birds in wooded places, a wood, and a garden. The song is marvellously varied, and the variations seem endless; short phrases are tried over three or four times sometimes, long ones only once: the song is a running one to this extent. It is a very remarkable and striking song, but I do not think it is a fine one, the notes being usually very harsh, and wanting in mellowness and melody. In the space of a quarter of an hour, during which the bird sang continually, I could detect no mocking of other birds. There is a characteristic sound about the song of this bird (shared in some degree by at least two others of the genus *Hypolais*) by which you can recognise it at once; but the bird is sometimes easy to see when you have once made out its greenish-yellow tints against the foliage, and you can note its orange mouth and throbbing throat. Here are some phrases I took down from the song of the bird just mentioned:—"ts'quairk (grating and twangy) tisk tisk; sik sik sik, kik kik kik (high and shrill); tsairk (low and quavering like the cry of young hawks) poo-it poo-it; pit-it pit-it pit-it; tip tip tip; ti-op ti-op; pitch-it pitch-it; kip kip kip care; it-care it-care; ik-waya ik-waya; too-ay, too-ay too-ay; it-tay it-tay it-tay it-tay; wik wik zay" (three times over).

Acrocephalus streperus.—Two or three at some pools near Givet (see below); and one singing in a willow bush on the banks of the Meuse at Houx.

A. turdoides.—Just below Givet, in some flat grassy waste land, there are some large pools, perhaps partly formed by digging material for banking in the river (which is locked). The pools are partly grown up with thick beds of reeds, flags, and other water plants, and thickets of willows of two or three species,—some bushes eight or ten feet high. As I approached the pools, and was still at a considerable distance from them, I was attracted by some notes of a peculiarly guttural song, and as I drew nearer I had no doubt that here was one of the birds I

was hoping to meet with. Here I found these great Warblers in some numbers, and listened to perhaps half a score or more in the limited space I explored. The place was a veritable stronghold for the birds, as, in the absence of a boat, one could not hope to reach a nest, or indeed get very close to the birds. But the loud croaking song could be listened to easily, and could be heard from afar. Not much less conspicuous were the birds themselves, with their dull brown upper parts, reddish-brown tail, and whitish under parts (the contrast between the colours of the head and back and the tail is not very obvious in dried skins, but it is remarkable in the living bird), for they often perched on an upper willow twig, quite high up, or on a flag or reed stem in an open spot. The Great Reed Warbler sits, when singing, in a very upright position, with the point of its bill raised, the bill open as it sings, and the throat throbbing and swelled so that the small feathers part, showing their dusky bases, and the bird appears almost to possess a dusky gular spot. It is a restless, bold, and noisy bird at this season, and often takes flight from bush to bush. The song is very remarkable. The likeness of some notes in it, in character, to those of a Frog is very striking, although they do not exactly resemble those of any kind of Frog with which I am acquainted. The bird's notes are chiefly grating, and often have a guttural tone. These are some notes and phrases which I wrote down:—"Gurk gurk gurk; gurruck gurruck gurruck; ick ick ick ick; gik gik gik (shrill and squeaky); ajik ajik ajik; jirp jirp jirp ik ik; garra garra geek (last note high, and the g hard); gak gak karry karry (the last two notes high). Two or three Reed Warblers (*Acrocephalus streperus*) sang in their leisurely way in some of the thicker willows. Edible Frogs (*Rana esculenta*) in great numbers croaked their loud harsh grating cries, or splashed noisily into the water from spots where they had been sunning themselves. On the grassy land between the pools and the Meuse several Blue-headed Wag-tails ran after insects, or rose with their plaintive "wich-ooo" or "wich-eee" as I passed. Sedge Warblers, haunting the ditch below the river bank, contributed their hurried song, and a few Sky-Larks and Whinchats made up the bird-life in evidence, although visions of small species of the genus *Porzana* and some more secret Warblers made me long for a boat and a week's

search of the reed-beds and lush vegetation of the pools, over which a small species of dragonfly darted and hovered in numbers. I did not find the Great Reed Warbler in any other locality in the Dinant district, but met with it near Mechelen.

A. phragmitis.—Pretty common along the Meuse, especially above Hastière. Often to be seen singing on the wing, flying up high into the air also and then descending singing into a low tree or bush. I could not detect the Aquatic Warbler.

Accentor modularis.—I only saw two; one near the railway at Agimont, the other singing from the top of a roadside spruce in the Forest of Ardenne. Here, as in Switzerland, it does not seem to be the familiar garden bird it is with us. Later on I met with it, however, in the Botanic Garden at Mechelen.

Parus major.—This widely distributed species was on the whole the commonest Titmouse; there were fully fledged young at Houx on the 9th.

P. ater.—I met with some in the Forest of Ardenne, and a pair in the valley of the Lesse near Walzin.

P. palustris.—Seen in the same localities, and in about the same numbers as the last named species.

P. cæruleus.—Frequently seen; almost as common as the Greater Tit.

Troglodytes parvulus.—Frequently seen; Forest of Ardenne, Casino gardens, &c.

Certhia familiaris.—Seen once.

Motacilla alba.—Common. Young broods were on the wing, and, as I could only see these and old males (at least I could not see a bird which looked like a female), I imagine the females were sitting on second clutches. White Wagtails were especially common by the Meuse below Hastière; they often flew about half-way across the river with a dancing flight, about a foot above the surface of the water, to catch flies, and then returned to sit on the road, the low stone posts, or the iron protecting rail.

M. flava.—There were many Blue-headed Wagtails all down the Meuse from Givet, but they were commonest in the wide meadows above Hastière. Some hawked flies over the river, returning to perch near the spot they started from; they usually hawked higher in the air than the White Wagtails. These Wagtails perched habitually in the willows and the young fruit trees

planted along the path by the river. A male without a tail had a most extraordinary appearance.

Anthus trivialis.—Fairly common; about the edges of woods, &c.

Oriolus galbula.—I heard the note of this bird in the Bois de Roquet.

Lanius collurio.—I saw four males and one female. A male flew past one day with a cockchafer in his bill. Having settled on a bare branch, he put the chafer under foot and devoured it piecemeal, giving two or three harsh notes of satisfaction at the finish.

Hirundo rustica.—Not very numerous, and far less so than the next species.

Chelidon urbica.—Abundant. All up the Meuse from Namur, as we approached Dinant on a wet evening, the House Martins were conspicuous over the river, and they were numerous at Dinant, and about a large farm in the Lesse valley. In Givet they were in some numbers, and bred unmolested in the corners of windows, as well as under the eaves. In these towns there are not the swarms of Sparrows that we have. A crowd of Martins were collecting mud at a small pond at Sanzinne, and the same day we found them swarming in Houyet, a typical Ardenne village devoted to cows. It is quite a pleasure to see any number of Martins, for it is some years since I have seen a building well decorated with nests in England.

Cotile riparia.—A small colony in a shallow sand-pit near Agimont. As they were common over the Meuse about Dinant, I supposed that some bred in holes between the stones of the built-up river banks, and other supporting walls where roads had been cut out, for I saw no sandy places in the immediate neighbourhood. Yet all day they skimmed low over the water, and they haunted the river more than either Swallows or House Martins.

Ligurinus chloris.—Seen occasionally.

Passer domesticus.—Did not swarm as with us.

P. montanus.—Seen about young apple trees at Agimont; a pair near Houyet, and others in a garden there. The Tree Sparrow appears to be rather a common bird in Belgium.

Fringilla cœlebs.—Common; in the roadside trees in the

Forest of Ardenne, for instance. Many are kept caged in towns and villages, and sing very loudly; all that I examined were blind. The Chaffinch here sings a long and good strain. The first part is long, although usually rather sibilant; the second part is loud and full. The fact that the song of the Chaffinch differs (more or less) in different districts was remarked upon long ago by Humboldt, who, writing of the Canary of Montaña Clara, says:—"The note of these birds varies with their flocks, like that of our Chaffinches, which often differs in two neighbouring districts" ('Personal Narrative,' vol. i. p. 39).

Linota cannabina.—Common about bushy cliffs and box-clad gorge, as well as by the river.

Pyrrhula europæa.—I met with a pair in a wood bearing the curious name of Bois de Froide Veau (so in the map), and another in the valley of the Molignée.

Emberiza citrinella.—Seen about the arable land, and bushed gorge above Bouvigne.

E. schœniclus.—One by the Meuse.

Sturnus vulgaris.—A few near Dinant.

Garrulus glandarius.—Two in the Forest of Ardenne, one of which was making a queer attempt to sing, or rather to chant.

Pica rustica.—Occasionally seen.

Corvus monedula.—Numerous; they haunt, among other places, the cliff under the Château Walzin, various bare cliffs along the Meuse, the old Norman church at Hastière, and the ruins of the Château Montaigle, on an isolated rock rising straight from the Molignée.

C. corone.—Seen about the cliffs and wooded heights along the river, and in the Forest of Ardenne.

Alauda arvensis.—Fairly common on the open arable land, and some near Givet.

Cypselus apus.—A fair number about Dinant, and Swifts were to be seen about high cliffs here and there between that place and Givet. In Givet the Swift was the ruling species, and abundant.

Iynx torquilla.—Heard twice in the distance.

Gecinus —?—I heard several times the note of a Green Woodpecker in the woods and forest, but never saw the bird. On some occasions the laugh seemed deep in tone, as if it proceeded from *G. canus*, but this is uncertain.

Alcedo ispida.—One crossed the Meuse with a silvery fish crosswise in its bill.

Cuculus canorus.—Common. On one occasion three in close company crossed a road leading through a wood.

Syrnium aluco.—The remains of one lay by the roadside in a wood.

Athene noctua.—On two occasions I heard what I believe was the note of this bird, in woods.

Buteo vulgaris.—In the Forest of Ardenne I watched one soar up out of sight; saw another mobbed by Crows, and heard the wailing cry on two occasions.

Columba palumbus.—Strangely scarce; two only seen flying along wooded heights across the river.

C.enas.—One in the distance flying along a wooded slope at Houyet.

C. livia.—I saw a bird exactly resembling a wild Rock Dove about some river cliffs far from any (visible) house.

Turtur communis.—Several in woods.

Phasianus colchicus.—Heard several times in the Bois du Séminaire and the Forest of Ardenne.

Perdix cinerea.—I saw birds twice, once on the high ground at the back of Dinant, and again near Sommière.

Coturnix communis.—I heard a Quail calling from a field gay and sweet with sainfoin and yellow trefoil on the high-lying arable land above Bouvigne.

Ægialitis hiaticula?.—I saw a bird flying in the distance over the pools at Givet, which appeared to be a Ringed Plover.

From the 10th to the 14th of June I was at Mechelen, in the flat rich Flemish country. I made a list of the birds I saw, and it may be worth giving shortly. Those species marked with an asterisk were not met with about Dinant. The sandy land around Mechelen is very highly cultivated, and corn-fields, varied by many acres devoted to the cultivation of asparagus and other vegetables for the great *marché* of Mechelen, stretch away as far as the eye can see. But the country is well wooded with lines of poplars and plantations. There are grass marshes along the tidal, embanked Dyle and elsewhere, and willow and alder along the drains. But the country is densely populated, and a few

hours' drive over the paved roads takes you past numerous little villages and scattered houses, cheerfully adorned with red roofs, white walls, and green shutters. It was not therefore surprising to find that resident birds were scarce. The numerous population of small cultivators may account for the scarcity, as well as for the fact that you may probably see in Mechelen more carts drawn by dogs than in any other town.

Turdus merula.—In the Botanical Garden.

Pratincola rubetra.—Some in the grass marshes.

P. rubicola.—A pair carrying food on the bushed banks of a fortification.

Ruticilla titys.—Several seen in Mechelen (49,000 inhabitants), on the houses; one in the Grande Place.

Daulias luscinia.—Heard in all the small plantations, and about country houses; I saw and heard several in the Botanical Garden.

Sylvia cinerea.—Fairly common.

S. atricapilla.—Plantations and Botanical Garden, where it was in very fine song.

S. hortensis.—Appeared to be common in plantations.

Hypolais icterina.—One heard to the north of the town; another haunted the Botanical Garden. I heard a few rather good notes from this bird, and a regular screech once or twice; but I had no opportunity of listening to it well on account of a brass band and a crowd of people interfering on one occasion, and a cold grey morning on another.

**Acrocephalus palustris*?.—A bird singing, but out of sight, in a patch of tall rye bounded by a wet ditch and garden ground, was probably a Marsh Warbler. I heard imitations of the notes of Swallow, Whinchat, and Stonechat, with Nightingale-like notes and low chattering notes.

A. turdoides.—I heard the grating notes from some reeds and willows some way off on the other side of the Dyle. At a fortification to the north of the town there was a moat, of which I could get an occasional glimpse from the road. There I heard two or three of these Warblers, and caught sight of one. I did not think it desirable to poke about the place much with glasses and note-book!

Accentor modularis.—Seen once or twice in the Botanical Garden.

Parus major and *P. cæruleus*.—Occasionally seen.

Troglodytes parvulus.—About gardens, several times.

Motacilla alba.—Saw a few. In the Botanical Garden was the only adult female, so far as I could judge, that I saw in Belgium. It had the crown sooty mixed with grey.

**M. melanope*.—To my great surprise, I saw a black-throated Grey Wagtail sitting on a bare twig over a piece of water in the Botanical Garden. A tidal creek, or branch of the Dyle, bounds the garden on one side.

Anthus trivialis.—Seemed fairly common about wayside poplars.

Oriolus galbula.—I heard the note in a wood near the Château Rubens. One bird (and I think another also) was singing in the thickest parts of the tall trees which stand round the Botanical Garden. I moved it more than once, and at last got the glass on a male as it flew out. It is far from a conspicuous bird when seen against a background of fresh green, and moreover it is loth to leave the thick foliage. Its sweet rich "lit-a-voool" or "lit-a-voool-ee" was, I think, followed by some low chattering notes, heard only on two occasions, when I was just under the place where I thought the bird was sitting; but I could never see it when it was perched.

Lanius collurio.—One male.

**Muscicapa grisola*.—Several about the Botanical Garden.

Hirundo rustica.—In fair numbers.

Chelidon urbica.—A few only compared with some places.

Passer domesticus.—Not conspicuously abundant.

P. montanus.—Saw a good many. Some seen about pollard trees, and several times dusting by the roadside. Apparently rather a common bird in Belgium.

Fringilla cœlebs.—About gardens and wayside trees.

Emberiza citrinella.—Fairly common by the roadsides. Some males were very bright, as at Dinant also.

E. shæniclus.—Several along the high banks of the tidal Dyle; also about reeds in the grass marshes, and along a canal.

Sturnus vulgaris.—Common about grass marshes, &c. Some were in flocks; others inhabited St. Rombaut's great tower. Seen in Antwerp.

Pica rustica.—Several times seen by the wayside.

Corvus monedula.—Inhabited St. Rombaut's Tower and the Botanical Garden. In the Zoological Gardens at Antwerp I saw a pair of white Daws with pink legs and bill, and white (ordinary?) irides.

C. corone.—Two or three seen.

Alauda arvensis.—A few seen one day.

**A. cristata*.—On a large open bare sandy piece of ground outside Mechelen I saw a Crested Lark (very much the colour of the soil), which was beating some prey against the ground. When this Lark is alarmed its long crest stands up. I was glad to hear again its call-note "sweet-a-weet," or "weeta," or "seee weet weet." Another bird was singing, flying about in a desultory way, going a little way, and then pausing to sing its very sweet song (with a variation of the call-note) with beating wings; then dropping away down wind, to bear up again presently, and repeat the performance. So the song is often interrupted by flights. The big bill of the Crested Lark is conspicuous, as also is the light, bright brown in the tail when the bird flies up.

Cypselus apus.—Swarmed in great numbers round the huge cathedral tower (St. Rombaut's, 324 ft.). They could be heard from our windows screaming faintly, apparently at a vast height, after 9 p.m., when it was almost dark. In the evenings they swarmed in the air round the tower, and also about a large building looking like a factory; there were fair numbers all about the town and in the vicinity. In few other towns have I seen Swifts in such numbers.

Gecinus ——?.—A Green Woodpecker (apparently *G. viridis*) heard in a plantation.

Columba palumbus.—Several about plantations.

Turtur communis.—Several about plantations.

FECUNDITY IN EACH AVINE SPECIES, VARYING
ACCORDING TO ACCIDENTS OF LOCALITY.

BY BASIL DAVIES.

IN a former article I attempted to describe how the peculiarities of any species might cause its reproduction to differ from that of another: it is now my purpose to describe, if in a somewhat partial and incomplete manner, how the members of a single species may differ *inter se* as regards this function, because of the more or less favourable circumstances under which they may happen to breed. The possibility, and, later, the certainty of these differences and their origin, was early brought under my notice, seeing that for several years I alternately resided in the bleak and smoky outskirts of a northern manufacturing town, and on the edge of some of the richest land in the fertile western counties. I have also to thank Mr. W. Storrs Fox for supplying a little evidence upon my present subject in his kindly criticism of last month.

My ornithological books early informed me that a Hedge-Sparrow laid from four to six eggs, yet near my northern home I never found a clutch to exceed two; and so scant was the insect-life of the neighbourhood that a year would occasionally pass without my finding a single nest of the species. I personally have notes of many completed clutches of two, and a friend's voluminous diary can only furnish three clutches exceeding that number during a continuous residence of several years in the same district. In Gloucestershire, however, five was the usual number, and a nest of six occasioned no remark. In Lancashire the lingering winter, combined with a foul and smoke-polluted atmosphere, rendered insect-life nowhere abundant. In most English localities you may rely on retaining a pair of "resident" birds to breed with you during the summer, if you mark them frequenting your fields and hedgerows in the latter end of March; but at R—— the birds would weary of waiting for the tardy

spring. By means of some agency in the bird-world, corresponding, I suppose, to our daily press, they would hear of lovely nesting weather in Derbyshire; and to me March's promise brought but regrets in May. Even when insectivorous birds were few and far between, nature's providence forbade the laying of a full clutch, clearly evidencing the sparseness of the food-supply. Near Clifton I have often found six Hedge-Sparrows' nests containing the full clutch within the bounds of a single field, without regard to Chiffchaffs and Whitethroats catering for hungry families on very similar lines.

My favourite authorities would further inform me that the Sand-Martin is accustomed to lay from four to six eggs in its solitary clutch year by year. My notes of expeditions in the south and west confirm this rule, giving five as the common number, and four as the minimum. There rises before my vision a northern colony of this river-haunting bird. I see a miniature amphitheatre of oozing clay, its lofty sides dotted with Irishmen wielding spades and encroaching yet farther on the plateau-like meadow-land above; where we expect the arena is a loathsome clay-pool, slimy brown and forbidding, destitute of reed or flag. One side of the encircling banks has ended abruptly in a sand-wall, and here the Martins have found a home. The birds are flitting over the clay-pool, actually *struggling* for each rising fly. The meadows they will resort to towards sunset. The land is too poor to breed the humble fly; there are on it only the tiny moths which sleep by day among the blades and grass roots. On Aug. 10th, 1896, I examined seventeen nests in such a place as this, and no nest contained more than three eggs or young.

If we transport ourselves to some shelving sand-bank on some southern stream, we see the Martins flitting about careless of each other's prey. A warmer temperature and the vegetation plenteous in the stream-bed render insect-food abundant, and every tunnel in the wall's face will give to light five or six young Martins before September comes.

It is a great help in bird study to acquaint oneself with gamekeepers. One vacation I was trespassing, countenanced by the head keeper, and I found two Sparrow-Hawks' nests in woods three or four miles apart. Each contained the magnificent clutch of seven eggs, forming a picture none the less delightful

because I had no desire to "collect" them. I resolved to tell the keeper of the unusual discovery, although I expected him to grumble because I had not destroyed them. To my surprise he was well pleased. He told me how his master had caused all the Hawks on his estate to be slain as far as was practicable, with the exception of an occasional pair in woods lying remote from each other. He desired to protect his coverts, but, like a true sportsman, he could admire a stately bird in mid-air; consequently a pair was suffered to nest here and there undisturbed. These orders, the keeper continued, had been in force some ten years, and the clutches of surviving pairs had each year increased from the time when he had received orders to destroy as many as possible. There were now remaining some three or four pairs of Sparrow-Hawks on the whole estate. The Kestrels had been exterminated. He had frequently found clutches of six of late years, and on rare occasions the larger number of seven. This certainly appears to point to the conclusion that increased scope for foraging results in increased fecundity.

The Yellowhammer is an excellent example of my point. After a long correspondence in the 'Feathered World,' Mr. John Craig, of Beith, and one or two others began to collect statistics regarding the usual number of eggs deposited by this Bunting in one nest. Mr. Craig himself showed that in Ayrshire a clutch of three was normal; this county consists largely of sheep-farming land, and alternates between rather thin close-cropped grazing-ground and furze-clad moorland, foliage and herbage being nowhere luxuriant. In a western English county I obtained sufficient evidence to show that five was there the usual clutch; while a Cheshire friend stated that four was usual in his neighbourhood, five and three being of less common occurrence. Cheshire, as regards fertility, comes about half-way between the two extreme instances previously cited. It possesses a tolerably productive soil, bearing a reasonable proportion of woodland and thick ground herbage.

To speak on broader lines, I everywhere found large clutches in the west and small clutches in the north. I well remember one afternoon with the birds of Somersetshire. The ground we traversed was a large plain, moist, loamy, and dark-soiled, intersected by numerous rhines, fences, and hedgerows. Nests were

everywhere abundant, everywhere cramful of eggs, and all species seemed to be adequately represented. Nearly every nest we examined contained the maximum clutch permitted by book-writing authorities, and in some cases the legitimate number was exceeded, the most notable instance, perhaps, being that of a Whinchat incubating seven eggs. Indeed, the wit of the party remarked that the prescribed maximum had been passed in the case of every nest we had found, save that of the miserable Cusht-Dove, which had merely deposited the regulation couple.

THE COLORATION OF BRITISH BIRDS AND
THEIR EGGS.

BY W. STORRS FOX, M.A., F.Z.S.

SOME three years ago I made a rough table of the coloration of British birds and their eggs. I did this for the benefit of a local Naturalists' Club. Last year I had reason to revise this table. As I do not know of the existence of anything on quite similar lines, it has struck me that it may be of interest to some of the readers of 'The Zoologist.'

In dealing with coloration it stands to reason that there cannot be one law for birds found in the British Islands, and another which applies to those inhabiting the rest of the world. But, being more familiar with our own birds, I have drawn my illustrations from them almost entirely. I believe that the principles laid down in this paper are of universal application, and that the interest attached to them will not be lessened by the fact that the examples given are taken from a small group of islands.

The introduction to the second volume of Seebohm's 'British Birds' consists of an account by Mr. Charles Dixon of the protective colour of eggs. The subject is there dealt with at some length. Dr. A. R. Wallace, when treating of the coloration of birds' eggs, refers to that "valuable work."* Mr. Dixon has collected a number of very interesting facts, and everyone interested in the subject ought to read his account.

It will be seen from the two following tables that certain general principles govern the colours of both birds and their eggs. There are, however, some very awkward exceptions to the rule. Perhaps someone will throw light upon these difficulties. When it is clear that eggs are usually protectively coloured, it is strange that we ever should come across any which lack such protection.

* 'Darwinism,' p. 214.

So also with the birds themselves, it is difficult to see why the cock Song-Thrush should be protectively coloured, but the cock Blackbird conspicuous on account of his intense black plumage. I am not aware that the former assists in incubating the eggs, and that the latter does not perform any such office. It is obvious that certain birds have little or no need of protectively coloured plumage. Some are naturally protected by their size and strength, *e.g.* the Swan; others by size combined with gregarious habits, as the Rook and Heron; or, by these defences combined with great powers of diving, as the Cormorant and Guillemot. Birds, except very small ones, which nest in holes can dispense with protective colours. It may fairly be said that the position and structure of the nests regulate the colouring of the birds themselves as well as their eggs, and that wherever there is no special need for sombre shades of plumage, conspicuous or bright hues prevail.

I. Of birds which make *open nests*, either (a) both sexes are protectively coloured; or (b) the hen so coloured and the cock more showy.

It will be readily seen that small birds, and birds frequenting very exposed places, specially need protection. It is such birds which have both sexes protectively coloured, *e.g.* Song-Thrush Hedge-Sparrow, Lark, smaller Game-birds, Rails, Plovers, Sandpipers. Certain species of the last-named group have the sexes different.

That the hen should be sombre but the cock conspicuous is not surprising in large birds, such as Ducks and the larger Game-birds. But in a less degree it holds good also in the case of many small birds, such as the Blackbird, Blackcap, Wag-tails, some of the Finches, and Buntings; but in all these (except the Blackbird) the colouring of the *upper parts* tends to harmonize with their surroundings.

Among the Plovers and Sandpipers the Dotterel (*Charadrius morinellus*) and Phalarope (*Phalaropus hyperboreus*) may be mentioned as exceptional, for with them the female is more brightly coloured than the male. The explanation lies in the fact that these males perform the duties of incubation.

Most sea-birds are equally showily coloured in both sexes. They nearly all have pure white under parts, which strongly

contrast with the grey or black of their upper parts; as, for instance, Terns, Auks, Gulls, Divers, Grebes.

Here it must be pointed out that (1) parts of plumage which are never displayed are dull-coloured; (2) parts which are out of sight when the birds are at rest, but which appear during flight, or under excitement, are often ornamented with beautiful colours or patterns. Examples may be found among Pheasants and Sandpipers. Conspicuous marks exposed during flight possibly act as danger signals* Probably *all* such showy colours and patterns are made use of in courtship and in battle.

The larger Gulls take three or four years before they attain to mature plumage. The plumage of quite young Gulls is sombre. The stages through which they pass before arriving at maturity are supposed to be recapitulations of former states of colouring.†

II. Birds which *nest in holes*.

As a rule, both sexes of such birds have conspicuous plumage; as Woodpecker, Kingfisher, Sheldrake; and, among foreign birds, Parrot, Toucan. But small birds, such as Tits, Nuthatch, are much less brightly coloured than larger ones.

There are some noticeable exceptions to this rule. In the case of the Wheatears and Redstarts, the hens are sombre in colour, and the cocks much more striking looking. According to my own experience of *Saxicola oenanthe* and *Ruticilla phoenicurus*, they place their nests quite out of sight. I have very little acquaintance with the other members of these genera, but, so far as I can gather, the nests of some species are usually quite hidden, whereas those of others may be as much open to view as are many nests of the Pied Wagtail. Is it possible that with our common Wheatear and Redstart the sombre hues of the hens' plumage date back to a time when the nest was always more exposed to view?

The Wryneck and many of the Petrels are also exceptions, as both sexes are clad in dull-coloured garb. I know of no satisfactory explanation.

III. All British birds which build *covered nests* have both sexes alike, and are sombre in colouring. They are small

* Newton's 'Dictionary of Birds,' p. 101; Wallace's 'Darwinism,' pp. 217-226.

† Newton's 'Dictionary of Birds,' p. 100.

defenceless birds, such as the Wren, Willow-Warbler, and Dipper.

IV. Nocturnal birds, *e.g.* Nightjar, Owl, have plumage which will conceal them during the day. At first sight the Barn Owl would seem to be an exception, but this species is much more retiring than most of the others, and hides away entirely out of sight.

V. The usually dull colours of the Accipitres may help these birds to escape the notice of their prey. Such an explanation is not very satisfactory, as they do not sit still and wait for their prey to approach them. But, as these birds are well able to take care of themselves, they might be expected to have bright-coloured plumage.

There are certain individual cases which are very difficult to explain:—

(a) Why is the common Swift (*Cypselus apus*) such a sombre-looking bird?

(b) Does the Cuckoo (*Cuculus canorus*) really *mimic* a Hawk? There are other members of this family which appear to mimic species which are not allied to them.

(c) How is the Egret (*Ardea garzetta*) protected? It is not large, and has pure white plumage. Is its beak a sufficient means of defence?

(d) Ruffs (*Machetes pugnax*) are adorned with variously coloured plumes about the neck. They go through a form of battle for the Reeves. Such characteristics are contrary to the rule of the family (*Scolopacidæ*) to which they belong. By way of explanation, Darwin* states that the males of this species are probably polygamous.

(e). The plumage of the hen Oriole (*Oriolus galbula*) and the Jay (*Garrulus glandarius*) is quite bright enough to be conspicuous. But they nest among the thickest foliage.

Just as the coloration of birds' plumage falls naturally into divisions depending upon the nesting habits of the species concerned, so also may their eggs be grouped on similar lines. And moreover, the less important divisions also correspond in both cases. But when we are considering eggs laid in open nests, it

* 'Descent of Man,' ch. viii.

is necessary to remember that such nests are nearly always partially covered by overhanging leaves and branches, by a projection of rock or stone, by thick herbage, or by sedges and long grasses. This fact will often account for the deeper or paler shades of egg-colouring.

I. Eggs laid in *open nests* are coloured.

(a) The ground colour of those laid in trees and bushes is often some shade of green or blue marked with brown, red, or black, *e.g.* Thrushes, Finches, Crows.

(b) When the nest is placed very low down amongst herbage, or when it is placed in a covered site, the ground colour of the eggs is paler, and so are the markings, which are sometimes greenish, *e.g.* Redbreast, Wagtail, Whitethroat; but not so the Pipits.

(c) When exposed to some extent on the ground they are generally clay-colour, or brown, or greenish brown, spotted and blotched with a darker shade, or even with black, *e.g.* the Lark, Lapwing, Curlew, Gulls.

(d) Certain birds, as Ducks, Partridge, Grebes, cover their eggs when they leave the nest. Such eggs are usually white or of a pale tint. This might be expected, as the protection of colour is in such cases unnecessary.

(e) Large birds which are able to defend themselves may be expected to be capable of keeping their eggs safe from the attacks of Crows, &c. Swans and Cormorants will come under this head.

II. Birds which *nest in holes* nearly always have white eggs, *e.g.* Swift, Woodpecker, Kingfisher, Puffin, Petrel. But very small birds so nesting generally lay white eggs speckled with red.

The only exceptions which occur to me are the Wheatear, Redstart, Starling, Jackdaw, and Chough. The first two of these have already been dealt with. I have no personal knowledge of the Chough. But there is some reason to suppose that nesting in holes is a comparatively recent habit both with the Starling and the Jackdaw. In 1887 I found two Starlings' nests which were "open." One was at the top of a spruce-fir, built upon an old Wood-Pigeon's nest; the other was in ivy. Perfectly fresh-laid Starlings' eggs differ very much, varying from a decided blue to nearly white. Jackdaws sometimes lay their eggs in hollow trunks, where they can be seen from above.

Moreover, I have a note to the effect that near Eyam, in 1887, some Jackdaws were nesting among the branches, after the manner of Rooks. In the 'Naturalists' Journal' (vol. vii. No. 72, June, 1898) a similar occurrence is recorded.

III. When birds build *covered nests* the eggs are white, spotted finely with red, black, or brown, *e.g.* the Wren's, Chiffchaff's, Swallow's; or pure white, *e.g.* the Dipper's. The House- and Tree-Sparrows are exceptions.

IV. *Nocturnal birds* lay white eggs, as the Short-eared Owl; or nearly white, as the Nightjar. Protective colouring is not needed in such cases, as the birds sit on their eggs throughout the day.

V. The eggs of the Accipitres are safe under the parental guardianship. They are pure white, white slightly spotted with red, or boldly blotched with red, or in some cases the ground colour is entirely hidden by the overlying red.

Here again the exceptions to the rule present great difficulties. Some of them are interesting enough to have attracted the attention of Dr. Wallace and Prof. Poulton.

(a) All the breeding habits of the Cuckoo are strange and abnormal. Until more is known about them we cannot hope for a satisfactory explanation of the variability of its eggs.

(b) It is a surprising fact that the Wood-Pigeon, which makes an open nest, lays pure white eggs. Dr. Wallace* and Prof. Poulton† give the following explanation:—They suggest that the egg is white as a protection *from below*; that the Wood-Pigeon builds a flimsy wicker nest, through the bottom of which the eggs can be seen; but that, being white, they are inconspicuous against the blue sky. [Dr. Wallace expresses it rather differently. After remarking that light may be seen through the nest from below, he says:—"It is a difficult matter to discover, from beneath, whether there are eggs in the nest or not, while they are well hidden by the thick foliage above."] It seems hardly possible that this is the true explanation. Wood-Pigeons' nests are not always of the wicker type; and, if it is an advantage

* 'Darwinism,' p. 213.

† 'Colours of Animals,' p. 62; *cf.* also Beddard's 'Animal Coloration,' p. 115.

for the eggs to be unnoticeable from below, the natural course for the birds to take would be to build solid-bottomed nests always. Nor has it yet been proved that a white egg is less conspicuous from below than a coloured one. Mr. Beddard has shown that white is not invisible from below,—that a snowflake, when seen against a blue sky, looks black. If the colours of eggs have any meaning, they are obviously a protection against marauders *above* the nest. It is not usual for eggs laid in open nests to be white, even when dense foliage overhangs them. The eggs being white and the nest so flimsy, it might be supposed that until recently these birds built in holes. But the fact that by far the majority of the members of this great family (*Columbidæ*)—which embraces some three hundred species—does not nest in holes is a very strong argument against such a theory. These birds lay but two eggs, and often begin to sit as soon as the first egg is laid. In this way the need of colour would to some extent be obviated.

(c) Lastly, we must turn our attention to the *Alcidæ*. The eggs of the Common Guillemot display an extraordinary variety in ground colour and markings. Dr. Wallace* and Mr. Dixon† suppose that this is due to their being laid on inaccessible cliffs, and thus completely protected from enemies. If this is the correct explanation, it seems strange that the eggs should be coloured at all. But a visit to Flamborough Head in the breeding season will show that these eggs are not safe from all marauders. These cliffs are tenanted by Jackdaws as well as by Guillemots. And that the former have a taste for the eggs of the latter is evident, for the shells of sucked eggs may be seen lying about on the top of the cliffs. Prof. Poulton‡ believes that a more feasible explanation is that all this variety of colouring enables “each bird to know its own eggs.” But, if this is necessary in the case of Guillemots’ eggs, how do Terns and Gulls, which nest together in such dense numbers, dispense with a similar provision? Most of the eggs of any one species are very much alike, and are so difficult to see that the greatest care must be taken by anyone visiting their nesting stations in order to avoid treading on them.

* ‘Darwinism,’ pp. 214, 215.

† Seebohm’s ‘British Birds,’ vol. ii. p. xxvii.

‡ ‘Colours of Animals,’ p. 213.

The Razorbill also lays its eggs on precipitous rocks, but they are placed under cover. Though the markings vary to some extent, the ground colour is generally white, sometimes brown. The Puffin's eggs are laid far down a hole, and they are pure white. When they are fresh and clean faint traces will be found of those bold markings which are so common on the eggs of the *Alcidæ*. Do not these suggest that long ago the Puffin laid coloured eggs in the open, after the manner of its cousin the Guillemot at the present day?

I hope that these remarks will draw out criticisms and observations from your readers, and that thus the difficulties of the subject may to some extent be cleared up.

WHAT IS THE REASON OF THE GREAT VARIATION IN CUCKOOS' EGGS?*

BY DR. E. REY, LEIPZIG.

Translated and communicated by W. WELLS BLADEN, Vice-President, North
Staffordshire Field Club.

AMONG the many attempted explanations of the great variation to be found in the colouring and markings of Cuckoos' eggs, the application of the Darwinian theory of selection seems at first sight to be most feasible. But on closer examination it does not appear to be in accordance with many well-founded facts. This theory supposes that those female Cuckoos whose eggs most resemble those of the nest chosen, have greater chance for the preservation of their offspring than others, whose eggs would be more liable to be destroyed by the foster-parents. As it may moreover be presumed that their daughters would lay eggs similarly coloured, and would make the same selection of nests for their offspring as their mothers, the consequence would be a preponderance of females whose eggs are similar to the nest eggs in colouring, whereas the other class would become more rare, and finally disappear.

I have already demonstrated in my work on the Cuckoo, and am now able to confirm by material at my disposal, and by nearly 2000 examples, that eggs matching those of the foster-parents are only to be found in a small percentage of cases. Those who only take into consideration the few examples in which Cuckoos' eggs are coloured like the nest-eggs, would alone venture to ask that the theory of selection should be accepted; whereas others, who consider the question in its entirety, will reject it as untenable, as far as the Cuckoo is concerned.

If the resemblance of its eggs to those of the foster-parents were such an advantage to the Cuckoo it would not be found as an exception to the rule, but would, on the contrary—at least here in the neighbourhood of Leipzig—be very perceptible in connection with *Lanius collurio*, most Cuckoos' eggs (84 per cent.) being found in the nests of these birds; of 282 Cuckoos' eggs found in the nests of the Red-backed Shrike, only sixteen, about 5 per cent, were of the type of *Lanius* eggs.

* "Was ist der Grund für die grosse Variabilität der Kuckuckseier?" Ornith. Monatschrift des deutschen Vereins z. Schutze der Vogelwelt. Jahrgang 1895. Nr 1.

Quite irrespectively of this, how would it be possible to explain, by means of the theory of selection, the fact that there are a great number of Cuckoos' eggs which have a particular type of colouring not to be found in any eggs known to us, and others marked like eggs with which eggs of the Cuckoo are seldom placed. We must therefore cast about for another explanation. In a number of species of birds we see that the eggs differ considerably in colour and marks when they come from places far apart. To quote a few examples: eggs of *Phylloscopus trochilus* from Lapland are, contrary to those found in our parts, marked with dark spots, so dark as almost to be mistaken for eggs of *Phylloscopus rufus*. Again, whilst spotted eggs of the Redstart are rare here, examples are frequent in high northern latitudes; and whereas *Caccabis sawatilis* lays distinctly spotted eggs in the alpine regions, its eggs from Greece are monochromous, or but very slightly marked.

Now, as Wickmann has demonstrated that eggs take their colour from the transposing products of the blood, so must we lead back the varieties of colouring to the variety of these transposing products, and the latter again to the chemical or physical properties of the blood. We must look upon food as the chief cause of the difference in the formation of the blood, for according to its different chemical properties it will produce lesser or greater variety in the composition of the blood. We must therefore take, as the cause of the variation in the colouring of the eggs of the same bird from different places, the difference of food according to the place of their residence. Not that different nourishment would produce an immediate change in the colour of the eggs—for we know that every female bird will, during its whole life, unless pathological changes should occur, lay the same, or at least very similarly, coloured eggs—but the difference in food will, in the young female bird, whilst the body is developing, have an abiding influence upon its blood-forming organs, and determine the colour of her future eggs. It is clear that apparently similar food can produce different results, for we often see that insects and larvæ, externally alike, have, chemically, quite different bodies; and, again, quite distinct insects are chemically alike.

If, on the one hand, the variation in the eggs of different female birds of the same species is occasioned in this way, the law of heritage confines it on the other. We see that Shrikes and Pipits lay very different eggs, but notwithstanding the number of varieties there is a decided type running through them all. Here we see a certain inherited resemblance, whereas in other cases the eggs are so completely distinctive as to be unrecognizable. If we apply this to the Cuckoo, we are not astonished if almost every bird lays differently coloured eggs, because the difference of food arising from the various foster-parents, according to their kind and individuality, pro-

duces a much larger variety than in other birds. And if we further apply to the Cuckoo the law of heritage, over and above the difference in food, the variation in the eggs would be enormously increased. Considering the manifold variety thus produced, it is quite possible that the eggs of the Cuckoo should assume a likeness to the eggs of other birds, even of such as it does not choose to lay with. We must also admit that the principle that the food of many birds, though it may not affect their own eggs, has its influence on the colouring of the eggs of their offspring, can also be applied to the Cuckoo, in the case also when it is nurtured for generations in the nests of the same species of birds whose eggs do not vary much.

We can, with some amount of certainty, assume that our Cuckoo, before he became a nesting parasite, laid monochrome blue eggs, as we see now in its near relatives the North American *Coccyzus americanus* and *C. erythrophthalmus*, which have already occasionally begun to give up rearing their own young. The blue eggs of the Cuckoo, exclusively found in the nests of the Redstart, which also lays blue eggs, may be traced to similarity of food and inheritance.

NOTES AND QUERIES.

MAMMALIA.

CARNIVORA.

Habitat of the Thick-tailed Mongoose (*Cynictis penicillata*).—According to the ‘Royal Natural History’ the Thick-tailed Mongoose inhabits the Cape Colony. Nothing is said about other parts of South Africa. As far as my own personal experience goes, *C. penicillata* also inhabits both the Orange Free State and the Transvaal. I have often seen and shot the animals on the Free State flats some miles north of Bloemfontein. Some time back I shot two examples of the same species about twenty miles north of Johannesburg, in the Transvaal. They are somewhat difficult to shoot, but, being spurred into a great desire of obtaining one for identification by the statement in the ‘Royal Natural History,’ I finally managed to shoot the two individuals above mentioned. I have their skins before me now. The one is of a brilliant orange drab on the back, fading into light yellowish grey on the flanks and under parts. The fur is finely speckled owing to the hairs being ringed with alternate black and amber-brown. The tips of the hairs are amber, and the roots white. The other example is of a greyish yellow colour, much lighter than the former. The fore feet of both have five toes, and the hinder ones only four. The tail is bushy, and has a white tip. There can be no doubt as to their identity. The question is, How far north do they extend? That I cannot say as yet.—ALWIN C. HAAGNER (Dynamite Factory, P. O. Modderfontein, Transvaal, South Africa).

[I procured a specimen of the Meer-Kat (*Cynictis penicillata*) near Pretoria in 1890, and recorded the same in my ‘Naturalist in the Transvaal,’ p. 159 (1892). This specimen I placed in the British Museum, which, Mr. W. E. de Winton informs me, is “still the only specimen we have with locality north of the Colony.”—ED.]

White Stoat.—In the last issue of ‘The Zoologist’ (*ante*, p. 131), I observe the record of a white Stoat (*Mustela erminea*) from the North of England. About the 21st of November last I received a similar specimen from West Somersetshire (near Watchet), and, considering the mildness of the weather at that time, I was surprised at its appearance. It was pure white, except some regular light brown markings over each eye, looking

much like eyebrows, and, of course, the usual black tail-tuft.—H. W. MARSDEN (40, Triangle, Clifton).

UNGULATA.

Zebra-Horse Hybrids.—I have just read, in the ‘Bulletin de la Société Nationale d’Acclimatation de France’ (October, 1898), the translation of the article published in ‘The Zoologist’ (1898, p. 49) on the hybrids of the Burchell Zebra and mare by Prof. J. Cossar Ewart. I have perused this memoir with much interest, because you will see by the publications I forward that I also have crossed the Zebra and mare. Until now I believed that I was the only one who had obtained this production, but by the article in question I see that I am not; and besides, my first production was born three and a half months after that of Prof. Ewart’s—my first, Sordello, being born Dec. 5th, 1896, and Prof. Ewart’s Romulus Aug. 12th, 1896. It is very curious to note that neither of us has known of the other’s writings and ideas, yet have both carried into execution these experiments within a few months of each other. At this moment Prof. Ewart is the first in Europe, and myself the first in America, who have obtained these hybrids by crossing the Zebra with the mare, or, rather, other writings on the subject are unknown to me. I send you some photographs of my first two hybrids, but have not yet any of the others; but when I have will forward them to you. I am writing also to Prof. Ewart, and sending the same documents and photographs.

La Société Nationale d’Acclimatation de France has published, in its Bulletin of October, 1897, my account of “Le Croisement du Zèbre avec la Jument.”

Dr. Fr. Steinriede published, in the ‘Landwirtschaftliche Presse’ of Berlin (Oct. 15th, 1898), an article with illustrations made from photographs of Zebra-Horse hybrids which I sent him.

The ‘Journal l’Eleveur de Paris,’ No. 726 (Nov. 27th, 1898), published a translation of a communication on the subject which I contributed to the ‘Société Nationale d’Agriculture Brésilienne.’ — BARON DE PARANA (Porto Novo do Cunha, Rio de Janeiro).

AVES.

Nesting of the Mistle-Thrush.—This bird (*Turdus viscivorus*) is much more common here than it used to be thirty years ago. On April 26th, 1888, I found a nest with four eggs, and the bird sitting on it, in a hole in the stone pier of a field-gate near Clogher Head, Co. Louth. The gate was often used, and the bird was sitting within six inches of it as it swung. There were plenty of high hedges and trees quite close. I consider this the most extraordinary and abnormal place I ever found a nest

in. The year before (1887) I found a nest in the fork of a tall oak, and climbed up to it, as I wanted the eggs. It was ready for laying, but empty. I did not see the birds, but evidently they saw me, for two days afterwards they had moved the nest bodily to the next tree, where the hen was sitting on it. I was so touched by their intelligence that I left them in peace. On July 24th, 1892, I saw a curious Mistle-Thrush. It was pale dove-colour (a very pale grey) all over, and shone like silver in the sun. It was with about thirty others, and they stayed about the house for several days. I often got within forty yards of it, and watched it through a powerful glass. Its eyes seemed to be red. I have often seen Mistle-Thrushes, and heard them sing, in Fitzwilliam Square, Dublin, a somewhat curious habitat for such a wild bird.—G. H. PENTLAND (Black Hall, Drogheda).

Male Blackbird storing Seeds at Nest.—On March 21st I found, in a hedgerow, the nest of a Blackbird (*Turdus merula*), containing three eggs. On March 25th I again visited the nest, when I found the female incubating, and the side of the nest piled with a quantity of seeds, some of which I enclose for identification. On the 28th of the month I watched the nest from behind an apple tree, and saw the male bird come and go repeatedly, each time depositing these seeds, which are about the size of the half of a very small pea. His intentions were exceedingly charitable, and I should very much like to know if it is a common occurrence for the male bird of this species to feed the female during incubation, as I have never before observed him in this act.—STANLEY LEWIS (Wells, Somerset).

[The seeds are those of the common ivy (*Hedera Helix*).—ED.]

Blackbird's mimicking Notes.—I can corroborate Mr. Davenport's instance of the Blackbird (*Turdus merula*) imitating the Curlew. I find in my notes that on April 14th, 1892, I heard a Blackbird imitating a Curlew's whistle so perfectly that it at first completely deceived me.—G. H. PENTLAND (Black Hall, Drogheda).

Green Woodpecker in Ireland (Correction).—In Swann's 'Handbook of British Birds,' 1896, it is stated that this species (*Geococcyx viridis*) had only twice been obtained in Ireland previously to October, 1889, "when an extensive immigration occurred." Again, Aflalo's 'Sketch of the Natural History of the British Islands,' 1898, speaks of a "recent immigration into Ireland, where, previous to the appearance of the last edition of Mr. Saunders's admirable 'Manual,' but two examples had been recorded." The above immigration never occurred, and neither edition of Mr. Saunders's 'Manual' is responsible for such a statement, as regards the Green Woodpecker. There were, however, ten Great Spotted Woodpeckers shot in Ireland in October, 1889, to January, 1890, inclusive: six in Ulster,

two in Leinster, and two in Munster. This is referred to by Mr. Saunders.—R. J. USSHER (Cappagh, Co. Waterford).

Crossbill in North Wales.—Mr. Newstead (*cf. ante*, p. 28) will be interested to hear that two or three pairs of Crossbills (*Loxia curvirostra*) nested at Penmaenmawr, North Wales, in 1890 or 1891. I have lost my notes of the occurrence, but it was subsequent to 1889. I did not see them nesting myself, but my sister used to go and watch them, and I afterwards examined their nests. They were in some larch trees at a cottage in the lane which leads up to the Green Gorge, a well-known walk in Penmaenmawr. They were rather far out on the branches, and twelve or fourteen feet from the ground. My sister is a very good observer of birds, and she described them to me so minutely that there could be no doubt in the case. They were very tame, and she used to watch them from a distance of twenty or thirty feet, and could see their twisted beaks quite plainly.—G. H. PENTLAND (Black Hall, Drogheda).

The Eggs and Nest of the Moorhen.—I should like to add my mite of evidence to that of those who have already given theirs in favour of the view that the Moorhen (*Gallinula chloropus*) does not, as a rule, cover her eggs when leaving the nest. I have seen very many nests of the species under consideration, and I have never yet seen one in which the eggs had been intentionally covered over, and indeed I will go farther, and say that I have never met any collector or ornithologist who had. That the bird may occasionally resort to this means of protection is of course possible, but it is not its regular habit to do so, a fact about which the vast majority of observers seem quite agreed.—K. HURLSTONE JONES, H.M.S. 'Repulse,' Channel Squadron.

Little Tern (*Sterna minuta*) in Ireland.—So far as I know there are only two regular breeding places of this bird on the east coast of Ireland, but in 1897 seven or eight pairs bred at the north side of the mouth of the Boyne, within eighty yards of the second hole of our golf-links. The caddies unfortunately found them out, and took, I fear, most of their eggs, for last year they did not reappear. I wonder if they went on to the Isle of Man, and formed Mr. Ralfe's colony (*cf. ante*, p. 32)? In the same year a Ringed Plover chose to lay her eggs near the twelfth hole of our links, and right in the course. Every ball from the twelfth tee whizzed over her head, and every player and caddy used to have a look at her four pretty eggs, but everyone spared them, and she hatched them out all right. There is a little islet in Carlingford Lough, called Green Island, where a few Arctic Terns breed. In 1886 I saw a couple of Lesser Terns (*Sterna minuta*) there, but could not find their eggs. In 1887 there were none to be seen.—G. H. PENTLAND (Black Hall, Drogheda).

Songs of Birds affected by Weather.—I was much interested in one of the Rev. W. Warde Fowler's observations in the March issue of 'The Zoologist' (*ante*, p. 135), for the somewhat quaint reason that it is irreconcilable with my own experience. I am such an admirer of Mr. Fowler's books that I feel a diffidence in taking exception to any of his statements, especially as he is known to be such a close and diligent observer of birds; but I am far from concurring with him in the opinion that "our resident species are not affected in any degree by the temperature *in regard to singing*." Speaking generally, for about a month previously to March 20th, Blackbirds, Song-Thrushes, Mistle-Thrushes, Starlings, Redbreasts, Hedge-Accentors, House-Sparrows, and Wrens had combined every single morning to enchant my ears with a most delightful vernal concert. Not only was their minstrelsy resonant and prolonged from daybreak until the morning was well advanced, but again, as the gloaming drew on, sundry of the eight species mentioned above would musically assert their claims to notice. On the morning of March 20th sixteen degrees of frost were registered here, and on the three following mornings upwards of twenty degrees were registered, snow falling on the Thursday (March 23rd), the day on which I am penning these lines. During these four days, neither in the morning nor in the evening has there been any singing whatsoever on the part of any one of the species, and the contrast, after the flow of song that was so strenuously maintained day after day during the balmy weather associated with the preceding weeks, is naturally brought out into the very boldest relief. Nor, I must admit, is this my most recent experience at variance with what has gone before. I still see all the species I have enumerated round about the house, but they appear in no mood to sing, nor do they. Whereof the cause? Surely, surely, the great fall in the temperature.—H. S. DAVENPORT (Melton Mowbray).

The Covering of Eggs by Nesting Birds.—In connection with the discussion that has been carried on in these "Notes and Queries" as to the covering up of eggs by nesting birds, I may mention that I have noticed this done by Cormorants (*Phalacrocorax carbo*). In the end of May, 1895, I visited a colony of these birds on an islet off the coast of Sutherland. I took a photograph of a group of three nests which were placed side by side on the cliff. When we first approached the spot the birds flew off from the nests, leaving the eggs exposed to view; but, on returning to the same spot half an hour afterwards, after exploring the rest of the island, we found that in two cases the eggs had been covered up with reeds and grass, evidently with the intention of shielding them from observation.—H. C. MONRO (Stratfield Saye, Hants).

Destruction of Norfolk Birds: a Rejoinder.—In 'The Zoologist' for March (*ante*, p. 114), I notice the following paragraph in connection with

the increased scarcity of certain species of birds in the "Broads" district : — "To say nothing of what has been done to compass their destruction by a well-known dealer in birds' eggs in the West of England." As Mr. Gurney has since stated that this refers to me, I cannot allow a statement calculated to bring me into contempt with the better class of naturalists to remain uncontradicted. Of the six or seven species tabulated as having decreased so much, I have never asked for or received *a single egg from East Anglia*, except of the Bearded Tit. Of this species I did obtain a large number in one year (about 1885), but far more were sent me than I asked for or desired. I wrote to a correspondent in Norfolk for "a few sets," to which he replied by sending a large consignment, and though I wrote him at once to stop collecting, the birds must have been so common that even in the time occupied by exchanging letters he got a lot more. During the last ten years I have had almost no eggs from this district—possibly thirty or forty a year—comprising usually one, two, or three (three only one year) sets of Bearded Tits, and the rest Water Rails or a few common things. I was once offered a clutch of Garganeys, which I did not buy. These are the facts; I think any remark of mine is needless. — H. W. MARSDEN (40, Triangle, Clifton).

[No name was mentioned in the disputed statement of Mr. Gurney, who, however, has since frankly owned that he referred to Mr. Marsden. Under these circumstances, and at the request of both Messrs. Gurney and Marsden, the above note appears, though it is of a more personal than zoological character. This discussion is now considered as closed in these pages.—ED.]

INSECTA.

Great Wood-boring Wasp (*Sirex gigas*) in Ireland.—I should be glad to learn if these insects are on the increase throughout the country. They first appeared here in 1893 or 1894, and now every fallen fir tree in my woods and nearly every paling and gate-post is riddled by them. I watched a female boring into a larch-post last summer for fully ten minutes, a most curious sight. She stood up on the tips of her toes, and stuck out her ovipositor at right angles to her body and into the bark of the post. Then she wriggled and worked very hard, but did not revolve as I expected she would, as the ovipositor has a regular screw like an auger at the end. I was foolish enough to grow impatient and catch her before she finished the operation.—G. H. PENTLAND (Black Hall, Drogheda).

NOTICES OF NEW BOOKS.

In the Australian Bush and on the Coast of the Coral Sea, being the Experiences and Observations of a Naturalist in Australia, New Guinea, and the Moluccas. By RICHARD SEMON. Macmillan & Co., Limited.

THIS is a very welcome translation of the itinerary and biological observations of a naturalist in—zoologically speaking—some of the most interesting regions of the world. Of the Malay Archipelago we have now a charming literature, which, we might say, was begun by Wallace, and has been continued since the publication of his well-known eastern travels. Of Australia we would fain know more. Its natural history early incited Bennett and Gould; Lumholtz has given us a good book; Saville Kent's recent work is well known; but the subject is far from exhausted. As Mr. Semon observes, Australia to the zoological explorer "will prove Eldorado, unequalled by anything else. For so singular are some aspects of the flora and fauna of Australia as to justify one in opposing the Australian region to all the rest of the world, and practical reasons only have prevented men of science from arranging their hand-books accordingly."

One great advance in the study of zoology is emphasized by the object-lesson of the modern travelling naturalist. The general *mise-en-scène* of tropical forests and coral seas is now familiar to the ordinary tourist and the most cursory reader; while the pure and simple collector holds a subordinate place in the estimation of naturalists, for men now travel across the globe to study the life-history of one animal form. Embryological studies in oviparous-mammals, and marsupials, and, above all, the developmental history of the "Australian lung-fish" (*Ceratodus forsteri*), which now inhabits but two small rivers of the east coast, were the main objects of Mr. Semon's visit to the Australian continent; and of *Ceratodus* in these pages we learn much, and more will be found in the author's strictly scientific

publication, 'Zoologische Forschungsreisen in Australien und dem malayischen Archipel.' One observation on Termites is, however, too interesting to pass over. Our author was molested by the inhabitants of a big ant-hill near his encampment, and "strewed a handful of naphthalin crumbs all over the hill, in the certain expectation that this would occasion a general emigration." Conquering disgust, the Termites removed these objectionable deposits from their habitation. Pieces of potassic cyanide were now tried, and the expectation was held that by the morning the place would be deserted by the ants and their belongings. "How astonished was I when I found the whole surface of the heap strewn with dead ants like a battle-field. The pieces of cyanide, however, had totally disappeared! More than one-half of the community had met death in this desperate struggle, but still the death-defying courage of the heroic little creatures had succeeded in removing the fatal poison, the touch of which must have been just as disagreeable to them as it was dangerous. . . . Once removed from the heap, the poison had been well covered with leaves and pieces of wood, then interred, and thus prevented from doing further damage."

We have not space to follow Mr. Semon through the islands of the Malay Archipelago. As regards Celebes, he prefers the views of Max Weber to those of Wallace, and refuses to associate Celebes with the Australian region, believing its fauna to be an impoverished Oriental one, showing a strong Australian admixture.

The charm of these books lies in the philosophical treatment of natural history narrative, which not only gives us glimpses of exotic nature, but points to its signification.

Cambridge Natural History. Vol. IX. *Birds.* By A. H. EVANS, M.A. Macmillan & Co., Limited. 1899.

WE recently drew attention in these pages (1898, p. 510) to Mr. Beddard's 'Structure and Classification of Birds,' and if a companion volume is sought to be found to that work, Mr. Evans's book should come under that designation. One supplements the other, and most naturalists will probably place them

side by side on their book-shelves for handy reference, in days when a zoologist is expected to know everything about something, and something about everything.

“In accordance with the scheme of the Series generally, the order followed runs from the lowest forms and the Ratite Birds upwards; the Carinate Birds being divided, after Dr. Gadow’s plan, into two Brigades or Main Sections, and these again into Legions, Orders, and so forth.” The contents of the book are practically an introduction to the birds of the world, and, although such encyclopædic completeness is impossible in a single volume, a distinct success has been achieved in referring to so many species within the confines of 587 pages. All these works have their strong points and their limitations. The first are found in the discriminative care by which a capable ornithologist sifts and rejects recorded narratives; the second inevitably postulates that much is necessarily overlooked. We should have been glad to see under the subject “*Struthio camelus*” some reference to Mr. Cronwright Schreiner’s communication on this bird which appeared in our pages in 1897, and which we have read elsewhere, and, have also been told, corrected some previous misconceptions. Nevertheless we are thankful for a book that tells us so much in a small space, and the evident thorough work of the author is supplemented by the proof-readings of Mr. Howard Saunders and Dr. R. B. Sharpe.

One extract must be given; it expresses a fundamental truth little regarded in current zoological philosophy:—“It cannot be denied that Genera and Species are merely ‘convenient bundles,’ and that divisions of either, if carried too far, defeat the object for which Classification is intended. Genera are only more distinct from Species, and Species from Races, because the intervening links have disappeared; and, if we could have before us the complete series which, according to the doctrine of Evolution, has at some time existed, neither Genus nor Species would be capable of definition, any more than are Races in many cases; while the same remark will apply to the larger groups.” This might well become the esoteric faith of every describer and monographist; most naturalists admit the truth of the doctrine, but specific and generic controversy is not yet a thing wholly of the past.

The Resources of the Sea, as shown in the Scientific Experiments to test the effects of Trawling and of the Closure of certain Areas off the Scottish Shores. By W. C. McINTOSH, M.D., LL.D., F.R.S., &c. C. J. Clay & Sons.

THIS excellent contribution to the natural history of the sea is written to sustain a thesis, which is, that, granting man's unfortunate agency in the extermination of many land animals, his influence on the resources of the sea is infinitely small, almost practically *nil*. Last year (Zool. 1898, p. 376) we had the pleasure of giving extracts from a lecture by the Professor on that subject, and this book is a demonstration and exemplification on that theme. It is pleasant to find this bracing optimism in relation to at least one of Nature's realms. The enmity of the fisherman to the Star-fish, by "tearing them across the body before returning them to the water, only helped to increase their numbers, for each portion of the disc was regenerated and became a complete five-rayed Star-fish." In fact, "the survey of the sea and its inhabitants, therefore, in the main, affords no grounds for pessimistic views, but, on the contrary, conduces to reliance on the resources of nature (by which we mean Divine Providence) in this vast area." The deadly effects of the "trawl," as we have read elsewhere, on adult Sponges, Zoophytes, Star-fishes, Crabs, and Shell-fishes on the sea bottom is stated to be compensated by the fact that their larvæ and young are pelagic, and quite beyond the reach of injury. Even the "crushing and division of Sponges is not followed by the death of all the fragments, and each of those which survives is capable of flourishing as an independent organism (not to allude to the liberation of ova which may happen to be present)." It seems very necessary to remember that there is a surface as well as a bottom fauna, and that while we may bewail the action of the trawler on the latter, we must not overlook the action of screw-propellers, which must kill myriads of young, and destroy countless floating eggs. After all, our knowledge of even some of our common food-fishes is very incomplete. "Why should we not be in a position to say, in this nineteenth century, that a fish, say, the Haddock, extends in great numbers from either hemisphere into the Atlantic, and, if

so, whether the pigmy belt of the three-mile or even the thirteen-mile limit can have any more influence on this form than on the ever-abundant Herring?" In this able defence of the "trawl," we may realize what a destructive, though not altogether exterminative agent it is; but beyond this the book is a welcome addition to a knowledge of the inhabitants of that most romantic and little-known region which we call the Sea.



Des Hybrides a l'état sauvage. Règne Animal. (Classe des Oiseaux).

Par ANDRÉ SUCHETET. Lille: Bigot Frères.

HYBRIDITY is a problem which lies at the root of a philosophical conception of the much-used and much-vexed term "species." We all agree that the various breeds of Fowls and Pigeons represent but one species, because we know their life-histories. But we describe new forms of animals received from abroad as species on the canon of what is understood as "specific differences." Hence philosophically we are wrong, and systematically we are right, and the same practice and a similar rule are employed by naturalists throughout the animal kingdom. Even mankind have afforded the same problem, and from France also came a suggestive little book by Dr. Paul Broca, which was translated and published in London in 1864 under the title of 'On the Phenomena of Hybridity in the Genus Homo.'

Mons. Suchetet has undertaken a great work, and if succeeding volumes are allied in size to this one devoted to birds, a colossal publication on the subject is assured. The limitations attached to the term "species" are apparent when our author remarks:—"Nous avons substitué les mots '*formes animales*' aux mots '*espèces animales*,' parce que notre embarras a été grand lorsqu'il s'est agi de distinguer entre l'espèce et la race (ou, pour mieux dire, entre l'espèce et la *sous-espèce* comme on fait emploi de ce mot en zoologie)." The introduction occupies no fewer than 118 pages, and is a valuable summary of most that has been written on the subject. In the "Liste des Musées Publics et des Collections Particulières dont les Directeurs ou les Propriétaires ont été assez gracieux pour nous envoyer en communication," we notice seventy-eight entries, the cosmopolitan character of which prove that the material has been widely sought; while the "Liste

Alphabétique des Personnes avec lesquelles nous avons correspondu au sujet des Hybrides" is a most representative one, including many of our own contributors, some under a new appellation, as, for example, the Curator of the Leicester Museum, who appears as "pasteur à Rotterdam (Hollande)."

Neither time, trouble, nor expense has evidently been withheld in the production of this book, which incorporates a large amount of scattered information in a systematic and judicial manner, and will for a long time prove a recognized reference to a most important factor in zoological philosophy.

A Dictionary of Bird Notes, to which is appended a Glossary of Popular, Local, and Old-fashioned Synonyms of British Birds. By CHAS. LOUIS HETT. Jacksons', Market Place, Brigg.

In these pages (1897, p. 535) we published an announcement by Mr. Hett that he was preparing a Dictionary of the Call-notes of British Birds, and we have now received a tasteful and inexpensive book—interleaved for the record of observations by the reader—which may well find a place in the ornithological library. The method pursued is as follows:—Firstly, under "Note-Bird" an alphabetical list of the notes, with the name of the avian vocalist attached, is given, and then, under "Bird-Note," the arrangement is reversed. Easy reference is thus afforded, and the equivalents of the sounds themselves will and must be judged by specialists in the appreciation and interpretation of bird-notes. The Glossary of Popular, Local, and Old-fashioned Names of British Birds is a most excellent and useful compilation, which should prevent many errors on the part of too hasty transcribers of observations, and prove a boon to puzzled readers of local notes. A List is given of the 376 Birds accepted as British by the Committee of the British Ornithologists' Union in 1883, and also of the "Terms applied to Wild Fowl," as, for example, "RUFF. 'a hill of,' several."

EDITORIAL GLEANINGS.

WE have received the Annual Report and Transactions of the "North Staffordshire Field Club" for 1897-98. In Sectional Reports, and under Zoology, Mr. Masfield reports as follows:—"It is frequently said by our landowners who are Fox-hunters that Badgers kill or drive away Foxes. Now the Badger still survives in our county, as is shown by the frequent reports I receive from different localities of Badgers having been observed, dug out, or shot, and therefore I am glad to be able to state, on the authority of Mr. Heinman, of Porlock, who has had exceptional opportunity of studying the ways of Badgers, that equally in Devonshire, Somersetshire, and Northamptonshire he 'has constantly found full-grown Foxes and Badgers dwelling together in unity.' This statement will, I trust, dispel the fears of Fox-hunters for ever, and should cause them to extend 'neutrality,' at all events, to our local Badgers in future."

WE are all cognisant that light attracts fishes as well as many other animals. We have been much interested in the accounts of the new French naval destroyer 'Gustave Zédé.' Anything more unlikely to produce a zoological observation than this proposed navy annihilator is difficult to imagine. Still, the unexpected always happens. We learn that the destructive powers of this new terror are limited, not alone by naval science, but by natural causes, and by fish. "As for the telescopic mirror arrangement which was to enable her to direct her course from under water, it failed, not for one but for several reasons; while her 'electric eye,' or searchlight, so far from enabling her to see anything ahead of her through the water, rather rendered the sea ahead more opaque, as it attracted shoals of fish, which hovered round the brilliant disc, like moths round a candle."—*Westminster Gazette*.

AT a meeting of the Zoological Society of London, held on Feb. 7th, Mr. G. E. H. Barrett-Hamilton read a paper on the Mice of St. Kilda, of which he recognized two species—*Mus hirtensis*, sp. nov., a representative of *M. sylvaticus*, and *M. muralis*, sp. nov., representing *M. musculus*. Both of these species showed good distinctive characters from their well-known prototypes.

At a similar meeting, on March 7th, Mr. W. E. de Winton exhibited and made remarks upon the tail of a Common Fox (*Canis vulpes*), showing the gland on the upper surface covered with straight coarse hair, the existence of which appeared to be little known.

THE Annual Meeting of the Society for the Protection of Birds was held on Feb. 28th, Sir Edward Grey, M.P., in the chair. The Report, which was presented by Mr. Sharpe, chairman of the executive committee, stated that the total number of members is now over 20,000, and the branches number 152. The Society still continued its campaign against the wearing of Ospreys, but without apparently much effect, as in 1898 nearly 35,000 Birds of Paradise and 2200 packages of Osprey plumes were sold in six days at auction. With regard to Ospreys worn by the officers of certain regiments, a promise had been given by Mr. Brodrick that an effort will be made to find a substitute. Sir Edward Grey, in moving the adoption of the Report, said the Society had done much to awaken public opinion to the need of checking the wanton destruction of bird-life. But a wholesale destruction of foreign birds in the breeding season still went on, with a view to supplying ornaments for hats, which would necessarily lead to the extinction of certain species. People did not realize this. Considerable power had been given to county councils to protect bird-life, and they had responded very well, and in most cases had passed very satisfactory bye-laws. But the real difficulty was the enforcement of these rules.

WE have received from the "Humanitarian League" a tractate on "The Cost of a Seal-skin Cloak," by Joseph Collinson. He who reads may literally shudder on horrors as the callous destruction of these animals is detailed. Allowing, however, for all exuberant animal sympathy, and offending no "philistine" with the introduction of a new "fad," we must agree with much that is here written. The writer pithily remarks:—"It is a remarkable fact that during the whole of the time that the Anglo-American controversy raged over the Behring Straits Seal question, not one word should have been said on behalf of the Seals themselves. The flood of talk swept on; there was a great deal said about 'rights'—every right, indeed, was abundantly discussed except the right of the Seals, if not to live their lives in their own way, at least to humane treatment when the time comes round to kill them. The horrible tortures inflicted on these helpless animals to provide mankind with Seal-skin were treated as if they were entirely immaterial."

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EARLY SPRING MIGRATIONS.

BY JOHN CORDEAUX, F.R.G.S., M.B.O.U.

THE spring movements, or the passing out, of birds such as winter in these islands, as all observers on the east coast are aware, is far less in evidence than are those great and continuous inrushes in the autumn, extending over days, weeks, and months, and arresting attention by their very magnitude and persistence. In the vernal movement, or emigration, there is rarely anything to attract notice, for it seldom happens that flights of birds are seen actually leaving the shore; all the chief phenomena probably occurring in the night time, or at such a height as to be invisible to our eyes.

That great movements are in progress is suggested by the larger flights of various species which in the early spring congregate in the coast districts—here one day and gone the next—and having their places taken by other flocks presumably coming from more inland localities, all bent on leaving the country; for it is now a proved fact that, as a rule, birds emigrate from the same section of coast as witnessed their immigration, only in the reverse direction.

In this north-east corner of Lincolnshire, bordering the sea, the most obvious and perhaps the best marked spring movements are in connection with the Thrushes (*Turdus*). By the end of February, excepting such as are resident and nesting, the

immigrant Mistletoe-Thrushes (increasing numbers of which annually arrive every autumn) have taken their departure. Old cock Blackbirds begin to swarm in coast hedgerows, and in fact in every tall rough fence and coppice for miles inland, till we are amazed at their astonishing plenty and the facilities offered for the "four-and-twenty Blackbirds all baked in a pie." These Blackbirds, also the Thrushes which move later, do not appear to congregate into flocks on departing, but gradually thin off and disappear from their temporary retreats as the spirit moves them. This, however, is not the case with the northern Thrushes—Fieldfares and Redwings. Both are gregarious, and the former pre-eminently so; for days before setting off, Fieldfares sit in great flights in the middle of pastures, or crowd the summits of lofty trees within sound of the surf. Wild by nature and noisy to a degree, their harsh "yack-chuck-chuck" is about the most familiar of the bird sounds in the marshes. This mild winter has been very favourable for them with the abundant crop of hips and haws, yet with all this abundance neither young nor old have forgot the track of the Norway wind and the path to the summer home. Their going out is a long and protracted business, often not completed, although it begins early, before the middle or end of May. Redwings—most plentiful during this winter—are in a degree less gregarious, but they have much the same habits as their congeners, and leave at the same period as do the emigrating Thrushes (*T. musicus*), and they make a much more rapid and complete work of it than the Fieldfares, for we shall not find a Redwing after March, or middle of April at the latest, in the park-lands, paddocks, or meadows bordering the streams, where they have been hopping all the winter.

It is remarkable, considering the millions of Larks which for weeks and months pour on to the east coast in autumn from early in August to Christmas, so little is known of their emigration. Such, however, is the case; they succeed in slipping off quietly and unobserved, and probably, as in autumn, in straggling companies, and at night. Larks, however, do not always adopt open order on their migrations, and I have known them, under certain meteorological conditions, approach the coast in densely packed flocks like clouds, and hundreds of yards in extent.

Immigrating Lapwings, on first coming to land, sit for a time very closely packed where they happen to alight, as if comparing notes of their passage; and I have often noticed that before leaving their winter quarters they come together in the same way, covering the land like a black sheet.

Grey Crows have for weeks (March 24th) shown signs of leave-taking, and now scarcely any of the many hundreds can be seen in their winter haunts, or on the Humber tide-slobs. Black Carrion Crows move about the same time, and they are very numerous here in winter. I know of one small wood where about two hundred have come in each night to roost.

Golden-crested Wrens are always in evidence about the last week in March, not showing in the thousands of autumn immigration, but two and three together, and scattered all about the country. When delayed in departure by unfavourable weather conditions, I have known them accumulate in great numbers in the Flamborough hedgerows.

I often wonder what becomes of the Redbreasts which in October come in thousands at the same time as the Gold-crests. Robins which we see at low water skulking amidst blackened timbers of ancient wrecks miles from the shore—Robins in scores on the bleak wind-swept fitties sheltering amongst sea-plants, or on the marram-grown dune—Robins again in hundreds preening and sunning on the lee side of storm-clipt hedgerows, so numerous that on dull autumn days the dark strip of fence is bright as a flower-bank with the gleam of so many chestnut-red spots. Indications of the spring migration of Redbreasts are few; possibly they may return to their European quarters by another route. At Heligoland during the first part of April they are in the height of the movement.

Woodcocks and Gold-crests (Woodcock pilots) are fellow-travellers in autumn, and on the move at the same time in spring from the middle to the end of March, when the former approach the east coast and appear in the covers.

Peregrines in pairs move northward along the coast in March.

Greenfinches, Chaffinches, Twites, and Yellowhammers, particularly the latter, come in great flocks in oat-seed time, but are quickly gone, often remaining but a few hours.

Many Grey-Geese were observed by the coastguard passing over North Cotes on Feb. 10th and 11th. About the same date Golden Plovers were singing their spring song, one of the most charming sounds in nature, always reminding me of some of the flute-like notes of a Blackbird.

Resident Starlings are now (March 24th) busy at their nesting quarters; at least a dozen pairs in the ivy of this house. Tens of thousands, however, of the foreign purple-headed birds continue each afternoon to fly over the grounds to roost in a blackthorn cover in the marsh. They are late emigrants, and will probably not altogether disappear before April is well on.

I saw the Gold-crest here on the 24th, and a Woodcock the same day. On the 25th many Golden Plovers, several black-breasted, and the remainder more or less in transition. In meadow lands and pastures extraordinary numbers of Fieldfares and a few Redwings. The great severity of the weather since March 17th has probably retarded and thrown back any migratory movements on their parts, hence this great accumulation in our coast district.

Further Notes on Spring Migration.

On the night of Feb. 7th to 8th, Larks, Thrushes, and Redwings beat about the lantern of Flamborough Lighthouse, and again, mixed with Starlings, on the night of 14th to 15th.

Night of April 4th to 5th a Water-Rail was killed against the lantern; also two Golden-crested Wrens flew against the glass—this was just after midnight. The same night (4th to 5th) a remarkably fine heavy Woodcock flew against one of the telegraph wires near Filey Station, and all but decapitated itself, the head being only attached to the body by a loose fragment of skin. The Water-Rail which I obtained at the lighthouse on the 6th was bruised down one side, and appeared to have struck sideways. These notes are interesting, as they indicate the time these birds were on the move and actually leaving the country.

Between April 1st and 4th many Wheatears passed north, apparently touching the most prominent positions along the coast. They were, between these dates, seen in some number at the Spurn, Flamborough Head, Filey Brigg, and Scarborough

Castle Rock. In two of these places I did not see one on the 5th and 6th.

Wheatears appeared much earlier on the west coast. Mr. G. H. Caton Haigh wrote to me:—"On the 21st (March) we had the heaviest snowstorm that has occurred here for years; in the afternoon the snow was eight inches deep. In the midst of this storm the first Wheatears appeared, four or five, all males; they frequented the seaweed-covered rocks in company with scores of Meadow-Pipits."

ORIGINAL SKETCHES OF BRITISH BIRDS.

BY H. S. DAVENPORT.

THE RING-OUSEL* (*Turdus torquatus*).

My knowledge of this species has not been acquired to any exceeding extent in Leicestershire, though sundry authors in giving a list of the counties in which it has been known to breed do not exclude the shire which is chiefly famous for Fox-hunting. I have certainly met with the Ring-Ousel in the county on the spring and autumn migrations, but of course its true breeding places are the upland wastes and the wild and rocky districts in more mountainous parts of the country.

Leaving the cultivated lowlands and the civilization of village communities behind me one April morning during the spring of 1894, I started on a nesting tramp into the mountains between Festiniog and Dolgelly, my object being to spend an hour or so with the Ring-Ousel, and to get as far as Blaenlliw, a farm about five miles distant from the Llanuwchllyn end of Bala lake, tenanted by the kindest and most hospitable of people, and, what was infinitely more to my purpose, situated right in the heart of the mountains of North Wales—"right away from everywhere," as it was succinctly described to me. It was a charming morning, and for the first mile my course lay by the side of the river Lliw, where I had occasional visions of Common Sandpipers flitting to and fro, while here and there a Grey Wagtail, or a Pied Flycatcher, or a Dipper caught my eye. After passing the gold-mine, Carn Dochan by name, I began to rise the high ground, and a walk of another mile or so brought me nearer to the haunts of the Ring-Ousel, whose home in the summer is essentially a wild and romantic one. From the summit of the rock-strewn hill between Carn Dochan and Arenig a magnificent view of some of the surrounding country was unfolded to my gaze, while the Blackbird's mellow notes, which I had listened

* "Ousel." This spelling is by request of Mr. Davenport.—ED.

to only so recently and had easily identified amidst the general chorus, began at length to be replaced by those of the Ring-Ousel, and, though I am doubtless laying myself open to the charge of bad taste, I cannot say that I regretted the exchange.

A shy bird I am inclined to call the Ring-Ousel, for it will fly from rock to rock, generally keeping at a respectful distance; but when the vicinity of its nest is invaded, temerity becomes a very strongly marked characteristic of the species. In common with the Blackbird, it possesses the habit of elevating its tail on alighting, but in my humble judgment its song bears a stronger resemblance to that of the Mistle-Thrush than to that of the Blackbird. I have been fortunate enough to hear the Ring-Ousel and Mistle-Thrush sing within a short range of each other, and, though it is always far from my wish to appear dogmatic, I cannot agree with those writers who rather liken the former's song to that of the commoner species.

The Ring-Ousel also possesses three or four piping, plaintive notes, *pee-up, pee-up, pee-up, pee-up*, quickly repeated; they sound inexpressibly weird and sad when heard under certain conditions, and are, I believe, the call-notes of the male. While uttering them the bird will not improbably be found perched low down on a rock, and remaining so still that, unless the listener has a first-rate eye, it will be very hard to catch a glimpse of the performer. The alarm-note is a hurried *tac, tac, tac*.

A nest I found on the morning to which allusion has been made was placed on the ledge of a rock, and contained four eggs; they were greenish blue in ground colour, richly blotched and flecked with purplish brown. In fact, they were typical eggs of the species. Hard by was a Common Buzzard's nest containing two fresh eggs.

I had never considered the Ring-Ousel from an epicurean point of view until the autumn of 1894, when I formed one of a party Grouse-driving on the Stiperstones, a well-known stretch of rough and rocky moorland in Shropshire, when the bird that is so easily recognized by its conspicuous gorget was daintily served up as a second course one evening for my especial benefit. In my opinion it beats all the other members of the family *Turdinæ* in flavour, but is not comparable with either the Snipe or Land-Rail. I should add, however, that the bird I sampled was in

famous trim for the table, as it had been feeding on the cranberries and bilberries which grow in profusion on the Stiperstones range, and it was covered with fat. It had evidently preferred the sweeter bilberry to the cranberry, as I made a note of on picking it up.

I also found a nest of this species in the spring of 1894 on the rocky heights above Aberhirnant, Sir E. Buckley's picturesque residence in Merionethshire; it contained a single much-incubated egg. Ring-Ousels are undoubtedly partial to rocky situations, and it is perhaps worthy of remark that just about the time when Fieldfares and Redwings are quitting our shores for northern climes the Ring-Ousels make their reappearance. The nest bears a striking resemblance to that of the Blackbird, as do some of the eggs to those of that species; but a combination of care and patience should always prevent any blundering in the matter of a correct identification of the same.

THE WHEATEAR (*Saxicola cenanthe*).

According to my observations, one of the earliest of the spring migrants to put in an appearance in this county (Leicestershire) is the Wheatear. I find on reference to notes extending over several years that the little Chiffchaff hunts it very closely, but in the matter of actual precedence, in the large majority of cases, the Wheatear is easily first.

I have observed its sprightly form even before the middle of March in some seasons, and have been frequently struck with wonder at its comparative tameness on arrival in this country, allowing a very imminent approach as it does, and apparently courting close inspection. Invariably by itself when I have so observed it—for, like other migratory species, the males precede the females—it regards the intrusion of a visitor on its temporary halting ground with consummate indifference. I should here remark, however, that the grass pastures and tillage lands of High Leicestershire are little calculated to permanently attract such species as resort for breeding purposes to the downs and warrens and the wild, mountainous, and uncultivated districts of more southern counties.

A favourite resting ground in the spring of the year with an odd Wheatear or so is a large rabbit-warren on the borders of my

native village, and thither I generally betake myself in quest of the earliest arrival of this species. There is an old saying that spring has come when you can place your foot on five full-blown daisies in a cluster, but our feathered visitors, to my thinking, are the best harbingers of the glad time of the year; and whether it be sight of Wheatear or song of Chiffchaff, there is no doubting the eloquence of the reminder that the frosts and snows of winter are virtually a thing of the past.

Wheatears only stay a few days on their first arrival in these parts, moving forward to their breeding quarters as soon as they have recuperated their exhausted strength. Yet they afford us more than a passing glimpse of them in September, and it is not at all uncommon when out Partridge-shooting to notice them on the fallows, or in fields where stones have been gathered together into little heaps. Where, however, in the spring time only a single bird had been noticed, in the autumn there would frequently be two of them together.

I have only met with one instance of this species breeding in Leicestershire, and consider the fact of its having nested where it did most unusual. That Wheatears should repair to the rocky heights round about Bardon and Bradgate to rear their young does not surprise me in the least, for in such wild tracts they are quite in their element; but that a pair of these birds should have had recourse to a drain-pipe on the turnpike road in Skeffington parish, in which situation they built a nest in May, in the year 1875, and laid five eggs of a pale greenish blue speckled very distinctly with brown, was quite a novel experience. The eggs were slightly incubated when I found them, and the birds must have employed a vast amount of cunning to have escaped detection so long, as the drain-pipe was within but a short distance of the village school, and there are few boys who are not indefatigable nest-hunters during their play-hours. This nest was constructed of pretty much the same materials as are to be found in the general run of Wheatears' nests, the lining being of cow-hair, rabbits' fur, and a large quantity of feathers; but the exterior was composed of fibrous roots, dried bents, moss, and hay, and it was bits of the latter protruding from the drain-pipe that first gave me the clue to the nest. Of course my suspicions had been previously aroused by seeing the birds in the locality.

It is very seldom that Wheatears perch on trees, but I have seen them do so, and they have not avoided the higher branches. The male bird sings very prettily, and it has often been my good fortune to hear it in the rock-strewn mountains of North Wales. The song consists of four or five rich, clear, mellow notes succeeded by an equal number of trilling ones, which might easily be mistaken for some of the tremulous strains of the Whinchat, though they are more musical and less harsh. It sings when stationary as well as in the air, and a pretty sight it is to watch it quit its perch on a rock, mount into the air after the manner of the Whitethroat, twist and jerk about, singing all the while, and then descend to its original starting point. It frequently runs two or three steps before taking wing, and when apprehensive of danger it repeats again and again what sounds in my ears like *trz-wee, wee, trz-wee, wee*. The bird is not uncommon on the mountainous tracts of rocky moorland in North Wales, as I have already intimated, and a favourite place for its nest, according to my observations, is in a stone wall, though I have also met with nests in rabbit-burrows, as well as in the cavities beneath great boulders of rock. I found the species especially abundant on Lundy Island in the spring of 1897. I am always glad to get a chance of hearing a song which has been much vaunted by authors, though few birds are so speedily on the alert as Wheatears when they mark the approach of an intruder. The male bird, perched conspicuously on some rock or wall, is almost certain to catch the eye first, but probably, long before you have seen it, it has seen you, and telegraphed a warning note to its mate. It will fly about from boulder to boulder, out of sight one moment and reappearing the next; but do not be misled by an apparent indifference to your presence. Though you may note it dart forth and catch an insect, it is all the while vigilant and suspicious to a degree, and though you may crouch in the bracken and keep watch for an hour, it has not forgotten, nor will you entrap it into overlooking, your presence; while as to betraying the whereabouts of the nest, depend upon it, it will be pure guesswork if you find it. It is a vivacious little bird to watch, and seems to have a high opinion of its own superior intelligence; while the rapid up-and-down movements of the tail, which appears to be ever in motion, is a habit which we are more apt to associate with members of the Wagtail family.

I have noticed in clutches of eggs of this species, that when all the eggs have rust-coloured specks on the surface, one of the number generally has such specks much more strongly pronounced than the rest. Again, that when the clutch is of a pale greenish unspotted blue, uniform in colour, one egg occasionally exhibits a few faint rust-coloured specks. Such an egg I regard as answering to the variety that is so frequently found in the nests of other species, and in none is the difference so emphasized, in my opinion, as in the case of the Sparrow-Hawk and the Tree-Sparrow. Eight is freely spoken of as the extreme number of eggs in a clutch, but my belief is that six is much more frequent; very rarely seven. I have never found so many as eight myself, nor have I known anyone who has actually found this number; I have never met with a dealer who had a clutch of eight for sale, and therefore it would be interesting to me to learn what the authority is, and whence it emanated, for such a statement.

It is, of course, matter of history what immense numbers of Wheatears used to be taken in traps on the downs in bygone years when assembling previous to retiring from this country. In those days they were esteemed very delicious articles of food, and though the taste may not have died out, yet, owing to the large tracts of waste land which have been reclaimed since that era, the haunts of the Wheatear have been much encroached upon and virtually broken up. It is, too, common knowledge that the species is an adept at the art of mimicry; but it may not be so generally known that on fine warm nights in May it will sing till long after dark.

THE WHINCHAT (*Pratincola rubetra*).

I have noticed that this species is to be met with more frequently some years than in others, and though doubtless numbers resort to furze-clad commons for breeding purposes in general with their near relatives the Stonechats, I do not agree that the nest is of necessity to be sought in such wild districts. On the contrary, I look upon the Whinchat, which is a spring migrant and arrives in this country about the middle of April, as a sociable bird, and partial to cultivated fields and roadside hedges, whereabouts it finds an abundance of insectivorous food and suitable spots for rearing its young.

Considerable stress has been laid on the fact that Whinchats study the art of concealment when constructing their nests, or, perhaps I should more correctly say, when choosing a site for the same; but that such cannot be the invariable rule is, I think, made evident by the very open situations in which I have found them. On more than one occasion have I discovered a nest mainly owing to first having caught a passing glimpse of the glossy greenish-blue eggs reposing in it. I have known nests in various situations: in grass fields, in the banks of roadside ditches, in coarse grass on a hillside, on railway embankments, and at the bottom of gorse bushes on the upland wastes. There is no doubt that when built in this last-mentioned position the nest is exceedingly well hidden, and not likely to be easily discovered unless you chance to beat the bird out of her recess, or detect her quitting it as she hurriedly flies forth at the signal of danger from her mate. If the eggs are on the point of being hatched, the hen will sit uncommonly close; but if they have only been recently laid, the alarm-notes have the desired effect of scaring her away immediately.

During the period of incubation the male bird keeps a vigilant and incessant outlook, and gives warning of the approach of an intruder by sharply uttering the notes *utac, utac*, and there is no more convenient eminence for observing this habit than the top of a railway embankment, the cock bird, as a rule, being perched, sentinel-like, on the telegraph wires. My wife found two nests of this species on a grassy slope just outside Scarborough in the summer of 1892, each containing six eggs, which is the usual number of the clutch. There was nothing remarkable in the mere discovery of the nests beyond the fact that both were built within a few yards not only of each other, but of the old nests of the preceding year. Yet another instance of the tendency of birds to return annually to their erstwhile haunts. One of the nests I found by first noticing the eggs, was placed in an open bank in the middle of a field adjoining the river Lugg, in Herefordshire; it was the sort of situation a Redbreast might have chosen, but almost too exposed, I should have thought, for even this confidential species. Another nest was placed in a grass meadow that had been "laid" for hay, and could be seen from the foot-path that bisected it.

However, the most sure and effective way of discovering the nests of many of our spring migrants is to note the exact spot of a district they frequent on their arrival; there or thereabouts—unless the halt, as in the case of the Wheatear, is destined to be merely temporary—you may generally rely on meeting with them two or three weeks later. I took a clutch of seven beautiful eggs on May 18th, 1893, under circumstances which will serve by their narration a twofold purpose, *viz.* to adorn my story and point a moral.

I had noticed a pair of Whinchats frequenting a broken straggling hedgerow on their arrival just a month previously, and had also remarked that an artificial cutting or trench, overgrown with rank herbage, ran alongside of it. The movements of the birds showed pretty plainly that they had come to stay, so, merely jotting down in my note-book a memorandum as to the species, locality, and date, I troubled no more about the matter until the morning I removed their eggs to my cabinet. I have merely related the above as evidence of what can be done by a little intelligent observation in the early days of spring. I would also impress upon all those who tread the paths of ornithology the infinite value of learning the song of each different bird; many and many a time has a ripple of melody betrayed the fact of a nest in my vicinity when I had little suspected it. Again, it is of untold advantage to have at your fingers' ends the different haunts affected by the different species for nesting purposes, and the actual sites usually selected by them. Moreover, it is not probable that your eye will see every nest when you are hunting a hedge, or bank, or bushes, or the brushwood and undergrowth of plantations and woods—far from it; though the possession of a stout walking-stick, discreetly used, will frequently make up for any ocular shortcomings.

The eggs of the Whinchat vary in number from five to seven, but, as has been already intimated, six is a favourite clutch. Some are inclined to rotundity, others are elongated; while their ground colour is of a greenish-blue type, and occasionally exhibits a polished appearance, more especially when the eggs have been incubated for any length of time. Sometimes they are without the wreath of brownish frecklings round the larger end, but in most series this addition to their beauty is, I have reason to

believe, fairly well established; occasionally the specks are faintly distributed all over the shell. The illustrious Colonel Montagu, who states that the eggs are entirely blue, without a spot, and in this connection compares them with those of the Stonechat, evidently had an experience very different to more modern observers; and it is difficult to reconcile what he so emphatically alleges on the point with the observations that annually come under my own notice, except on the plausible supposition that it is only of late years the brown frecklings have become so pronounced a feature in the appearance of the egg. They have little of the turquoise-blue of the Hedge-Sparrow's eggs about them, and they ought never to be confused with those of the Redstart, and seldom with those of the Stonechat. The variety egg I have often noticed in nests of the Whinchat takes the form of a much lighter ground shade, and the frecklings are generally more emphasized. To assert, however, that this egg is invariably the last one laid is contrary to the fact, for I have known instances when it was the first.

Sometimes when in pursuit of food this species has a pretty habit of poisoning itself on hovering wing—after the manner of Swallows in hay-fields before the grass has been laid low—and then darting down, snatching its prey, and flitting back as quickly as possible to the top of the bending spray from which it had only a few moments previously gone through the same process. I do not mean that Swallows actually perform all this—only that their suspensory movements in mid air when hawking for insects at a low level over tall standing grass are very similar to the hoverings of the Whinchat. The analogy, however, must not be carried any farther, for as the former species snaps up its prey at about its own level, the latter often indulges in a downward, almost pouncing kind of movement.

The statement that the Whinchat as a species passes the winter in these islands is, of course, entirely apocryphal; it may be that individuals have remained on occasions, but in the majority of cases it is warrantable to suppose that casual observers have mistaken the Stonechat for the bird under discussion. Neither have I any faith in the assertion that this species is double-brooded, and only regret that there is no means of tracing the authority for some of the remarkable statements

with which not a little of the popular literature of the every-day bird-life of our islands is overburdened.

The song of the Whinchat is not unlikely to escape notice amidst the conflicting strains of various warblers, and, even if heard, may easily be mistaken by careless listeners for that of the Redstart. There is a peculiar harshness, not by any means unpleasing, about it; but, though I am very familiar with it, and never deem a few minutes' delay in order to listen to it as time ill-spent, I have presence of mind enough to know how feeble most attempts are that aim at reducing the songs of birds to writing. Syllables suggestive of the call-notes are all very well and frequently instructive, as, for instance, the late Mr. Seebohm's felicitous rendering of the Lesser Redpoll's call-note by the French word *henri*; nevertheless, attempts to give the full song of a bird on paper must more often than not end in fiasco. That of the Whinchat is interspersed with some beautiful flute-like strains, but the harsher tones predominate in the refrain which is not disappointingly curtailed, and is repeated again and again from some elevated perch where the performer takes up a conspicuous position on the topmost twig for minutes together. The performance is usually accompanied by a fanning motion of the tail.

My impression is that Whinchats' nests need not be looked for much before the end of the second week in May; my earliest recorded date is on May 12th for the first egg, and some other dates run thus: May 21st, May 26th, May 27th, May 28th, and May 29th; and it is partly on this account—late nesting—that I decline to accept the apparently irresponsible statement that the species rears two broods every year. The young of the first nest cannot be taught to provide for themselves all in a moment, and though some birds undoubtedly have two or three broods in the course of a summer, they are chiefly those that nest in our gardens and orchards, and whose young are out of the first-laid eggs before some of the migrants have reached our shores. Again, if these alleged second broods were so common, the males would surely treat us to a second edition of their May concert in June, which, as a matter of fact, they do not. Towards the end of this latter month, to my mind, it is quite melancholy to take a stroll through the woods—almost every voice is hushed.

The male bird is quickly apprehensive of danger, and in nine cases out of ten espies the intruder long before the latter espies him. It is too late to acquire much information about the site of the nest when your first intimation of the presence of this pretty migrant is a sight of him on some commanding perch. As in the case of the Wheatear, the Goldfinch, and the Golden-crested Wren, I have never discovered the male Whinchat actively participating in the building of the nest, and I am quite positive that not a few of the smaller nests which we come across in this country in the course of the summer are solely the work of the females.

One word more. Is the Whinchat a mimic? It certainly possesses a note at times not unlike that of a Partridge, though, of course, on a modified scale.

THE STONECHAT (*Pratincola rubicola*).

The Stonechat affects those wild uplands and barren heaths which are studded with a luxuriant growth of furze and other bushes of a corresponding height, and here it secures concealment for its nest and young, and a supply of food, more or less, all the year round. I have only twice met with this bird in Leicestershire, and that was during the winter of 1886, and the autumn of 1898. I should mention, perhaps, that my home for over ten years was at Ashlands in that county, between two and three miles from my native village, and in the winter I have referred to a Stonechat used to come and perch on the temporary railings which protected a new cricket-ground that was being made near to the house. None of the workmen engaged in levelling the turf had the least idea what the bird was, though they showed a little discernment when sending me a message to the effect that "a funny kind of Flycatcher" was their constant companion. Certainly, the Stonechat's method of taking its food on the wing very much resembles that of the bird above mentioned, and the fact of its presence near to Ashlands in mid-winter tended to confirm Harley's statement to the effect that at that season "it left its ordinary habitat of the whin-covered moor and wild for the cultivated field and hedgerow." What warranty he had, however, for saying that the nest was occasionally lodged on the horizontal bough of a Scotch fir, I know not.

I am presumptuous enough to think, after careful observation, that the nomenclature of each of the three species, *viz.* the

Wheatear, the Whinchat, and the Stonechat, is open to improvement, and that if lots were drawn as to which of the names should be applied to each bird, the result might not improbably be more in accordance with their individual haunts and habits than is now the case. The favourite perch of the Wheatear is beyond all doubt on some wall or rock, and its affection for stony places is notorious. The Whinchat, to my thinking, frequents the lowland pastures more frequently than the upland heaths, and is not necessarily to be sought amongst whins; while, on the contrary, the haunts of the Stonechat are confined almost exclusively to wild heaths and commons, and on the topmost sprays of the whin-bushes it is almost invariably to be seen stationed. Nevertheless, the Wheatear does not take its name from the haunts it particularly affects, as its congeners are supposed to do.

Bircher Common—or, to use the vernacular of the district, Bircher “Kimmin”—is one of the favourite resorts in Herefordshire of the Stonechat. Here it is an early breeder, and those who are in want of its eggs and meditate a search for the same on their own account, had better make a note of the fact. The allegation that it rears two broods in a season, however, is probably correct. The nest, somewhat slovenly put together, is almost invariably placed on the ground in the recess of some furze-bush, and is most skilfully concealed. It is composed of moss and dry grass, and lined with finer grass, hair, and occasionally a few feathers, while I have one nest in my memory, taken on Bircher Common, that was profusely lined with sheep’s wool.

The eggs are subject to a certain amount of variation, but the ground colour is generally of a pale greenish blue, typical more of the shade of Spotted Flycatchers’ eggs than that of those of its allied species, the Whinchat. They are, however, very prettily and distinctly mottled with specks and spots of reddish brown, which, when not confluent, frequently form a wreath round the broad end. I have never come across the unspotted variety in my wanderings. The most perfect clutch of Stonechat’s eggs I ever saw came from the common I have already alluded to; they were not only of unusual size, but a magnificent zone of bold brown markings enriched the broad end of every one of them. Five is as frequent a number in a clutch as six, according to my observations.

THE REDSTART (*Ruticilla phoenicurus*).

Many birds pause awhile after reaching this country before engaging in nesting operations, but I am rather inclined to think that the Redstart is not one of the number. I knew of a nest in the hole of a tree one year that contained an egg so soon as the first day of May. Early on the morning of May 5th a heavy snowstorm raged for a couple of hours, and when, shortly afterwards, I inspected the nest, I found the hole, which faced due north, filled with snow, some of the eggs broken, the interior of the nest disarranged, and the locality forsaken by the birds themselves.

I have found many nests of this species in the course of my rambles, and noticed that, in addition to being a comparatively early builder, an especially favourite haunt is the pollard or "sally" trees—as they are termed in some parts of Herefordshire—that form so ornamental an appendage to the banks of rivers. I am not quite sure that pollard willows do not more correctly express the type of tree I have in my mind's eye; but willow, pollard, and "sally," all, I believe, indicate its colloquial appellation in different parts of the country. In the natural holes of such trees the Redstart loves to nidificate, though suitable cavities in stone walls are equally resorted to.

With regard to its eggs, I have found the clutches varying from five to eight, but am of opinion that six, equally with seven, is the more favoured number. They are smaller, and lighter in shade than Hedge-Sparrows', and the shell is far more brittle. Touching the colouring of the same, I find myself in distinct opposition to the experience and opinion of Mr. C. Dixon, as enunciated at page 138 of his 'Nests and Eggs of British Birds.' The author writes:—"It is said that the eggs of this species are 'occasionally speckled with reddish,' but surely this must be a mistake." I have not been able to trace the statement to which the author referred to above takes exception, but I can unhesitatingly corroborate its accuracy. I have on more than one occasion possessed myself of Redstarts' eggs with rufous brown specklings on them, though others in the clutch have been without any colouration, beyond, of course, that of the uniform pale greenish-blue ground shade.

Nevertheless, it is only a few summers ago that I found in a hole in an ash-tree near to Rolleston Hall, the residence

of Lord Churchill in this county, a clutch of six Redstarts' eggs, all more or less boldly spotted with brown. The value of my "find," however, was sadly discounted by the fact of the eggs being on the point of hatching. In Mr. C. Dixon's same work, and at the bottom of the same page, it is alleged that Hedge-Sparrows' eggs are the only ones with which those of the Redstart can be confused in our islands. In my opinion, the latter bear a far more striking resemblance to Pied Flycatchers' than to Hedge-Sparrows' eggs, compare them how you will. Not only in grain and colour, but also in size and shape, Redstarts' eggs, I contend, approximate more nearly to those of the Pied Flycatcher. The highly polished shell to which some writers so pointedly invite attention as a distinguishing feature of the egg of the Redstart, I have never been discriminating enough to notice.

The song of the Redstart I am inclined to characterize as unequal. I have frequently been astounded by the melody flowing from the throat of this little bird, but on such occasions it has almost always been perched amidst the uppermost branches of lofty poplars, and April has invariably been the month when I have heard it warbling what I deem its most fascinating notes. It is many years now since I was first attracted by its song under such circumstances; and having previously regarded it as merely a mediocre performer, and as one that usually sang from a lower level, I brought my field-glasses to bear on the songster, to avoid any risk of blundering; and what I then observed was recorded in my note-book on the spot. Subsequent meetings with the Redstart in April in Ireland, Wales, and other wide-distant portions of these islands, have not led me to alter the opinion I formed of its carol as delivered from the upper branches of a Leicestershire poplar—long, long ago.

In support of what I have written above, it gives me satisfaction to quote from Mudie's 'British Birds,' published in 1853, as follows:—"When the males arrive, they sing from elevated perches; but after the operations of nesting are begun, they sing lower, and always within a short distance of the nest." While, somewhat curiously, in the same connection and evidently pursuing the same train of thought, Seebohm wrote exactly thirty years later:—"It may also be noticed that the Redstart, directly after its arrival in April, seeks the tree-tops for his orchestra; but as the summer

comes on this habit is lost, and the bird warbles from a lower perch, usually in the neighbourhood of his nest."

The Redstart has a very peculiar habit of shaking the lower portion of its body at intervals when stationary, quite different from the gentle, fanning, up and down movement of the tail that is associated with the Whinchat. The former seems to be periodically shaking out its feathers, somewhat after the manner of a Peacock, though, of course, on a much less obtrusive scale. The song in a general way, as I believe has been stated in my notice of the Whinchat, bears some resemblance to that of this latter bird. It has likewise a peculiarly rich, liquid note, occasionally heard when in flight, sounding in my ears like *tu-ee, tu-ee, tu-ee, tu-ee, tu-ee, tu-ee*.

However, to revert for one moment to its nesting site: the hole chosen is invariably a natural one; there is no such thing as artificially adapting it to its requirements, as is the case with some of the Woodpeckers. The nest itself is artlessly put together, and is formed of roots, small fibres, and dry grass, and frequently a little wool, and is lined with hair and occasionally a few feathers.

I do not see that we have any means of ascertaining whether or not this species is life-paired. Redstarts are, beyond question, very conservative in their regard for old haunts, but, considering it is generally admitted that the sexes do not migrate in company—the males usually preceding the females in the spring of the year—it must be purely a matter of speculation.

One other little point I would touch on before closing this sketch; it refers to the marked similarity between the alarm-note of the Redstart and that of the Chaffinch. It may possibly take a very skilful ear to discriminate between the two utterances, but I think it will be admitted that there is a more plaintive character about the alarm-note of the Redstart than is noticeable in the case of the other species; while the former also frequently emits a sound, two or three times quickly repeated, which resembles that form of annoyance in an individual so commonly expressed by the tongue and the teeth without the aid of language.

In the summer of 1896 I found a Redstart's nest, full of young, in a kettle hung on a nail in an old tumble-down shed near to Keythorpe. I have also known the species utilize a site just previously tenanted—with success in the matter of rearing their young—by a pair of Great Tits.

THE TREK-BOKKE (*GAZELLA EUCHORE*) OF THE CAPE COLONY.

BY S. C. CRONWRIGHT-SCHREINER.

SOUTH AFRICA has probably never been surpassed in the variety and profusion of its wild animals ; it has certainly had nothing more wonderful than its prodigious numbers of Springbucks. These fleet and beautiful creatures still exist in numbers incredible to people unacquainted with the country, though they have lately so decreased that it is almost impossible now to form any conception of the hosts that infested the endless flats only a few years ago. Where Springbucks run wild in large numbers they are distinguished as "Hou-bokke" and "Trek-bokke," the "Hou-bokke" being bucks (we term all our Antelopes "bucks") that live permanently on the same veld, the "Trek-bokke" those that congregate in vast hosts and migrate from one part of the country to another in seasons of drought. When the country was so densely covered with all kinds of game, the vast herds of Springbucks quickly felt the effects of the frequent droughts that devastate the inland up-country parts, and began to "trek." Congregating in millions, they moved off in search of better veld, destroying everything in their march over the arid flats. The "Trek-bokke" can only be compared, in regard to number, with the Bison of North America, or the Pigeons of the Canadas. To say they migrate in millions is to employ an ordinary figure of speech used vaguely to convey the idea of great numbers ; but in the case of these bucks it is the literal truth.

Gordon Cumming, who shot in South Africa in the early forties, and whose book ('The Lion Hunter in South Africa'), more than any book with which I am acquainted, gives some idea of the extraordinary variety and profusion of game which then existed, refers to a "Trek-bokken or grand migration of Springboks" which he saw between Cradock and Colesberg, and vividly describes how he stood on the forechest of his waggon, watching the bucks pass "like the flood of some great river," during which time "these vast legions continued streaming through the nek in the hills in one unbroken compact phalanx"; then he saddled his horse, rode into the midst of them, and shot until he cried "Enough." But this vast and surprising trek was, he says, "infinitely surpassed" by one he saw some days later. He "beheld the plains, and even the hillsides, which stretched away on every side, thickly covered, not with herds, but with one vast mass

of Springboks; as far as the eye could strain the landscape was alive with them, until they softened down into a dim mass of living creatures." It would be vain, he says, to attempt to form any idea of the number of Antelopes he saw on that day, but he has no hesitation in saying that "some hundreds of thousands were within the compass of my (his) vision." A Boer with whom he was shooting acknowledged that "it was a very fair Trek-bokken, but observed that it was not many when compared with what he had seen." "This morning," remarked the Boer, "you beheld only one flat covered with Springboks, but I give you my word that I have ridden a long day's journey over a succession of flats covered with them as far as I could see, and as thick as Sheep in a fold."

A generation back they trekked in such dense masses that they used sometimes to pass right through the streets of the small up-country towns. I have known old people who walked among them, and actually now and then touched them with their hand. Men have gone in armed only with a heavy stick, and killed as many as they wished. Native herdsmen have been trampled to death by the Bucks, and droves of Afrikander Sheep carried away, never to be recovered, in the surging crowd. So dense is the mass at times, and so overpowering the pressure from the millions behind, that if a sluit (gully) is come to, so wide and deep that the Bucks cannot leap over or go through it, the front ranks are forced in until it is levelled up by their bodies, when the mass marches over and continues its irresistible way. Again, when they come to our large rivers, which run almost dry before the summer storms fall, the thirsty creatures stream over the steep banks into the bed of the river, and drink themselves heavy with water. They crowd into the river-bed quicker than they can get out, and the crush is so great at times as they climb the steep banks that men have gone in on foot unarmed, and secured as many as they wished simply by catching them with the naked hand and breaking their hind legs. There was a certain element of danger in doing this, for, if the Bucks turned, the hunters ran the risk of being trampled to death. The density of such masses may be imagined when one remembers how timid and wary of approach these Antelopes are.

The Cape Colony has from time to time during recent years been visited by the Trek-bokke, though not in such numbers as the old farmers used to describe, and, I have no doubt, truthfully describe. In 1895, however, the up-country was suffering from a long drought, which was particularly severe in Namaqualand; and the Trek-bokke began to move well into the Colony. There were rumours of their coming, and then it was said that they were unusually numerous—that it was a "big trek." This soon proved to be the case. It was eventually known that they had not appeared in such numbers for thirty or forty years. They kidded on the Kaaien

Bult, in the district of Prieska, and then resumed their trek in search of better veld. Mr. J. W. Wright, a relative of mine, was then living at Karree Kloof, a farm about ten hours by cart (six miles to the hour) west of the railway in the district of Hope Town. In July, 1896, he wrote that the Trek-bokke were approaching Karree Kloof, and invited me to come and see them. Believing that such a large "trek" might never be seen again, I accepted his invitation.

Starting by train from Kimberley, I alighted at Kran Kuil, a railway station not far south of the Orange River. Leaving Kran Kuil by post-cart early next morning, and passing the little village of Strydenburg, with its immense "pan," the home when full of thousands of wild-fowl, after a ten hours' drive in a rickety cart, one of whose wheels was dished the wrong way, and threatened to fall to pieces every moment, I reached Karree Kloof at sundown. Our conversation that evening was of course largely about the Springbucks. Some hundred yards to the back of the house stands a kraal. Ten or fifteen years earlier Mr. Wright saw the Trek-bokke stream through between the house and the kraal. The present trek had approached within about four hours of Karree Kloof, and then turned, and was now some distance farther away. We started in a four-in-hand Cape-cart next day to see the Bucks. Passing through veld where the trek had recently been, and by many a dead Buck, we slept that night at Omdraai's Vley, in the district of Prieska, where two young Englishmen had an accommodation house and a country shop. Over a large fire that evening (it was mid-winter and freezing hard every night) we heard the latest news of the trek. The nearest Bucks were then about two hours farther on. A portion had passed over Omdraai's Vley, taking their way through a wire-fenced Ostrich camp, breaking some of the wires. To clear this camp of those that remained in, about one thousand had to be shot, one of which was an albino. A large number had of course been wounded, and many kids, whose mothers had been shot, died. In that camp alone two thousand must have perished. The owners of the shop were buying Springbuck skins at 5d. and 6d. each at the rate of three thousand a week, and had already purchased thousands of pounds of "biltong" (the raw flesh cut into narrow strips and dried), as had also Mr. Wright at Karree Kloof. It was reckoned that, in the district of Prieska alone, some hundreds of thousands of Bucks had been shot, and nearly as many wounded, and the little kids were dying in thousands; yet there was no appreciable diminution in their numbers. Among other things, we heard that various *rodentia* and *carnivora* were following the trek, a *Leopara* having been shot in the open veld, and "Wild Dogs" (*Lycan pictus*) having been seen in pursuit; also that Antelopes, unknown in those parts for many years, had appeared, carried along in the living flood which was pouring over the country. In

fact, at Karree Kloof, which the Bucks had not actually encroached upon, a Kudu and three Haartebeeste had been found in the camps, the Kudu (a bull) having broken off a horn in jumping over the wire fence.

Taking an early breakfast next morning, we inspanned, and, after several hours' drive, passing a pair of wild Ostriches with chicks on the way, saw the first of the Bucks, some ten or fifteen thousand, in several lots. One lot began to run, to cross the road in front of us. Whipping the horses up until we were close enough, we alighted with our rifles, and as the Bucks came bounding past shot several, and then, cutting off the hind legs of such as were fat at the small of the back, we slung them on the axle of the cart and drove on. After proceeding for a couple of hours, and shooting another Buck or two from the road, we outspanned at a farm called Weel Pan, and had an early lunch. The "pan" was dry and the house forsaken, except for a Hottentot servant. The farm was 12,000 morgen (about 25,000 acres) in extent, but had been so eaten off and tramped out by the Bucks that the owner had had to remove all his stock. This was the case with many farms in the path of the Bucks; the veld had been destroyed, cultivated lands eaten bare, and camp fences broken down by the resistless mass of Antelopes. Mr. Wright mentioned that he had 40,000 morgen of land on the Kaaie Bult, which the Bucks had so destroyed that he was removing all his stock from it. Before I left Karree Kloof, on my way home, the cattle from the Kaaie Bult arrived there, having been driven twenty-six hours (156 miles) to be pastured where the devastating Bucks had not been.

After lunch we changed our direction, and drove on, hoping to see a denser part of the trek, shooting an occasional Buck from the road. The Dutch farmers were out by the hundred; all day shots could be heard, and occasionally a horseman could be seen scurrying along the road to head a lot of Bucks, and we witnessed an exciting chase after a wounded ram, which, when the horseman dismounted, charged him—a very rare thing for a Springbuck to do. The whole veld was damaged; it was hardly possible to put one's foot down in that vast extent of country without treading on spoor of the Springbuck; and the Karoo bushes were torn and broken by their sharp feet. We passed several "outspans" where the hunters had encamped for days, with their waggons, and carts and horses—deserted camps which were marked by ash-heaps and charred bones, and the straw of bundles of forage; while offal and heads and the lower portions of the legs of the Bucks lay about to such an extent as to be quite disagreeable. We constantly saw dead Bucks, and there were especially large numbers of kids which had perished from starvation, their mothers having been shot. The Dutch farmers made on an average about 2s. 6d. per Buck—6d. for the skin, 2s. for the biltong. They enjoyed the sport, made a few sovereigns,

and did the country a service. Every farmhouse we came to was simply festooned with drying biltong, the ground around being covered with pegged-out skins. Many Bucks were being conveyed by waggon to the railway, and sent to the large centres: Johannesburg, Cape Town, Kimberley, Port Elizabeth, and other towns. On our return journey we passed a waggon laden with two hundred and thirty Bucks going to Kran Kuil Station, and after our arrival at Karree Kloof another passed with eighty more. This was going on over a large extent of country; we but saw the edges of the trek. Venison of the finest quality in the world was plentiful.

In the afternoon we gradually left the noise of the hunters behind, and drove to quieter quarters, until at length our wish to see large numbers of the Bucks was gratified. On driving over a low nek of land a vast, undisturbed, glittering plain lay before us. Our glance at one sweep took in the expanse of brown country, bounded in the distance by low kopjes, bathed in the wonderful glowing tints of the Karoo; and throughout its whole extent the exquisite Antelopes grazed peacefully in the warm afternoon winter sunshine. It was as beautiful as it was wondrous. Undisturbed by the hunters, they were not huddled together in separate lots or running in close array, but were distributed in one unbroken mass over the whole expanse—"not herds," as Gordon Cumming said, "but one unbroken mass of Springbucks"—giving quite a whitish tint to the veld, almost as though there had been a very light fall of snow.

We alighted from the cart, put our rifles aside, and sat down to watch them, and take in a sight we most certainly should never see again. We were three farmers, accustomed to estimate numbers of small stock, and we had an excellent pair of field-glasses. I suggested to my friends that we should endeavour accurately to estimate how many Bucks were before us. With the aid of the field-glasses we deliberately formed a careful estimate, taking them in sections, and checking one another's calculations. We eventually computed the number to be not less than 500,000—half a million Springbucks in sight at one moment. I have no hesitation in saying that that estimate is not excessive. We were thoroughly accustomed to the vast South African veld and the sights it affords, but we sat in silence and feasted our eyes on this wonderful spectacle. Now, to obtain some rough idea of the prodigious number of Bucks in the whole trek, it must be remembered it was computed that they extended twenty-three hours in one direction, and from two to three in the other—that is, the whole trek occupied a space of country 138 by 15 miles! Of course they were not equally dense throughout this area; but when one says they were in millions, it is the literal truth.

Having watched the scene long enough, we started on our homeward journey, leaving the Bucks undisturbed. We slept that night at Schilder

Pan, the farm of Mr. Jackson, who made us most welcome. Chatting about the Bucks, Mr. Jackson said we had not seen the densest part of the trek, and told us of two incidents which indicated how thick the crowd had been on a portion of his farm. His son on one occasion got ahead of the Bucks, in a narrow run between some kopjes, down which he knew they were coming. They did come, and he only escaped being trampled to death by taking shelter behind a large stone, past which they rushed like a torrent. He actually shot one within a yard or two of the stone before taking refuge behind it. The other incident—it occurred on two occasions—was more remarkable. When Springbuck are shot at they all usually begin to run in one direction, up the wind as a rule; and, if they are in large numbers and hard pressed, they pass in two streams on each side of the object they wish to avoid. (When they once take their direction they will keep it. Hunters know this well. Shooting near Colesberg, in 1880, we used to start the Bucks running, and then ride to head them off. I have thus ridden right through a flying herd of only a few hundreds.) When the object is very close they pass in front of it in a kind of crescent form, giving a little in the centre, and thus closing back towards the original line of their flight. As the Karoo veld is very bare and sandy, they often raise, and run enveloped in, a cloud of dust. Mr. Jackson was out in his four-in-hand Cape-cart shooting Trek-bokke. As he drove along the dense masses began to cut across in front of him enveloped in a cloud of dust, which, as the numbers thickened and the pace increased, grew denser, and as it grew denser and obscured their sight the rushing mass came closer and closer to the cart, until at last, in a thick storm of blinding dust, some of the Bucks actually ran against the cart-wheels and under the horses' bellies. A man on foot would probably have been knocked down and trampled to death.

No careful study has, to my knowledge, been made of the habits of the Trek-bokke. It is known that they migrate in search of better veld, urged thereto by drought. They do not travel fast when doing this, but feed along. In some out-of-the-way parts they kid, and when the kids are strong enough they return to their own veld, if rain has fallen. If it continues dry they do not return at once, but stay on till later in the season, or perhaps over another kidding. How they know when it has rained where they came from, when perhaps it is dry where they are, one cannot say; but it is generally held that, through a subtle sense of smell, they do know. Whether the Trek-bokke of forty or fifty years ago or earlier came from some particular part of the country and again returned to it, I do not know, but I do not think this was the case; it seems more likely that when the Bucks were in such countless numbers all over the country they simply all moved off together during droughts in search of food. Trek-bokke then might have come from any part of the country suffering severely from

drought, returning in time, no doubt, each to its particular haunts. I do not think that there is any difference between the "Trek-bokke" and the "Hou-bokke," except in the matter of weight, the Trek-bokke averaging about 10 lb. to 15 lb. lighter. This difference in weight, however, is probably accounted for by the quieter life of the "Hou-bokke," for veld will permanently support a few Bucks in good condition where a large number would starve. I do not know whether there were "Hou-bokke" in the earlier days. To-day the veld is never so eaten off and destroyed as when the Bucks and other game were in such enormous numbers, so there is no need for the few Bucks now left to migrate. But in the north-west of the Colony, and in Great Namaqualand, they are evidently still to be found in large numbers, and these, when a severe drought comes, trek into the Karoo of the Colony in search of food. As I have said, these Bucks, when trekking down, do not travel fast; but the old Dutch farmers, who should know their habits well, say that when they return they travel at a great pace, even as fast as one hundred miles a day. How true this is I cannot say; it cannot seem impossible to such as know the extraordinary fleetness and staying power of these Antelopes. However considered, the Trek-bokken are one of the most wonderful occurrences in a wonderful country. Yet it is probable that the days of the very large treks are past, and that such a sight as we saw in 1896 will never be seen again.

[Mr. Cronwright-Schreiner informs us he has also sent this communication to the 'Cape Times.'—ED.]

NOTES AND QUERIES.

MAMMALIA.

RODENTIA.

An Albino of the Beaver (*Castor canadensis*).—From all accounts by those in a position to know, the Beaver seems to be following the Buffalo into a precarious existence. Before long now both may have undergone the fate of so many other extinct species. It is therefore of importance that any items of information about the Beaver should be placed upon record. So far as I can find in the limited literature of the subject within my reach, no notice seems to have been taken of albinism in the Beaver, though doubtless the variation takes place as frequently in the species as in other animals. On the walls of the Mansion House of Mavisgrove here, there has hung for several generations past a square glazed case which contains a very beautiful pure white Beaver skin. Not long ago I had the privilege of examining it, and, although it is now one hundred and twenty-one years since it was made into a specimen, the skin is still in the best of preservation. There is a printed label attached, but the record thereon is merely a paraphrase of a written statement, now faded greatly, which is gummed to the back of the case. The written document is as follows:—“In the year 1777 Mr. Joseph Aimse, the Indian interpreter at Michilimackinac, informed Colonel de Peyster, then Major to the Kings Regt., and Commandant of that post, situated at the confluence of the Lakes Huron and Michigan, that an Indian had been seen standing for several days at the corner of the storehouse, who had just informed him that he had been directed by a spirit in the form of an Amik Waubascan (white Beaver),* whilst slumbering in the Great Beaver Island, to take his stand there, and kill the commandant as he passed; but, finding his heart fail to give the fatal blow, he begged to be sent out of that part of the country which the commandant refused, but ordered him to go to the island and fetch him the white Beaver, which the Indian accordingly did; and this is the skin of it.—(Signed) A. S. DE PEYSTER.” Apparently this document is in the handwriting of Col. Arentz Schuyler de Peyster himself, who, as I find from a short biographical notice in McDowall’s ‘Sketches from Nature,’ pp. 314–321, was a Dutchman by extraction, but a Briton by

* The only white one seen in that part of the country.

adoption. His grandfather was a magistrate in Amsterdam, and his father, who emigrated to America at an early age, entered the Army, and held for years the appointment of Lieutenant-Governor of New York. Col. de Peyster entered the Army before he was seventeen years of age, and the best part of his military career was spent in Canada. His wife was a Dumfries lady, and probably for that reason the last years of his life were spent here. He died at Dumfries Nov. 26th, 1822, at the age of ninety-seven, having held the Royal Commission for upwards of fourscore years.—ROBERT SERVICE (Maxwelltown, Dumfries).

[A white Tiger is reported as having recently been shot in Assam. The general colouration of the skin is white, the stripes not being very clearly indicated. We read that the skin has been sent to Mr. Newing, a Calcutta taxidermist, for preservation.—ED.]

A V E S.

White Eggs of Redbreast (*Erithacus rubecula*).—On the 15th of April this year I found a Redbreast's nest in a bank, containing a pure white egg, and at the time of writing there are five, and the bird is sitting. The eggs are very round in shape, and greatly resemble a small Kingfisher's egg in appearance. I enclose one for inspection. — WM. DELVES, Jun. (Maynard's Green, Horsham Road, Sussex).

[Pure white eggs of the Robin are well known, though some collectors have never met with them under natural conditions. This bird is now very abundant on my part of the Surrey Hills, and Mr. Service informs me of the same plentitude near Dumfries, where he has never previously seen the nests so numerous.—ED.]

A Stray Visitor to Kent.—On Saturday morning (April 15th), whilst eating my breakfast opposite a window facing my garden, I observed a tiny Warbler doing me good service by clearing the aphides from my rose trees. The sun was shining, and the bird was only about eight feet distant from me, so that I could see it quite distinctly; it was about the size of a Goldcrest, but olive-green above, pale yellow beneath, and with a well-defined eye-stripe. If this was not *Phylloscopus superciliosus*, I can give no name to it, for it was far too small for a Chiffchaff or a Willow Warbler, both of which I often see either in the spring or autumn in my garden. I watched the bird carefully for three or four minutes before it flew away. — A. G. BUTLER (Beckenham Road, Beckenham, Kent).

The Grasshopper Warbler in Breconshire.—As might be expected from the nature of the country, the Grasshopper Warbler (*Sylvia locustella*) is not uncommon in Breconshire. We have here most of the conditions in which this little summer migrant delights, such as rushy meadows with

grass tussocks here and there, neglected fields containing clumps of stunted blackthorn bushes and brambles, dingles furnished with little alder bushes, and dry wastes of low cover. In places of this kind it nests, and may be heard singing during the season, the favourite haunt being round Llangorse Lake, where it may be termed common. I first heard the unmistakable little trill of this bird when I came to live here fifteen years ago, and found the first nest on May 29th, 1886. It was placed in a tuft of rushes, and contained five fresh eggs, two of which, with the nest, are now in the Natural History Museum, South Kensington. I have since found five more nests. Eggs from three sets in my possession are mostly zoned; one clutch taken on June 9th, 1893, is unusually highly coloured. Every nest is wonderfully well concealed. If it contains eggs the sitting bird disappears at once in the nearest cover; if there are young, both birds come back and commence creeping and tumbling about, wings and tails spread, within three or four yards of a bystander's feet, uttering a rapid metallic "tick." For some years I tried to shoot a male bird before the nesting season, but without success, owing to the persistent way in which it keeps out of sight when singing, and have been obliged to content myself with a pair of nestlings, which, set up in a nest, make a nice little case. With a bird like this, which is often heard but seldom seen, the song is all-important for identification purposes. In this case it seems to me to be precisely like the sound made in drawing out a line from a small Trout fishing-reel the check spring of which happens to have the right pitch. During fifteen years the earliest date on which I have heard the song is April 15th, and the latest July 24th. It is sometimes to be heard in July in fields of standing wheat.—E. A. SWAINSON (Woodlands, Brecon).

Common Crossbill in Worcestershire.—Whilst rambling over Brake Wood, near Churchill, on April 15th last, I noticed a few Crossbills (*Loxia curvirostra*) among the Scotch firs, busily employed with the cones. Upon making enquiries from the keeper, he stated that he had noticed them there for the last three years, sometimes numbering upwards of fifty, though this winter not so plentiful. I could not satisfy myself that they were breeding there. The cover is only a small one, and gave me a splendid opportunity of finding their nest had they been so doing.—J. STEELE-ELLIOTT (Hillcrest, Clent).

Cirl Bunting (*Emberiza cirrus*) in North Cheshire.—On April 12th, when walking in some meadows about six miles from Manchester, I noticed a bird flying about a low fence close to a railway embankment. I went cautiously towards it, keeping close to the fence. The bird kept flying in and out of the gaps in the fence, often settling in the grass, and occasionally making an attempt at a song. At first the yellow on the head made me

think it was only a Yellowhammer, but presently getting a better view, I was surprised to see that it was a Cirl Bunting, as I understand that this species is very rare in this part of the country. I may add, however, that I was informed that another example of this species had been seen only about two miles from the spot where I met with the Cirl Bunting. This other example was seen in a little-frequented part of the district in the summer of 1897 or 1898, my informant distinctly recognizing the species; in fact, I closely cross-examined him on the differences between the Cirl Bunting and the common Yellowhammer, but he remained confident that he had correctly diagnosed the species. In the meadows alluded to above the following Buntings occur regularly: *Emberiza citrinella*, *E. schœniclus*, and the local *E. miliaris*.—GRAHAM RENSHAW (Sale Bridge House, Sale, Manchester).

Cuckoos' Eggs in Nest of Red-backed Shrike.—In Dr. Rey's interesting article on Cuckoos' eggs (*ante*, pp. 176–8) there is one observation which shows how different the habits of the same species may be in different countries. I refer to the statement that in the neighbourhood of Leipzig 84 per cent. of the Cuckoo's eggs are found in the nests of the Red-backed Shrike, which in England seems to be one of the most uncommon foster-parents. During the last four years I have certainly seen *in situ* over thirty nests of the Red-backed Shrike, and have had the opportunity of examining the unblown eggs of perhaps twelve or fifteen more, not one of which contained a Cuckoo's egg or a young Cuckoo, though Cuckoos and Shrikes abound in the same meadows. A Cuckoo's egg was found here in 1894 in a Shrike's nest, but there was no other egg, and the nest was apparently a deserted one. A friend who knows the Shrike well, and has found many nests, is of opinion that a pair of Red-backed Shrikes would give a prowling Cuckoo they found in the near neighbourhood of their nest a warm reception, in which I quite agree with him.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Variation in Cuckoos' Eggs.—After reading Dr. E. Rey's views as to the reason of the great variation in Cuckoos' eggs (*ante*, pp. 176–8), it struck me that his theory, that the variation is caused by the different diet supplied to the nestling Cuckoos by their foster-parents, may not generally be accepted by ornithologists as a satisfactory explanation. In the first place, it may be questioned whether there is any material difference in the diet provided by the various species of foster-parents, for even hard-billed birds, *e.g.* Buntings and Finches, feed their young largely on an insectivorous diet. The young Cuckoo would in almost every case be reared mainly on an insectivorous diet by its foster-parents, and when once it was launched out into the world, and dependent on

its own exertions for a food-supply, it would doubtless adopt similar habits of feeding. But if it is the difference in the food-supply that causes the Cuckoos to lay eggs of varied types, I would ask Dr. Rey to explain why the Common Guillemot lays eggs of such wonderful variety? The food of one Guillemot at any rate does not differ from that of another Guillemot. I would ask the same question, too, with regard to the eggs of the Tree Pipit, a species whose eggs show a very great amount of variation.—E. W. H. BLAGG (Cheadle, Staffs).

Colour of the Bill of the Grey Lag-Goose.—At a recent meeting of the British Ornithologists' Club, Mr. Caton Haigh asked me what was the colour of the bill of a Grey Lag-Goose (*Anser cinereus*). I answered, as probably many other persons interested in ornithology would have done, flesh-colour. Now, this last winter I have had opportunities for examining twenty freshly killed Grey Lag-Geese, and in no single instance was the bill flesh-colour. All the ornithological works that I have been able to refer to give the colour as flesh-colour, with the exception of Mr. F. O. Morris. I have looked it up in Seebohm's 'British Birds,' Yarrell, Mr. Howard Saunders's 'Manual,' Prof. Newton's 'Dictionary,' Col. Irby's 'List,' &c., with the same result. All the Geese that I examined were killed by me in March, and I took the trouble of catching some wing-broken birds alive so that the colour should have no opportunity of fading. Each bird had a lemon-coloured bill, almost pale orange, with a narrow flesh-coloured line down the centre, and a white nail. Can the explanation be that this is the colour only at this time of year, or that all these authors have taken the colour from the skins? for after the Geese had been dead some days the colour became more as they state. I shall be very glad to hear the opinion of naturalists or sportsmen, who may have had chances of examining freshly killed specimens, as to the colour of the bill they have found, and at what season of the year they have made their observations. The weight of the birds killed varied between $6\frac{3}{4}$ lb. and $9\frac{1}{4}$ lbs., so that it is probable that I examined both old and young birds.—H. LEYBORNE POPHAM (21, Ryder Street, London, S.W.).

[Macgillivray described the bill of this bird as "yellowish orange, with the unguis white or bluish grey."—ED.]

Russian Partridges.—I recently saw, in the shop of a local game-dealer, some Russian Partridges with black horseshoes on their breasts. I should be glad to know whether these birds come from any particular district, as most of the Partridges sold as Russian that I have previously noticed have little to distinguish them from English birds.—R. H. RAMSBOTHAM (Shrewsbury).

Heavy Death-rate of Lapwings.—The month of March, 1899, has been notable for having—at least here—the most severe snowstorm which has been experienced for well over half a century. The result is that considerable disturbance has been caused in the ordinary habits of our birds. The occasion has been conspicuously brought to notice by the many Lapwings (*Vanellus vulgaris*) which have been starved to death. Twenty were seen dead here within a few yards of each other. Of course they rushed towards marshes and water sides for food and shelter; but they seem to have succumbed to the severity of the frosts, as they could have easily obtained sufficient food to keep them alive, the ground being quite fresh about the damp places where they find food in cases of ordinary “Lapwing storms,” as they are locally called—*i. e.* storms occurring after the arrival of the Lapwings. Others could be seen in a very feeble condition, being apparently only capable of flying with great exertion. These birds were being threatened with extermination by the prevalence of assiduous egg-collecting, until measures were adopted to terminate it by a certain date of the year. There is no doubt that these birds have increased in numbers since, but this arctic visitation has clearly done much in limiting that increase. Lapwings seem to have little notion of impending storms, if we judge from the certainty by which a few bright days in early spring bring them to their summer resorts. But I may observe that before an ordinary spring snowfall they are in the habit of collecting in flocks, and apart from being led to any place where available food has a common attraction. There is no doubt that such a severe and protracted storm at the date mentioned must affect many birds seriously, and the question of the particular situation of our various migratory birds must be of value in comparing their instinctive powers to keep in their winter quarters until that season, in the strict sense, has passed away. The exact date of the equivalent here to the present stormy March is 1837, and before that a short April storm in 1813. A similar March storm occurred in 1812.—WM. WILSON (Alford, Aberdeen, N.B.).

Nesting of the Common Snipe (*Gallinago cœlestis*) near London.—It may perhaps interest some of your readers to know that a nest of the above species, containing four eggs, was discovered on Epsom Common on the 17th of April. I have not heard of the nest of the Snipe from this locality for the last five years, and believed that it had deserted this spot, which was formerly somewhat favoured by it both in winter and occasionally in the nesting season.—JOHN A. BUCKNILL (Hylands House, Epsom, Surrey).

Songs of Birds affected by Weather (*vide Zool. ante*, p. 183).—No birds have sung here since I came up on the 8th of April, except one Wren,

and to-day (April 19th) one Chaffinch. Why? Surely, surely the awful climatic conditions. The climatic conditions, I consider, may be easily imagined by those who live in more favoured climes by the simple statement, "No birds singing"; to which I append the rider: Trout are *not in condition* when birds are not in song, in late seasons like this spring of 1899.—J. A. HARVIE BROWN (Drachlaw, Turriff, Aberdeen).

REPTILIA.

Notes on the Cape Monitor (*Varanus albigularis*).—The Cape Monitor seems to be fairly plentiful in the Transvaal, judging from this district. I have often come upon them basking in the hot sunshine on the bank of a "spruit" (rivulet). When disturbed by a human intruder they will leap into the water with a "flop." On Aug. 1st, 1898, I found in a female twenty-four eggs of a dull white colour, not unlike snake's eggs, and oval in form, about the same thickness as a fowl's egg, but considerably longer. I have seen a couple in confinement for some time now. One was an old one (the largest I have seen here), and was quite ugly (presumably with age), the skin being rough, the colour very dirty-looking and faded. It has been like that ever since it has been in captivity, now some nine months: This one measured about four feet in length. It was very sluggish in its movements, and, when teased or even approached, would emit a sort of hissing sound, and lash out with its tail. I had a younger one also, not more than eighteen inches long. This little reptile was very "slippery" and shy. When come upon suddenly in its favourite occupation of lying in the hot sun, it would dart in among the stones which formed its home like a "flash of lightning," figuratively speaking. These specimens lived on raw beef, also Crabs and Frogs. Though they had a tank of water, they were found more often out of, than in it. — ALWIN C. HAAGNER (Dynamite Factory, Modderfontein, Transvaal).

[All the Monitors which I found around Pretoria belonged to the species *V. niloticus*. I am glad to learn that Mr. Haagner's experience in keeping *V. albigularis* in captivity was more satisfactory than mine in reference to the first named species.—ED.]

NOTICES OF NEW BOOKS.

The Foundations of Zoology. By WM. KEITH BROOKS, Ph.D., LL.D. New York and London: Macmillan & Co. Ltd.

THIS volume of the "Columbia University Biological Series" perhaps prompts, rather than explains, the question as to what are "the foundations of Zoology." Are they to be sought in the laboratory, or are they to be derived largely by purely mental processes? Or are physical demonstrations to be allied to, made altogether subservient, or treated only as secondary in position to philosophical conceptions? This problem must occur to the reader as he studies in these pages the author's views and commentaries on the writings of Huxley, Lamarck, Galton, Weismann, Darwin, Paley, Agassiz, and Berkeley.

Prof. Brooks has a philosophical position of his own. He is clearly not Neo-Lamarckian, a term applied at present to so much American speculation; he may be better described as Anti-Lamarckian. He is not a Pyrrhonist, though on many questions he gives the verdict only of "not proven." Perhaps an extract may give a better clue to the foundation on which he rears a philosophy which is more critical than affirmative, and vibrates between the idealistic and materialistic conceptions. "I am not able to answer the question whether, in ultimate analysis, the principles of science are physical or metaphysical. I know nothing about things ultimate. I do not know what the relation between mind and matter is. I do not know whether the distinction between 'things perceived by sense' and 'relations apprehended by the mind' is founded in nature or not; but I am sure that natural knowledge is useful to me, that it is pleasant, and profitable, and instructive; and I must ask whether all this does not show that nature is intended?"

The main issue is seemingly whether these questions are biological or metaphysical; or whether, appertaining to both

realms, they can or should be separated? Is it a fact, as Prof. Brooks believes, that there is a partial failure of training in biological laboratories to make naturalists of the students; and is the explanation of that failure "the belief that our biology (the biology of the present day, and not that of the unknown future) ends with the study of the structure and functions of the physical basis—the belief that biology is 'nothing but' the discovery of its physical and chemical properties"? It is at least probable that we have also naturalists who are not philosophers, and philosophers who are not naturalists.

Zoology to-day is a science of so wide and exhaustive a nature, that its student may indeed form philosophical conclusions, while having no time for the wide reading and reflection necessary to the acquisition of a mental competency. Aristotle's knowledge of zoology was small indeed compared with what may readily be acquired at the present day, but the position is reversed when his philosophical method is compared with modern speculative gymnastics.

This book may be well commended to the perusal of those who love debatable matters, and who seek to tread the labyrinth of biological speculation. It is a good, but not altogether an easy book to read. It is not assertive, but rather argumentative; it often quotes only to question, and frequently details a proposition to show its weakness. Sometimes we ponder over such a conclusion as the following:—"Biology is not a closed science, and Darwin's view of the matter is not proved—possibly is not provable; but its great value is in the proof that there is no shadow of evidence for any other view." Does not this constitute Herbert Spencer's canon of truth—or proof—by the inconceivableness of the contrary? The great importance of these works is that they do not entreat assent, but demand consideration; their mission is not so much to convince as to promote thought:—"Scientific men who are not zoologists are fond of telling us science has nothing to do with the Why? and is concerned only with the How? but, in zoology, it is often easy to discover why an action is performed, while we are very ignorant of the structural conditions under which it takes place."

The Penycuik Experiments. By J. C. EWART, M.D., F.R.S., &c.
Adam & Charles Black.

THE title of this book may sound a little *outré* to some biologists to-day, but cannot be misunderstood in the course of a few years, when the breeding experiments of Prof. Ewart will be more generally known to zoological science. Our readers will remember a paper "On Zebra-Horse Hybrids," which appeared in these pages last year, and which in the 'Penycuik Experiments' is reproduced. Penycuik is the Midlothian abode of Prof. Ewart, who has now for some years followed the breeding investigations that so long occupied Darwin; and though to the general public these are better known as the Zebra hybrid experiments, much valuable work has been done with Pigeons, Fowls, Dogs, and Rabbits. The result, as might be expected, leads to another nail in the coffin of our old fetish "species," and the dogma as to its immutability. "Among plants, hybrids are sometimes quite fertile; while some crosses are quite, or almost, sterile. There is no hard and fast line between species and varieties, and hence there can be no fundamental difference between a hybrid and a cross, nor yet any *a priori* reason why any given hybrid should be sterile, or any given cross fertile. It is no longer possible to contend that species were originally endowed with mutual sterility, by way of preventing the confusion that would result from free interbreeding."

Prof. Ewart recognizes three distinct types of Zebras:—*Equus grevyi*, *E. zebra*, and *E. burchelli*, which, ignoring the now generally considered extinct *E. quagga*, is in agreement with the views of Mr. Pocock (*cf.* Zool. 1897, p. 380). He has bred nine Zebra hybrids by crossing mares of various sizes (from 11 to 15 hands) and breeds with his Zebra stallion, and possesses also three hybrids out of Zebra mares, one sired by a donkey, the other two by Ponies. The importance of these experiments is clearly seen by the separate considerations and discussions on such interesting biological problems or suggestions as—Reversion, Prepotency and Inbreeding, Telegony, Saturation, and Sterility; while the conclusion is reached that "there is obviously no real difference between cross-fertilization and intercrossing. Whether we interbreed or intercross, engage in 'line'

breeding or 'cross' breeding, we are making use of cross-fertilization. Further, I may add, the difference between intercrossing and hybridizing is one of degree, not of kind."

This book is beautifully illustrated, characteristically bound, and, unfortunately, unprovided with an index.

Wild Animals I have Known. By ERNEST SETON THOMPSON.
New York City: C. Scribner's Sons.

MR. THOMPSON is the Carlyle of the animal world outside man: he sees the Zingis Khan, the Attila, the Napoleon among his Wolves, the Rachel among his Foxes, the bandit chief leading his Dogs. "What satisfaction would be derived from a ten-page sketch of the habits and customs of Man? How much more profitable it would be to devote that space to the life of some one great man. This is the principle I have endeavoured to apply to my animals." Thus we have a few vivid and brilliant sketches of animal life which we should unhesitatingly describe as a new departure in fiction, were we not warned in a "Note to the Reader," "these stories are true." We are not led to the sceptical position by any unreality of the narrative, but rather marvel at the psychological sympathy with, and apprehension of, ideas and conceptions which are so commonly described as belonging to the instincts of brutes. The story of the King-wolf Lobo, who remains unconquered by his many justly-incensed enemies, and who by his cunning, or intellect, defies all their stratagems, till the death of his loved bitch Blanca renders him reckless, and proves his undoing, is only another story of the rise and fall of the great and much-admired man-wolf amongst ourselves. The Dog Bingo that must go wolfing, but comes home to die; the Fox Vix, courageous to frenzy on behalf of her young, are amongst some of the strongest characters of this more than interesting book. We are often warned against ascribing our own mental processes to other animals, and thus forming erroneous conclusions as to their cognitions and psychology. Do we not rather greatly err on the other side? Is it not more reasonable to argue that we have indeed passed on, but that in leaving them behind we have not altogether severed our

common cognitions? The perusal of this book, with its altogether charming illustrations, must tend to lead to a better understanding. One remark expresses the keystone to much modern speculation: "No wild animal dies of old age. Its life has soon or late a tragic end. It is only a question of how long it can hold out against its foes."

Report of Observations of Injurious Insects and Common Farm Pests during the years 1897 and 1898. By ELEANOR A. ORMEROD, F.R.Met.Soc., &c. Two Parts. Simpkin, Marshall, Hamilton, Kent & Co., Limited.

SINCE we noticed the Report for 1896, two more of these annual contributions to economic entomology have appeared. They are written with the same care and thoroughness as distinguished their predecessors, and exhibit the same voluntary and enthusiastic devotion to the study which is likely, in a material sense, to reward readers and students rather than authoress. Two welcome announcements are made. A general index to the long series of reports which have now been published—twenty-two in all—will shortly be issued; and Miss Ormerod has now secured the co-operation of Mr. Robert Newstead, of the Grosvenor Museum, Chester, whose power of microscopic observation and delineation, with a special knowledge of the *Coccidæ*, must prove of a helpful character.

The work of Miss Ormerod is not confined to the publication of these Reports, but is also engaged in the management of what may be called a private consulting economic bureau on insect pests and their depredations. In 1897, we read that the correspondence "amounted approximately to about three thousand letters received"; and as these may be considered as mostly in the nature of enquiries, this scientific enterprise pursued privately by one lady is probably unique.

The Forest Fly (*Hippobosca equina*), the pernicious Horse pest, whose presence up to 1895 was considered in this country to be wholly confined to the New Forest or its vicinity, has now been only too clearly demonstrated to have established itself in the south of South Wales. Hay imported from South America contains very frequently specimens of the Migratory Locust

(*Acridium (Schistocerca) paranense*); in one case the average was a Locust to a pound of the Alfalfa (Lucerne) hay which was landed from Buenos Ayres; in another instance there were no fewer than two hundred specimens in one truss. Such food, it need scarcely be pointed out, is at least highly suspect for Horses. We might multiply extracts to show that these reports are of the first interest to agriculturists, farmers, and rearers of stock, whilst to the naturalist and entomologist they embody a series of faithful life-histories.

A Text-Book of Agricultural Zoology. By FRED. V. THEOBALD, M.A., &c. Wm. Blackwood & Sons.

NOT only the farmer and the agriculturist, but also that numerous class whose urban prosperity permits rural residence and pursuits, frequently seek—and sometimes vainly—for some authentic information respecting the animal friends and foes with whom they are brought in contact. As a rule, farmers are not zoologists, nor are all country residents naturalists, consequently the few books which now exist on the subject—and we must not overlook Miss Ormerod's excellent contributions—may be well supplemented. Mr. Theobald's profusely illustrated volume is a compilation which contains much scientific matter over and above animal biography and narrative. It grapples largely with modern animal classification, detailing some anatomy, but more physiology. And as the book is likely to fall into the hands of those who have received no particular biological instruction, it should serve a good purpose. To such readers it is most opportune to show that zoology and botany are only divorced sections of natural history, not necessarily distinct sciences. When Mr. Theobald discusses animals and plants, he is forced to acknowledge:—"In fact, there is no hard-and-fast line to be drawn between these two organic groups. Such lowly creatures as *Volvox* are treated by botanists as plants, whilst the zoologist includes them in the Protozoa." Organic nature lends herself to the systematiser; or she could neither be studied nor understood, but she still remains one and indivisible.

A good word is said for the usefulness of those furred and

feathered creatures which the gamekeepers have classed under the section "vermin," and have sentenced to extermination. It is, however, probable that those worthy and energetic men are not likely to read these pages, or to agree with them if they did.

"The prevention of vermiceous diseases" is the subject matter of Appendix I. In some respects, in perusing this section, we seem to be again reading some of the modern injunctions for preventing the spread of phthisis among ourselves. Diseases, "such as husk, are spread by the embryos being brought up in the mucus from the air-passages; these germs are scattered about upon the ground, and thus sow the seeds for numbers of other lambs and sheep to obtain. When that spasmodic cough so characteristic of 'hoose' is heard, it is surely advisable to remove the animal, and so prevent it from contaminating the ground."

 EDITORIAL GLEANINGS.

PROFESSOR OTHNIEL CHARLES MARSH, of Yale University, died at New Haven, March 18th, in the sixty-eighth year of his age. He was born at Lockport, New York, in 1831, and was graduated at Yale in 1860. He subsequently studied several years under leading specialists in Europe, returning to New Haven in 1866, where he has since occupied the chair of Palæontology. He has long been recognized throughout the world as one of the leading authorities in vertebrate palæontology. His explorations in various parts of the West for fossil vertebrates began in 1868, and in subsequent years he amassed the immense collections which have been so long famous. The results of his investigations have been published in a long series of papers and memoirs, numbering nearly three hundred titles, covering a period of more than twenty-five years. His unrivalled collections of fossils, as yet only partly worked up, he presented to Yale University, with a considerable endowment for carrying on and publishing the results of further investigation of this great mass of material. Prof. Marsh is well known to ornithologists for his numerous publications on fossil North American birds, including his great quarto memoir 'Odontornithes: a Monograph of the Extinct Toothed Birds of North America,' published in 1880. Probably five-sixths of the known extinct North American birds have been described by Prof. Marsh. His scientific work brought him many honours both at home and abroad. In 1878 he was chosen President of the American Association for the Advancement of Science, and from 1883 to 1896 he was President of the National Academy of Sciences (The 'Auk').

WE regret to announce the death of Joseph Wolf, eulogized by Landseer himself as "without exception the best all-round animal painter that ever lived." Many obituary notices have appeared in our current press, but a particularly full and excellent *résumé* of his life's work has appeared in the 'Field,' from which we extract the following:—

"Born at Möerz, near Coblenz, in 1820, the son of a farmer, his powers of observation and delineation of animal life were made manifest at an early age, and his talent as a draughtsman soon obtained employment for him.

“The first work which brought the artist's name prominently before the scientific world was Rüppell's ‘Systematische Uebersicht der Vögel Nordost Afrikas,’ published in 1845, in which some fifty African birds are depicted in attitudes which contrast strongly with the stiff and unnatural positions in which previous artists were wont to portray their subjects. We look upon these illustrations as instituting the *renaissance* period in ornithological drawing. In 1850 appeared Temminck and Schlegel's quarto volumes on the fauna of Japan, which, with Wolf's coloured plates, still constitute one of the best illustrated works on natural history. Quickly following this came Schlegel's grand ‘Traité de Fauconnerie,’ in folio, with life-size portraits by Wolf of all the Hawks employed by falconers. Each one of these is a study which deserves attention.

“The late Mr. G. R. Gray's standard work, in three volumes quarto, on the ‘Genera of Birds,’ a copy of which cannot now be obtained under £30, was partly illustrated by Joseph Wolf, in consequence of the acceptance of a foreign appointment by the late Mr. Mitchell, the former secretary of the Zoological Society, who had been working at it jointly with Gray.

“Those who are familiar with the magnificent folio works of Gould on the ‘Birds of Asia’ and the ‘Birds of Great Britain’ will recognize in many of the life-like coloured plates the handiwork and talent of Joseph Wolf; while the same remark will apply to Elliot's grand volumes, also in folio, on the Pheasants, Birds of Paradise, the Birds of North America, and the *Felidæ* or Cat family.

“More than half a century ago the Zoological Society of London, recognizing Wolf's extraordinary talent in depicting animal life, secured his services to illustrate their periodical publications, and from that time forward the ‘Proceedings’ and ‘Transactions’ of the Society have teemed with the life-like productions of his pencil. Visitors to the picture gallery over the reptile house at the Zoological Gardens can scarcely fail to have been struck with his remarkable ‘Zoological Sketches,’ which were produced under the auspices of the Society, and there adorn the walls. In the numerous coloured plates which have illustrated the ‘Ibis’ from the commencement of that quarterly journal of ornithology in 1859, we have another example of the artist's wondrous skill in the delineation of birds.

“We may pass over the many large works, both in oils and water-colour, which have passed from the easel to the private cabinets of those who know well how to appreciate them, because, although we have had the privilege of seeing many of them, the public have had no opportunity, as with the exhibited works of other artists, to judge of their merits. We may remind our readers, however, that numerous works on sport and natural history have been entirely illustrated by Joseph Wolf. Of these we may name Anderson's ‘Lake Ngami,’ Livingstone's ‘Missionary

Travels,' Atkinson's 'Amoor-land,' Emerson Tennent's 'Ceylon,' and the same author's 'Wild Elephant,' Baldwin's 'African Hunting,' Col. Walter Campbell's 'Indian Journal,' Bates's 'Naturalist on the Amazon,' and Wallace's 'Malay Archipelago'; while many beautiful full-page plates from his pencil adorn the works of Lewis Lloyd, A. E. Knox, Henry Stevenson, Philip Gosse, Canon Tristram, Professor Newton, and the Duke of Argyll. Nor should we omit to notice his 'Life and Habits of Wild Animals,' which appeared in 1874, illustrated from his designs, engraved by Whympfer, with descriptive letterpress by D. G. Elliot."

MR. J. ARTHUR THOMSON, Extramural Lecturer on Zoology in Edinburgh, has been appointed to succeed the late Prof. Alleyne Nicholson as Regius Professor of Natural History in the University of Aberdeen.

OUR contributor Mr. F. Coburn has recently written, in the 'Birmingham Daily Post,' on the subject of the Public Natural History Collection in Birmingham, which included, or rather consisted of, the collection of specimens formed by the late Dr. Sands Cox. "The loss the city has sustained through not possessing a properly appointed natural history museum, presided over by a competent curator, at the time when this great collection was handed over to the custody of our authorities, is absolutely irreparable, and the fate which has befallen the bulk of that collection forms one of the strongest arguments which could be advanced for the establishment of a museum, for there are still a few gems left in that collection which ought to be saved. This collection must have cost its founder almost a fabulous sum of money, for it was peculiarly rich in forms which were most difficult to procure in those days. The collection of British birds was a very fair one, but its greatest value lay in the African, Indian, Australian, New Zealand, and New Guinea forms, some of which are now totally extinct, while others are on the verge of extermination."

Amongst its present treasures is the *Nestor productus*, or Phillip Island Parrot. This "is one of the greatest treasures which any museum in the world can hope to possess, as it is now generally admitted to be totally extinct; and, according to Professor Newton ('Dictionary of Birds,' p. 224), only about twelve skins, exclusive of the Birmingham specimen, are known to exist in the world. Thus it becomes a far greater rarity than even the Great Auk, a specimen of which was recently purchased by the Edinburgh Museum for, I think, 350 guineas, this being considered a very low figure. There are over sixty skins of the Great Auk known to exist, against about a dozen of *Nestor productus*. Its great value, therefore, is apparent at

once. I should say that at a very modest estimate the skin is worth at least 600 guineas. There are a good many who, I have no doubt, would put it down at 1000 guineas. Here then is a veritable gem, the possession of which alone ought to act as a powerful lever in inducing the Council to provide a proper museum in which to house it. It is, I believe, now locked up in an iron safe in the possession of Mr. Whitworth Wallis." In this collection there appears to have been a most formidable weeding-out process.

IN the 'Zambesi Mission Record,' a Catholic publication, we notice an interesting article by Father O'Neil, S.J., on "Some interesting Beetles," as observed in South Africa. "'Tockies' are large heteromerous beetles, generally black or brown in colour. They have been called 'Tockies' in consequence of a habit they have of knocking loudly on the ground to attract their mates. Let us watch one of these insects walking about in search of a partner. It advances a few paces, then stops, and, raising a rather unwieldy body on its long legs, gives four or five rapid knocks in succession. Then there is a pause, a further advance, and the knocking is repeated. After a bit answering knocks are heard, and our Tocky sets to work knocking most vigorously to aid in the determination of his whereabouts. As might be expected, the Tockies have given rise to many a ghost story. Though they walk about a good deal during the daytime, they are especially active at night; and, when doors are left open after dark, will frequently enter the bedrooms. Then in the dead of the night some unfortunate individual is awakened by a loud knock, knock, knock. If he be of a nervous disposition, and unfamiliar with our rapping friends, the result can be imagined. I know a pious gentleman who one night was firmly persuaded that one of the holy souls had come knocking for prayers. Here in Dunbrody the Tockies are often very troublesome, owing to the fact that our ceilings consist of thin laths, which make glorious sounding boards. One particular kind of Tocky will insist upon climbing up the walls of the house, and hammering away overhead at night time. More than one member of the community, myself among the number, have been kept awake during the greater part of the night by an almost uninterrupted tattoo. The noise the beetle makes when exercising itself on these laths is just like a loud knocking at a door. Not long ago one of them started rapping overhead about supper time. 'Come in,' cried the reverend father, whose room adjoins mine. 'Knock, knock, knock,' replied the Tocky. 'Come in,' *shouted* his reverence this time. My laughter unfortunately put a stop to the fun. I must not dismiss the Tockies without alluding to their omnivorous quality. Though it generally feeds on plants of one kind or another, the beetle seems to be capable of devouring

almost anything. It is quite common to see one of them dining off a departed brother.*

WE have received the Annual Report of the Millport Marine Biological Station for 1898:—"The Committee are now in a position to give an account of the first year of the actual working of the Station. Under these circumstances they consider the Report of 1898 to be of great importance, seeing that it is the first which provides data from actual experience by means of which a forecast of the future success of the Station may with some degree of certainty be drawn. They feel that they have every reason to be satisfied with the results of this crucial year. They can report good progress, not only in regard to the numbers who visited the Robertson Museum, and to the degree in which the facilities afforded by the Laboratory were utilized by scientific workers, but also in regard to the measure of public support accorded to the scheme. From the Curator's Report it will be seen that there were over eight thousand visitors to the Robertson Museum during the past year, and that tables in the Laboratory were utilized for terms varying from a week to a month on thirty-eight different occasions. During the past year many additions have been made to the Station, especially in the Laboratory Department, where good sets of reagents, dissecting-troughs, and vessels have been provided. A dark room for photographic purposes has been constructed. A system of heating the Laboratory and Museum by hot-water pipes has been carried out. Out-buildings for work and store-rooms have been built, and the laying down of a jetty near the Station will be carried out as soon as possible. An apparatus for keeping up continuous motion in a number of vessels has been fitted up, &c. The carrying out of an efficient system of heating was a work of very great importance. During the previous winter, partly owing to the newness of the building and to its situation near the shore, and partly also to the method of heating then in use, a portion of the Robertson Collection, in particular the *Foraminifera* and *Ostracoda*, suffered from damp. Mrs. Robertson set herself to the arduous task of cleaning and remounting the whole of these specimens. It is matter for congratulation that no such injury can now happen to the collection, as it was matter for regret that it ever did occur."

COLCHESTER has its Oyster feast, Greenwich its Whitebait dinner, and now Great Yarmouth, on the 10th of last December, held its inaugural "Sprat Banquet." From a "Souvenir" which has been published detailing this function we find some facts relating to *Clupea sprattus* which are at

* "Beetle" is evidently here alluded to.—ED.

least interesting. According to Mr. Edward T. Ayers, "Sprat fishing is not followed in Yarmouth, though the fish is found in large shoals off the coasts of Norfolk, Suffolk, Essex, and Kent. In summer it is said to inhabit the deep water, and then in roe, and to be in highest perfection as food when the season for fresh Herrings has closed, and it does not visit us until November approaches. Southwold on the Suffolk coast and its neighbourhood have long been celebrated for Sprat catching and curing: Some fine and delicious Sprats were a few years ago taken in the South Ham at the entrance of Yarmouth Harbour, and the Yarmouth Herring curers are also good hands at curing Sprats."

Our contributor, Mr. A. Patterson, has of course some information to afford. "*Clupea sprattus* runs to about $5\frac{1}{2}$ in. in length. Three are recorded in January, 1882, off Aldeburgh, over $6\frac{1}{2}$ in. long. It spawns locally in the early spring, the time varying a little in different localities. On Feb. 29th, 1896, an unusual catch of Sprats occurred; some were found full of roe. In Scotland it is known as the *Garvie*; by the Geiman as *die-Sprott*; Dutch, *Sprot*; Swedish, *Skarpsill*; French, *le Melet* and *l'Esprot*; and Welsh, *Coog Bennog*. In habits it is gregarious; generally in big shoals; in cold weather it nears the shore—differing from the Herring and Pilchard, which retire to deeper waters. It may be located by the hosts of Gulls and other sea-birds which follow it eagerly, devouring myriads. In turn the Sprat preys on minute crustaceans, the transparent Opossum Shrimp (*Mysis chameleon*) in particular, which teems in certain localities. A small parasitic entomostracean (*Lerneonema monilaris*) is often found attached to its eye. This creature, which so anchors itself with its long trailing thread-like ovaries, is of a beautiful green colour, and more interesting to the naturalist than to its unfortunate possessor. Fishermen call them 'Lantern Jacks,' and believe that the bearers of the 'Lantern Jacks' are the pilots of the shoal."

A speaker at the banquet gave a very dispiriting account of last year's Herring fishing. "Unfortunately 1898 had proved one of the worst of seasons for the Herring fishing. The catch was 4000 lasts less than last year, which meant a loss of some £30,000 to the catchers and boat-owners, and of from £8000 to £10,000 to the workpeople, all of which would have been spent in Yarmouth and the district. Moreover, this year the Herrings had been of very poor description, the worst for many years in point of size and quality. Yarmouth had never failed of its Herring fishing except in bad weather. The Herrings were always here. Some people thought trawlers did the Herring harm. He did not think it, because smacks trawled up not only flat fish, but Haddock and Dog-fish, which were the greatest enemies of the Herring, consuming immense quantities of spawn."

THE London School Board have now the subject of Natural History Collections before them. The following extracts are from the 'Daily Mail':—" Tempting as may seem the offer of the entire contents of a museum for £51, some members of the London School Board (March 2nd) seemed disinclined to purchase on the principle that it was too cheap to be good. [We are entirely of that opinion.—ED. Zool.] The collection in question is at present in the possession of the Shoreditch Public Libraries Committee, and consists *inter alia* of:—Twenty-four cases of birds intact; 9 cases of birds broken, the whole being somewhat dirty; 223 birds unmounted, badly preserved, and probably not worth the trouble of mounting; 15 Emu and 20 Guillemot eggs; 291 eggs and 14 nests; 14 boxes of eggs; 68 jars of reptiles; 57 boxes of shells; cabinet of Lepidoptera (cabinet in bad condition, and the specimens attacked by mites); 43 boxes of Lepidoptera, 32 of Coleoptera, 8 of Hymenoptera, and other Lepidopteral rubbish; 26-drawer cabinet of minerals, fossils, and shells (cabinet very bad); 28 boxes of minerals, very dirty and unclassified; 2 cases and 2 cabinets of minerals; a collection of polished pebbles, garnets, &c., about $1\frac{1}{2}$ tons in weight; groups of coral, coins in cases, cases of medals, bones, tiles, glass jars, boxes, &c. One member was very sceptical as to the worth of the museum. He asked if the word 'mite' was not a misprint for 'mice,' but was informed, amid laughter, that 'mite is right.' In the end the Board resolved to purchase mites and all, provided one and a half tons of loose fossils were thrown in. The whole collection, it was stated, cost about £1000."

THE Rev. J. Conway Walter has contributed some interesting notes on "Fox and Dog Hybrids near Horncastle," to the April issue of 'The Naturalist.' Mr. Walter exhibited, at the meeting of the Lincolnshire Naturalists' Union in 1897, a case containing two stuffed specimens of a cross between a Fox and a Dog, the sire being a male Fox (*Vulpes vulpes*), and the mother a half-bred bitch between Shepherd Dog and Whippet. The mother was bought by M. Suchetet with a view to further experiments. Since then several similar hybrids have been produced in the same neighbourhood. In one case, at Ashby Puerorum, a farm-bailiff, named Cross, tied his Shepherd bitch near a Fox-earth, and the one pup reared is now in the possession of Mr. Frank Dymoke, of Scrivelsby Park. In another case a gamekeeper near Louth tied a bitch in a wood, in the nutting season, to give warning of trespassers, and subsequently the bitch had pups, evidently a cross with a Fox. One of these is now in the possession of Mr. Waltham, dealer in china, High Street, Horncastle. Another is in the possession of Mr. E. Walter, farmer, of Hatton, a cousin of Mr. Stafford Walter, who bred the original hybrids, which were exhibited in 1897.

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THE NESTING OF THE BLACK KITE (*MILVUS MIGRANS*) IN THE TERRITORY OF VERONA.

BY COUNT ETTORE ARRIGONI DEGLI ODDI,
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THE Black Kite (*Milvus migrans*, Boddaert)* has, until now, been considered a bird rarely seen in any part of Italy, occurring in some places as a rare straggler, and almost unknown; in others as a breeding species, but without becoming permanently established.

* Mr. Seebohm ('British Birds,' vol. i. p. 80), after having criticised Messrs. Newton and Dresser, who call this species by the name of *M. migrans*, Boddaert (1783), and Dr. Sharpe, who called it *M. korschun*, Gmelin (1771), adds that some future ornithologist, evincing more zeal than discretion, may adopt the name of *M. milano*, Gerini (1767), in homage to the law of priority. Mr. Seebohm has here fallen into a singular error; the bird drawn by Gerini on plate i. No. 38, of vol. i. of his remarkable work, 'La Storia degli Uccelli,' is not our *M. migrans*, but simply a variety of *Buteo vulgaris*, and the identical bird which Savi elevated to the rank of specific rank under the title of *Falco pojana*. Italian ornithologists all agree in referring Gerini's *milano* to *Buteo vulgaris*, and they place the same name under the synonyms of this species. Gerini speaks of *M. migrans* in the course of his work, but under the title of "Falco detto Nibbio nero." These are his words (*l. c.* p. 71):—"Falco detto Nibbio nero. Falx = Falco *Milvus niger* Schwenk et Sibbald, &c. *Asturis* magnitudine, remigibus majoribus nigris, cauda supra fusca, collo et uropygio albicantibus; cera lutea, rostro nigro, pedibus gracilioribus luteis." He does not mention it as

The following are the principal opinions of our ornithologists as to the appearance of the Black Kite in Italy:—

ITALY GENERALLY.—Salvadori, T.*: This Kite is rare in Italy; still there is scarcely a province in which it has not been found, and it has even bred in several places. Savi, P.†: “It is very rare in almost every part of Italy,” &c. He says that it lives constantly along the Riviera di Levante on the mountains. Giglioli‡: A rare species in Italy, but it has been found in small numbers everywhere in the central and southern regions, in which it has also bred, &c. Idem§: It is not a common species, but perhaps resident in Italy, in all parts of which a few individuals have been taken. Salvadori, T.||: A summer bird, but rare; it has nested in some localities. Martorelli, G.¶: “The Black Kite cannot be said to be common in any part of Italy, though it breeds in some localities. . . . It is much more easily found in our country in the fine than in the bad season, and it is therefore a summer bird, and one of passage.” Continuing, the author says that Giglioli had five examples of the Black Kite, caught at one and the same time at Lanzo. I cannot tell how Martorelli could have made such a blunder, for the renowned Professor of Florence says:—“In the Central Italian collection I have eight specimens, caught at Lanzo (October), Nice (December), Genoa (July), Florence (autumn), Terracina (April, May); so that the eight specimens were taken in the five above-mentioned localities. This species is not cited as Italian in the ‘Storia Naturale degli Uccelli.’”

PIEMONTE.—It is omitted by Bonelli; considered rather rarer than *Milvus iclinus* by Camusso. Giglioli speaks of an adult male which he had from the neighbourhood of Turin, May 15th, 1886.

LOMBARDIA.—Monti states that the Black Kite is rare at Como; he notes a specimen from Lugano. Messrs. Prada, Mazza, and Pavesi record this species from the Province of

an Italian species; he only adds, like Brisson, “Mures et Locustas in agris inquiri; Pullos tamen Avium adhuc volandi impotentes avidissime rapit.”

* Faun. d'Italia, ii. Uccelli, p. 13 (1872).

† Orn. Toscana, vol. i. p. 38 (1827).

‡ Elenco, p. 40 (1881).

§ Avif. Ital. n. 245, p. 248 (1886).

|| Elenco Ucc. Ital. p. 47 (1887).

¶ Monogr. Ucc. Rap. d'Ital. p. 116 (1895).

Pavia; Zanni and Bettoni record it for Brescia; Paglia records it for Mantovano; Ferragni for Cremona; Carlini does not record it for Valtellina; Pavesi excludes it from the region of Tessin, but Riva* had previously recorded a single specimen. Authors agree in saying that it is rare in these places, except Ferragni,† who says that in the Province of Cremona it is scarce, but passes regularly in May.

VENETIAN TERRITORY.—Count Ninni‡ says:—"It lives in the wood of Cansiglio, but it is not certain that it nests there. It has nested in the wood of the Marquis of Canossa at Grezzan (Perini)." Naccari does not record the Black Kite from Venetian territory, and Contarini refers to it as a rare bird. Ninni had a nestling, but he calls it an accidental visitor, and very rare. A specimen from the Province of Treviso, caught at the mouth of the Sile, is preserved in Scarpa's collection. I have mentioned a specimen killed at Vigodarzere on May 25th, 1885. We do not find it mentioned among the birds of the Province of Belluno (Doglioni), nor among those of Friuli (Vallon, Pirona); but recently my friend Professor Tellini has included this species among those which are probably caught in the aforesaid region, but which cannot yet be declared as such for certain. It is not noticed among the birds of Bassano (Baseggio), nor among those of the Province of Rodigino (Dal Fiume). We have no precise information for the Province of Vicenza. As for Verona, Perini,§ an author who cannot always be relied upon, wrote, in 1858, that, during a period of fifteen years, he had only succeeded in observing two examples of the Black Kite. "We are assured, however," he adds, "by the Marquis Bonaventura, of Canossa, that this Kite breeds in his wood at Grezzan, where it lays from three to four eggs of a yellowish white colour, with obscure spots very close to one another." In his edition of 1874 the same author remarks: "It is rare in our Province; its nest has, however, been found sometimes," without naming a locality. De Betta says it is rare, and, relying simply on Perini, states that it has bred in Canossa's wood. I do not find the Black Kite

* Orn. Ticinese, p. 63 (1865).

† In Giglioli, Avif. Ital. vol. i. p. 400 (1889).

‡ Cat. Ucc. del Veneto, in Comment. ecc. i. p. 9 (1868).

§ Uccelli Veronesi, p. 15 (1858).

mentioned in Garbini's works, but this author has applied himself only to water-animals (aquatic animals). Lastly, Dal Nero, in an article contributed to the 'Bollettino Agrario Veronese' of 1892, mentions the appearance of *A. migrans* in the Province of Verona; he says that it is rare and appears casually, that it is seen in very irregular numbers, and that it breeds at Grezzano. All these authors therefore agree in admitting the appearance and breeding of this Kite at Grezzano as an exceptional circumstance. Kolombatovich, Schiavuzzi, and Bonomi call the Black Kite a rare species in Dalmatia and in the Tyrol.

EMILIA.—Bonizzi, Doderlein, Carruccio, and Picaglia say that the Black Kite is rare in this region.

MARCHE.—It is not mentioned either by Paolucci, Carpegna, or Gasparini. On the contrary, Professor Paolucci, of Ancona, a well-known and eminent ornithologist, has recently favoured me with the following information:—"I have never seen (in the Marche) *Milvus migrans*, which is, of course, unrepresented in our collections; nor have I ever heard of this species being caught in our district, though, from the obvious character of its forked tail, it might have been reported by sportsmen. So far as my information goes, it is quite unknown in the Marche (*in lit.* June 21st, 1897).

TUSCANY.—Dei does not mention the Black Kite in 1862, in treating of the Province of Siena; but at a later date* he had a specimen. It is noted by Griffoli for the Val di Chiana; by Savi for the Province of Pisa; by Professor Giglioli for the Florentine region; by the Marchese Paolucci for the Province of Siena; by Bianchi as a bird of passage in the Isola del Giglio.

LIGURIA.—Durazzo says that it breeds, but that it is rarer than *Milvus iclinus*. Savi and Carazzi say that it is rare at Spezia; a straggler at Nice. *Milvus migrans* is said to constantly inhabit the mountains of the Riviera di Levante, and Giglioli had one from Nice in December. I have spent many months in winter in the Riviera, but I do not remember ever having seen the Black Kite flying among the mountains, and I have little faith in its being a stationary species in that country.

ROMAGNA; ROMAN PROVINCES.—Prince Bonaparte states that the Black Kite breeds in the mountains, which does not seem

* Giglioli, Avif. Ital. i. p. 401 (1889).

very probable. Salvadori, Giglioli, and Martorelli had specimens from these regions. The Marquis Lepri writes to me as follows:—"This Kite is with us a summer visitor, and fairly abundant without being positively common. It appears between the end of March and the beginning of April. It continues to pass until the latter end of May. It is then easily met with, being less shy than *M. iclinus*. I have this year seen more than one about the country-side. Several specimens are brought every year to the shop of the taxidermist De Dominicis, generally birds that have been caught in the Royal Domain of Castel Porziano, situated on the coast between Ostia and Anzio. So far as I have been able to observe, the Black Kite frequents running water, especially streams bordered by large trees. In the case of a specimen which I procured a few days ago, the stomach was full of fish. As for the breeding of the Black Kite, at least as far as concerns our province, I do not think that it occurs on the mountains, as Bonaparte states. I have never seen it on the mountain, neither is it known there. *M. iclinus* is also very rare on these heights; it does not breed here, though so abundant on the plain. *M. iclinus* breeds on large trees in woods on the plain, or beside running water; I have observed its nest several times. Referring to the extensive information which I have gathered on the subject, I think that the same holds good of *M. migrans*, and this is confirmed by the fact that at the beginning of July last year I saw in the shop of a bird-dealer a *M. migrans* scarcely covered with feathers that had been taken from its nest on one of those gigantic elm trees that border the Tiber near Castel Giubileo, a few kilometres from Rome."

SOUTHERN ITALY.—It is rare, according to the eminent De Romita, in the Puglie. De Fiore excludes it from Catanzaro, and Moschella mentions it doubtfully in his Catalogue of the Birds of Reggio, Calabria. He writes to me, however, in a letter of June 3rd, 1897:—"I have frequently observed the Black Kite this year; about twenty specimens have been caught. I have only been able to procure one specimen for myself—a male—and certainly not cheap." I also secured two specimens caught in that district on the 7th and 18th of May, kindly sent to me by Dr. Angelo Pertile. Our ornithological information from this vast region is, unluckily, very incomplete.

SICILY.—Very rare, according to Benoit, who adds:—"I am told, however, that it often appears in the interior of the island." Doderlein says that it is very rare, confuting the assertion of Schembri, who mentions it as very common. Giglioli also says that it is rare; it is very rare in the Province of Messina (Ruggeri, Pistone); rare but resident upon the mountains in the district of Modica (Dellafonte, Garofalo); finally, Leonardi excludes the Black Kite from his list of the birds of Girgenti. At Malta it is rare, according to Schembri, Wright, and Blasius.

SARDINIA.—Cara notices the Black Kite as being less common than *Milvus ictinus*. It has been mentioned by Salvadori and Lepori on the strength of this assertion; Giglioli found a young specimen in the Cagliari Museum, labelled *Falco barbarus*.

It is evident from the facts just stated that the Black Kite is seen almost all over Italy, but nowhere with any degree of certainty; that it has been found breeding in some places, but always as a rare and isolated circumstance, except perhaps in the Roman Campagna Romagna, where it appears to occur with a certain regularity. In the present paper I shall make known a locality where the important phenomenon occurs of a real and constant breeding station of the Black Kite, which is resorted to every year by a number of pairs—quite a novel event in the history of our avifauna. This happens on an estate belonging to the noble and historical family of the Marquis of Canossa, *i. e.* in the wood of Grezzano, near Villafranca, in the Province of Verona. Vittorio dal Nero, a modest but conscientious and diligent observer, was the first to speak to me of this fact; and it is indeed strange that this has until now been unknown to the ornithologists of Italy—and particularly to those of Verona, Perini and De Betta—who have mentioned the breeding of the Black Kite at Grezzano as quite a casual fact. Here I desire to acknowledge my indebtedness to the Marquis of Canossa, of Verona, for his kindness in allowing me to go to Grezzano, for sending me some specimens, and for supplying me with information; I must likewise return thanks to the Rev. Don Pietro Carcereri. He is very fond of sport, and an intelligent observer and has diligently studied the habits and life-history of the Black Kite; he has sent me several notes, which I have found most useful. Grezzano wood is about an hour and a half's drive from

Verona, beyond Villafranca. It is very near the magnificent Villa Canossa, from which it is separated by an iron gate; it is surrounded by a wide ditch, and marshes on one side, with a field partly laid out as a garden; on the other two with the country, which is covered with rice fields, meadows, and corn fields. The ground is intersected by numerous narrow channels. The wood is composed of plane trees, elms, oaks, poplars, chestnuts, &c., the greatest height of which may be about forty metres; it has a flourishing appearance, and the vegetation is splendid, but there are no firs. *Ardea cinerea* and *A. purpurea*, *Corvus cornix*, *Nycticorax ardeola*, *Ardeola ralloides*, and *Corvus corax* breed here; there are also quantities of Turtle-Doves, Golden Orioles, Blackbirds, Woodpeckers, and other smaller birds. In winter *Buteo vulgaris* is also found here, but, according to the inhabitants of the Castle, disappears as soon as *Milvus migrans* arrives.

In the Province of Verona, *Milvus migrans* is only to be found at Grezzano, "perhaps," says the Rev. Carcereri, "because it is attracted by the high trees; perhaps, because in that region and the neighbourhood it procures the food which it prefers, which consists of young chickens, when it can find them. Only two specimens are believed to have been killed at Chiesanuova, a mountainous spot to the north of Verona. One of these has been cited by Dal Nero. With these exceptions none have been seen except at Grezzano. It is simply a summer bird, since it arrives in spring, and leaves at the end of summer after having bred.

The following dates represent our information as to the arrival and departure of the Black Kite at and from Grezzano:—

Year.	Arrival.	Departure.
1883.....	March 18th—May 12th	.....July 25th—August 18th.
1884.....	April 5th—May 10th	.....August 1st—September 3rd.
1885.....	March 28th—May 6th	.....July 18th—August 29th.
1886.....	March 16th—April 24th	.....August 2nd—August 30th.
1887.....	March 12th—May 5th	.....August 5th—August 28th.
1888.....	March 16th—May 1st	.....July 28th—September 1st.
1889.....	March 10th—May 8th	.....August 6th—August 29th.
1890.....	March 18th—May 5th	.....August 3rd—September 2nd.
1891.....	March 20th—May 9th	.....August 4th—August 29th.
1892.....	March 11th—May 2nd	.....August 5th—August 19th.
1893.....	March 16th—May 1st	.....August 1st—September 2nd.
1894.....	March 10th—May 6th	.....August 4th—August 31st.
1895.....	March 12th—May 8th	.....August 9th—September 1st.
1896.....	March 15th—May 5th	.....August 6th—September 9th.
1897.....	March 18th—May 11th	.....July 20th—August 12th.

The birds, however, that arrive in March may be considered as the vanguard, and they come singly, while the main body arrive in April. The arrivals and departures are said to coincide with those of the Martin; the dates of which, for the Province of Verona, would run from April 12th to May 1st, and from July 25th to September 10th. Some Martins are, however, found also in October, while Black Kites have never been observed at Grezzano at that epoch. They arrive separately, and not in flocks, a fact which has already been stated by Ferragni in treating of the Province of Cremona, and by Ruggeri and Pistone in writing of that of Messina. Irby in Spain, Favier in Morocco, and Count Allèon at Constantinople have observed that Black Kites migrate in numerous troops. As soon as they arrive, they set about constructing their nests, which they build new every year. They have never been known to take possession of those of Herons or Crows, which are so abundant in those regions, and with these birds they seem to live in peace. Their nest is ready about the 10th of May, and they take twenty days to build it. They generally breed only in the wood; but nests have also been found in old and lofty trees in the country round about. They prefer the poplar, and build more rarely in the oak. They choose tall trees that reach a height of from thirty to forty metres, and build their nests on the fork of the thickest branches, perhaps for safety, so that the wind may not blow them down from such a height. They are large and easily noticed from the ground, and the bird hatches without being seen; but sometimes the nests are smaller, and then the head and tail of the sitting bird peep out. But this only occurs when they are young; in the second year of their age they make it larger. Goebel also says that the nest is very small, and that very often the head and tail of the sitting bird can be seen on every side of the nest. The height of the nest from the ground varies from about twenty-five to thirty metres; it is seldom lower. It consists of stout twigs strongly interlaced, ill-connected, but intertwined, and secured to the branch, from which the nest stands out like a bundle of wood. In the interior you see a hard layer formed with pieces of paper, linen rags which the Kite gathers here and there about the houses and dunghills; mud, and the dry dung of oxen, horses, &c., are added to unite the rags strongly together. This nest-bottom

resists the penetration of a fowling-piece. The Rev. Carcereri, desiring to kill some nestling Black Kites, was compelled to employ the Weterli carabine with a bullet to pierce the hardened layer. The nest is generally shallow, and sometimes lined with dead moss. Mr. Seebohm* observes that the fact of rags being found in the nest of the Black Kite has been declared to be an error; but he adds that the circumstance has been verified by Salvin in the Eastern Atlas. "He also states," adds Seebohm, "that its nest is usually built amongst the roots of a tree growing out of the rocks." In Italy, it has only been observed on lofty trees. When the nest is built, the female Black Kite lays her eggs, usually three, but sometimes even four in number, in the space of four or five days. Seebohm says that in Pomerania the eggs are usually two in number, and so does Irby of Spain; while Goebel, referring to the South of Russia, says that the eggs are three in number, though he adds they may accidentally be two, or even four in number; once only he observed five in a clutch. The eggs of the Black Kite are about the size of a medium hen's egg, usually but not invariably of a dirty white, with larger or smaller spots or brown spots of various tints. I here supply some information about four eggs of the Black Kite which form part of my collection.

Egg found on May 25th, 1891, at Grezzano.—This specimen is almost entirely of a dirty white, with a few spots of light brown, most numerous at the larger end; the smaller end is colourless. Another egg found on the same day.—It is almost entirely of a dirty white, with fine brownish spots widely dispersed as if sprinkled over all the surface, and so delicate that the egg, viewed at a little distance, appears to be colourless.

Egg found in June, 1892, at the same place.—This specimen is pure white, with large dots of a lively brown tint, darker round the edge of the dots, which are most numerous at the larger end; there are also many little spots of the same colour spread here and there. This egg approaches the one figured by Seebohm on plate v., fig. 1, of his above-mentioned work.

Egg found in June, 1893, at the same place.—The ground tint is of a less pure white, spread with little brown spots of dull brown, and there are some larger spots of the same colour,

* 'British Birds,' vol. i. p. 83 (1883).

forming a kind of zone in the middle part of the same egg. It bears some resemblance to the egg figured as No. 2 on the plate v. of Seebohm's work, but would resemble still more that of the Common Bunting, and appears to be a rare variety. Colonel Irby mentions the great variety of colour noticed in the eggs of the Black Kite, and Seebohm has described several of them.

The following are the dimensions of the eggs which I have preserved:—

Egg of May, 1891. Length, 5·68 cm.; breadth, 4·30 cm.

Egg of June, 1892. Length, 5·54 cm.; breadth, 4·15 cm.

Egg of June, 1893. Length, 5·18 cm.; breadth, 3·79 cm.

The females only incubate, and that for a period of from eighteen to twenty days. The male does not share the duty of incubation, but flies continually round his mate at a very great pace, and, unless disturbed, he continues to wheel gently around the eyrie. If he is aware of anyone's presence, he rises high in the air, flying round in wide circles, as though desirous of touching the tops of the highest trees, but always keeps out of shot, and, if shot at, he rises still higher; if he is left alone, he slowly descends again. The inhabitants of the castle say that if they gently strike the tree in which a female Black Kite is sitting, the bird at once flies away. I could never observe this fact, and the birds which I killed were males.

It is difficult to reach the nest, which is always situated at a great height, involving a perilous climb. The Black Kite exhibits great affection for its young, which are fed by both the male and female parents. Young chickens are their favourite food, being plentiful in the country. Like other birds of prey (*Circus æruginosus*, *C. cyaneus*, *Buteo vulgaris*, &c.), the Black Kite feeds its young at more or less regular hours; that is, according to what the Rev. Carcereri says, in the morning from about 9 to 11 a.m., and in the evening one or two hours before sunset. I have commonly observed this fact with *C. æruginosus*, which also feeds its young ones with chickens, and which breeds regularly in the marshes of Monselice. Its hours for feeding were about eight in the morning, and three in the afternoon. This may be explained by the fact that it cannot always get hold of chickens without being exposed to danger, and it must generally

lie in wait for them in the open country, and far from human habitations. The housewife usually lets out the young chickens at hours most convenient to her; that is, either when she returns from market or after dinner; at her leisure time, that is, when it is most suitable for her to look after them, and keep them out of danger.

The Black Kite is decidedly a pest to chickens. It pursues them everywhere, even in the midst of people, and when it is sure of its aim, it pounces among them with a flight swift as lightning, snatches one, and carries it to its nest. *M. migrans* does not confine its chase for chickens to Grezzano, but it haunts the country round about, sometimes even at the distance of from seven to ten kilometres, to find its favourite prey, and then it goes back to its wood. The poor little chickens are often heard crying from the Kite's nest in which they are about to be devoured. This Kite also victimises the nestlings of other birds. It has on several occasions been seen to hover above Canossa's Palace where Starlings breed, and then to pounce upon the young birds which were hopping about the tiles. Besides this, remains of the following fishes have been found in the stomachs of Black Kites:—*Esox lucius*, *Tinca vulgaris*, *Scardinius erythrophthalmus*, *Cottus gobio*, and *Gobio fluviatilis*. A Black Kite, killed on June 15th, 1894, by the Rev. Carcereri, contained the bones of *Rana esculenta*. That gentleman tells me also that a Kite caught in May, 1893, and stuffed by Dal Nero, contained the remains of numerous aquatic insects. In two birds which I killed on the 3rd of June last year I found entire remains of *Rana esculenta* and *Grillotalpa vulgaris*.

The following is a list of substances found in the stomachs of about twenty Black Kites. These results have been procured by Dal Nero, the Rev. Carcereri, and myself, and they show how varied the diet of this greedy bird really is. I return thanks to Prof. Adriano Garbini, of Verona, for his kind assistance in classifying the worms and insects:—

VERMES (A) Nematoda.—Gen. *Lumbricus* (the species could not be identified).

ARTHROPODA (A) Crustacea.—*Cypris pubera*, O. F. Müller; *Cyclops* sp. ?; *Asellus vulgaris*, Latr.; *Palæmonetes varians*, Leach.
(B) Insecta.—*Smynturus aquaticus*, Bourlet; *Libellula depressa*,

L.; *L. rubiconda*, L.; *Phryganea reticulata*, L.; *Hydroporus marginatus*, Dft.; *Hydrophilus piceus*, L.; *Stratiomis chamæleon*, Deg.; *Grillotalpa vulgaris*, Latr.; gen. *Acridium*; *Cicada plebeja*, Scop.

MOLLUSCA.—*Limnæus ampullaceus*, L.

PISCES.—*Cottus gobio*, L.; *Esox lucius*, L.; *Gobio fluviatilis*, Cuv.; *Leuciscus erythrophthalmus*, Linn.; *Tinca vulgaris*, Cuv.

AMPHIBIA.—*Rana esculenta*, Linn.; *Bufo vulgaris*, Laur.; *Triton cristatus*, Laur.

REPTILIA.—*Lacerta viridis*, Daudin; *Tropidonotus natrix*, Linn.; *T. tessellatus*, Linn.

AVES.—*Sturnus vulgaris*, Linn.; *Gallus gallinorum* (chiefly small chickens).

MAMMALIA.—Gen. *Talpa*; *Crossopus fodiens*, Pallas; gen. *Mus*; gen. *Arvicola*.

The Black Kite is almost always in pursuit of prey during the day, but is most frequently seen flying about the wood at mid-day and towards evening. It soars so high that it is sometimes scarcely visible, but seems to be a Swallow, and continues wheeling about in circles, or resting suspended upon the expanded wings for some minutes; or, as Allèon says, describing great spiral lines, making various evolutions, rising and descending. Now and then, suddenly closing its wings, it drops down with an extraordinary swiftness and almost touches the highest tops of the trees, and then it recommences its slow spiral flight; if it is left alone, it comes down about the wood, flying among the lofty trees, probably in search of insects. I have several times seen them fly close to the surface of rice fields when over-flooded, and to running water, intent, as Bailly says, on fishing. That author has seen them plunge into the water and take small fishes. I have also noticed them flying over fields where they find *Acridium* and *Grillotalpa*, as has also been observed in Spain by Werner.

The number of Black Kites that every year arrive at Grezzano, breeding in companies in the wood, varies from forty to fifty birds. I think that the number given me by the inhabitants of that country must be exaggerated when they say that it amounts to two hundred birds. In 1892 the Rev. Carcereri shot as many as twenty-five Black Kites; but in the following years, 1893–96, only three or four fell to his gun. From what I have

been able to observe, it is not easy to kill successive individuals, for the birds are very wary, and after the first few shots they soar very high; but, if the gunner hide himself carefully, the Kites fly down again, and can be killed with a good gun, especially when they enter or leave their nests. On the 3rd of June last year, without using all those precautions that the occasion would require, I was able in the space of a few hours to shoot down three fine Kites. They can be caught more easily when they have young ones. This species is commonly called *Poja negra* or *P. mora* by the inhabitants of Grezzano, and those who kill any Black Kites are blessed by the country people, for they see that the risk of their chickens being carried off is thus reduced. The following is a list of those collections that include Black Kites killed at Grezzano:—

- (a) Collection Perini, of Verona, two specimens.
- (b) Count Brasavola, of Verona, two specimens.
- (c) Count Reali, of Treviso, two specimens.
- (d) Collection Cipolla, of Verona, three specimens.
- (e) Collection De Betta, of Verona, one specimen.
- (f) Collection Bennati, of Verona, two specimens.
- (g) My own collection, eight specimens.

Besides these twenty specimens, the Rev. Carcereri had several birds, which he killed himself, stuffed by Dal Nero, which he then gave to his friends.

The Black Kite is a species which varies very little in its dress. When young, the colours are darker and brighter than when at full maturity. The Rev. Carcereri informs me that almost all those he killed resembled one another. As for size, the female is always larger than the male.

ORNITHOLOGICAL NOTES FROM MALTA.

By Sergeant HUGH MACKAY

(Highland Light Infantry).

DURING my stay in Malta I visited Mr. Micallef's interesting establishment at Birchircara, with a view of obtaining information regarding the numerous migratory birds which at times pass over the island. In a large show case of beautifully mounted specimens, I was prepared to find a number of birds which, although not altogether unknown in the British Islands, are nevertheless rare, and even here in Malta may be considered scarce, being only obtainable on migration. Altogether I saw no birds entirely foreign to the British Islands, yet for the benefit of the ornithological student the undermentioned species are well worth attention, if only for comparison with the numerous works on this interesting subject. I have not specified the scientific names of these birds, for the sake of space, while they are perhaps better generally known under their commoner names.

DUCKS.—Garganey, Teal, Pochard, Pintail, Tufted, Scaup, Shoveller. These birds are obtained here during the winter months.

HERONS.—Common, Purple, Squacco, and Night Herons; fairly common on migration.

GREBES.—Little Grebe, Slavonian, and Black-necked. Of the three mentioned the Slavonian is the most common, several specimens annually frequenting the Sliema and Quarantine harbours and other suitable localities between the months of October and January.

OWLS.—Barn Owl, Long-eared, Short-eared, and Scops. All obtainable on migration; while the Short-eared species is known to breed sparingly on the island, and is therefore classed as a resident species.

I have enumerated under different headings the species which predominate; but as the remainder are isolated more or less

from their families, it would occupy too much space to individualise each species under separate headings, therefore I will only comment upon those deserving note at the conclusion of the following list.

Grey Plover, Golden Plover, Turnstone, Starling, Glossy Ibis, Common Cuckoo, Bee-eater, Golden Oriole, Kingfisher, Black Redstart, Common Redstart, Pratincole, Great Grey Shrike (*Lanius excubitor*: I mention the scientific name of this bird to distinguish it from others of the same family), Common Bittern, Crane, Storm Petrel, Nightjar, Razorbill, Blue-headed Wagtail, Grey Wagtail, Turtle Dove, and Quail. All these birds have been obtained by Mr. Micallef, principally during the spring and autumn migrations. He pointed out to me several immature specimens of the Razorbill; adding that in one winter he secured thirty-four of these birds, all being young birds of the year.

At home I have had occasion to note and comment upon the irregular visits of the Razorbill, particularly along the shores of the Solway, where in some winters immature birds are extremely abundant, adult specimens being rarely found among them; while other winters pass without the appearance of a single specimen.

Three specimens of the Quail were also shown to me, one being plentifully suffused with bright yellow, the remaining two being of a dark reddish-brown colour, similar to that of the Red Grouse. In Malta, where Quails are so abundant on migration, it is not surprising to find some slight variation in size or colouring of plumage occurring.

Mr. Micallef has in his possession two specimens of the Nightjar, which at once attract the attention of an ornithologist. This is the species known as the Red-necked Nightjar, a species distinct from the common or Egyptian forms, and very rare.

The Whooper Swan is unquestionably of rare occurrence in Malta, being essentially an inhabitant of the far north; yet four specimens were shot on the Marsa during the month of March, 1898.

The Common Starling is known to almost everyone; but Mr. Micallef pointed out a specimen totally devoid of those markings so conspicuous on the British bird. This is the

variety known as *Sturnus unicolor*, and only wanders to the Mediterranean in very cold seasons.

The Bittern and Golden Oriole pass the island on migration, the last named being a very rare wanderer to the British Islands; while it breeds in Greece, Sicily, the Balearic Islands, Spain, and France.

SCLAVONIAN and EARED GREBES.—Both species frequent the different harbours around Malta between the months of October and January.

KESTREL.—These birds are common in the winter months, but the majority leave the island in the spring months for their breeding grounds, probably Spain, where they are abundant.

REDBREAST.—During my stay in Malta (two years and a half) I saw only three of this species.

WAGTAILS.—White and Grey Wagtails common during the winter months.

FINCHES.—The Goldfinch, Greenfinch, Chaffinch, and Hawfinch. The first three named species are common on migration; the Hawfinch is much scarcer, and is obtained generally in the autumn. The whole of these birds are much prized by the Maltese as cage pets.

SISKIN.—I have only seen two Siskins personally in the open, and these were obtained by a birdcatcher; but I am informed they visit the island from time to time in large numbers.

LINNET.—I have observed several Linnets in the vicinity of Citta Vecchia, but, as yet, nowhere else upon the island, except at Manoel, where four were caught in a field near the camp.

NIGHTJAR.—Upon two occasions only have I seen and handled a pair of Nightjars, although the bird is said to be plentiful on migration. I examined one at Manoel on November 7th, 1896. Its appearance is unusual on the island at this period of the year.

SKYLARK.—The Skylark is somewhat plentiful on the island.

QUAIL.—Quails are extremely abundant all over the island during the migratory seasons, but particularly in April and May. One single specimen was shot on the shore at Manoel, November 7th, 1896; while as late as December 8th, 1896, six specimens were shot near the same place.

GOLDEN ORIOLE.—Saw several specimens near Pembroke camp between May 10th and 31st, 1896.

STONECHAT.—Fairly common all over the island.

PURPLE HERON.—Observed a specimen of the Purple Heron on the ranges at Pembroke, April 16th, 1896; and subsequently handled the same bird in the flesh an hour later. I am informed it is of frequent occurrence on the island, principally during the winter months.

JACKDAW.—So far as my observations have gone this is the only representative of the Crow family existing on the island, and it appears to be confined to the localities of Citta Vecchia and Musta.

MONTAGU'S HARRIER.—Have seen a good many specimens at Pembroke camp during the months of April and May. They are common on migration.

BLACK REDSTART.—Observed a single specimen on April 30th, 1897; and handled a bird in the flesh the following day which was shot near the shore at Manoel.

THRUSH.—Observed a Thrush in the moat at Port Reale, November 1st, 1897. This is the first I have seen in Malta.

BEE-EATER.—On April 18th, 1898, Capt. Murray shot a male specimen of the Bee-eater, which he kindly gave me. It is not uncommon during the migratory season.

LITTLE GREBE.—Handled one of these birds which was shot near the shore at Manoel, April 20th, 1898.

TURTLE DOVE.—Abundant during April and May.

HOOPOE.—Saw a specimen of the Hoopoe in the moat at Fort Manoel. I was within twenty yards of it, and had an excellent view of the bird. I am informed that it is not uncommon on the island, although it is the only specimen I have seen. (September 6th, 1897.)

BLACKBIRD.—There is only one place to my knowledge which these birds frequent in Malta, and that is at Musta, where they nest on the bushes which grow out of the rocky sides of a deep ravine.

KINGFISHER.—I have only seen one solitary specimen of the Kingfisher here, and that in the early morning, near the Quarantine Bridge at Manoel, November 10th, 1897.

SHAG OR GREEN CORMORANT.—Handled one of these birds which was shot on the shore at Manoel, November 12th, 1897.

WILD GEESE.—A flock of Geese flew over Camp Manoel on November 19th, in a south-easterly direction, about 4.30 p.m.

RUDDY SHELDUCK.—A male example of the Ruddy Shelduck was shot in Sliema harbour, December 10th, 1897. I consider the occurrence of this species most unusual, and can only account for its appearance as a straggler. I am very sorry I did not secure the specimen.

WHITETHROAT.—These little birds are plentiful during the spring months. I have frequently found their nests around Manoel.

LAPWING.—On December 13th, 1897, I saw six Lapwings which had been shot in a field close to the Quarantine harbour. I am told they are of uncommon occurrence on the island.

COMMON SANDPIPER.—Have seen several flocks in various localities in the months of April and May, but at no other time during the year.

REDSHANK.—Handled a fine specimen in full breeding plumage, April 16th, 1897. It was shot on the shore near Manoel; another bird was fired at, but got away. This is the first specimen I have seen in Malta.

GREAT SNIPE.—A gunner along the shore at Manoel showed me four specimens of the Great Snipe which he had shot. These are the first I have seen.

SQUACCO HERON.—During the four days (April 29th to May 2nd) four specimens of the Squacco Heron frequented the shore at Manoel. They appear to be very lazy and inactive, allowing one to approach within twenty or thirty yards before taking wing. On the morning of May 1st I watched them for over half an hour, and during that time they remained almost motionless, except for an occasional turn of the head; the head and neck were drawn back upon the shoulders. I subsequently handled two of these birds in the flesh, which were shot by a native.

SHORT-TOED LARK.—This is a resident species in Malta, and is fairly common. I found a nest with young as late as July 11th, 1897.

NOTES ON SOME BIRDS FROM NORTH WORCESTERSHIRE.

BY H. E. HOWARD.

THE following notes were made between the hours of 2.30 and 6, in the morning of May 14th, in those extensive woods which once formed part of the Forest of Feckenham. A short account of these woods would perhaps be useful. They are very undulating, the highest point being about 400 ft. The trees are chiefly oaks, and in places where a year or two before the older ones have been cut down the ground is covered with low bushes of hazel and birch, with plants of various kinds; and here Warblers abound.

It was quite dark when I started on this morning. The first bird to begin singing was a Lark; this was about twenty minutes to three. They nearly always are the first to start, and, even though quite dark, they are high up in the air. A Redstart was next, followed closely by a Cuckoo.

It took me about twenty minutes to reach the wood, and by that time it was beginning to get light. The noise of the different birds singing was almost deafening; there seemed to be a Blackbird, Thrush, or Nightingale in every bush. Going some distance on, I sat down and listened. At first I heard nothing more than Thrushes, Blackbirds, and Nightingales, except a Nightjar, which was some distance in the woods, and a Fox which passed about fifty yards away, filling the wood with his unearthly howling. Now and then a Whitethroat would begin its song, but stop as if it was not quite awake. By 4 o'clock every bird was uttering a note of some sort or other.

Going farther in among the nut-bushes, I found Garden Warblers plentiful, and Blackcaps, of course, for a more jealous couple it would be impossible to find. The Blackcap is generally the aggressor; he flies at the Garden Warbler, and then starts to sing, his tail spread out and his wings drooping; and now is the

time when they sing most beautifully, more so even than when the females arrive. At times they positively seem to *curse* one another, the Blackcap always being the more excitable of the two. A Wood-Warbler was singing among the oaks. You nearly always find them in oaks or birches, and generally on the side of a hill. I always look on the Wood-Warbler as one of the most beautiful birds we have, both in colour and form.

Coming out into a little lane, which passed through the middle of these woods, I saw a pair of Lesser Whitethroats mating. The male Warblers are always worth watching when the females arrive; they have such curious ways of flirting. The Wood-Warbler seems to select two trees, and flies backwards and forwards between them, singing as he gets to each one. The Chiffchaff wanders about in the air like a big moth, flapping his wings very slowly. The Blackcap makes vain attempts to touch the top of his head with his tail. But most curious of all is the Grasshopper-Warbler; for some reason he runs about on the ground with a leaf in his bill—what the object of it was I could never quite tell—the female running about like a mouse, hardly ever uttering a note, though I have heard it once, very much like the young birds when fully fledged. Whitethroats abound in this lane, some in bright plumage, and others so dull you would hardly know them to be the same bird. They arrive in this state; two birds arrive at the same time, one in beautiful plumage, the other quite dull. Why this is I do not know, never having followed them to their winter quarters. The plumage of all Warblers very soon becomes dull, especially that of Whitethroats; I have shot a Wood-Warbler at the end of June in the most lovely plumage, and, when skinned, found it was covered with fat. The same with Yellow Wagtails, and these could only have lately arrived, for their brilliant yellow lasts but a week or two after they come to this country.

Turning into the wood again, among the oaks, I saw a pair of Greater Spotted Woodpeckers playing about, chasing one another from tree to tree; interesting birds to watch, especially when they have young. I have sometimes heard them rattling on a tree nearly a mile away; this particular pair evidently had a nest close by. Farther on in the woods a Green Woodpecker was laughing away to himself. The Greater Spotted is the

most common of all the three Woodpeckers we get here. No Pheasants are reared in these woods, so Jays and Magpies are allowed to flourish. The Jay is the worst mimic there is, though at times he warbles to himself very quietly.

Coming to the outskirts of the wood, I saw a Cirl Bunting singing in a little orchard close by. These birds have increased very much the last few years, and breed annually in one or two spots. On the top of an elm a Wryneck was sitting, all huddled up except when he threw his head back and stretched out his neck to utter his curious note. Farther on in the meadows you could hear the Redpolls calling. At this time of year they are very fond of osier-beds to roost in, especially those where a few years ago the trees have been cut down.

The woods are full of Stock-Doves, Turtle-Doves, and Ring-Doves. In a hedge a Grasshopper Warbler was singing; they are fairly common in this part of the county, but do not often sing here after the middle of May till the end of June—that is, during incubation. This one was sitting on the top of a thick bush, like a round ball of feathers. I got close to him, but he saw me, and at once every feather was drawn tight to his body, and he became an ordinary bird as the world knows him; then, climbing down, he hid among the bushes. Waiting for about ten minutes, he presently appeared climbing up the middle of the bush again till he got to the top; there he sat sunning himself, his feathers swollen out, and his form perfect, as beautiful a creature as you could see.

To see them in all their beauty birds must be unconscious of your presence; there is a vast difference between a bird as he is usually seen with his feathers lying flat on his body, and a bird that is really at rest, unconscious of the presence of any human being; then it is the feathers rise and fall in beautiful order, and form the most perfect outline. At the end of five years, if you live amongst them, you will begin to see their beauty; at the end of another five you will have learnt how little you knew at the end of the first five. There are some who seem to think there is no more to be learned about British birds as regards their form and habits. This can never be—the subject is endless.

NEW BRITISH ANNELIDS.

BY REV. HILDERIC FRIEND.

THE following records serve to show that as yet we are far from having gained a complete knowledge of the Annelid fauna of our own country. Nearly every time I go out to collect, some species new to Britain or to science is discovered; and, as each species has its place in the economy of nature, it is clear that we have much yet to learn respecting the part which the lesser worms play as friends or foes of the farmer and the gardener. My present records will be limited to one family, the Enchytræids. For the rest, suffice it to place on record the fact that *Limnodrilus hoffmeisteri*, Claperède, was found by me at Easter near the lake in Sutton Park, Birmingham—this being, so far as I know, the first record for this country.

1. FRIDERICIA MAGNA, n. s.

During Easter week, while on a visit to the Lake District, I went one day to the meeting of the waters where the Cocker joins the Derwent under the shadow of the Castle, and in view of Wordsworth House at Cockermouth. Among my other gleanings I here took two specimens of a worm which I at once found to be new to me, and, as it proved, new to science also. Its large size at first threw me off the track, and it was some time before I could bring myself to believe that it was a veritable Enchytræid, and a *Fridericia*, despite its well-marked characteristics. It was the largest species of the genus I have ever found, as it somewhat exceeded in size the seaside worm known as *Enchytræus humiculator*, which I once found on the banks of the Solway.

Fridericia magna is 35-40 mm. in length, and consists of about ninety segments. There are two setæ in each bundle behind the girdle, and three usually in each bundle on all the preclitellian

segments. I found as many as four setæ in two of the bundles, and, according to the accepted theory respecting this genus, the setæ should always be in even numbers (2, 4, 6, 8); but the rule is by no means invariable. In one specimen the four posterior segments were without setæ, and the penultimate set of four had only one seta in each sac. A marked peculiarity of this species is to be found in the colour of the blood, which is decidedly disposed to be red, as may be seen when the worm has been kept for a day or two in clean water. The body segments are striate, with about half a dozen rows of striate cells per segment. The girdle extends over segment xii and the hinder half of segment xi, the usual gland-pores being found on the former segment. I traced the dorsal blood-vessel to segment xviii, so it is post-clitellian in origin. The egg-sac extended back to the sixteenth segment. The blood-vessels in segments i-iv did not differ greatly in arrangements from that which usually prevails, the dorsal vessel giving off two branches on each side in the third segment, which formed loops and joined the returning vessels caused by the dorsal vessel dividing into two at the head. I found heart-like swellings in segments vii, viii, ix. The brain is nearly as broad as long, convex behind, and very slightly concave in front, the outline being slightly oval rather than circular. The coiled tube of segment xi is very long and fine; but the most obvious characteristic is found in the spermathecæ. There is a pair of sacs at the base of the pouch which is attached to the intestine, and at the outer extremity, between segments iv and v, the aperture of the spermathecal tube has a pair of large brown glands. These are so conspicuous that when first seen they have all the appearance of eye-spots. The length of the tube is about three times the width of the sacs.

I have named the species *magna*, because it is by far the largest yet described. I have not studied the nephridia, nor have I as yet determined the salivary glands, for want of material. The worm, which is sluggish in its habits, is found in moist places by slowly moving water. I found the same worm, or a close ally, at Hastings last summer, but, as only one specimen was taken, and one's holiday equipment does not render identifications easy, the exact species was not determined.

2. FRIDERICIA AGRICOLA, Moore.

Mr. C. Whitehead, of Maidstone, has recently submitted specimens of this worm for examination, on account of their having been found associated with meadow-grass which showed symptoms of disease. First found by Mr. Moore in America, it was some time ago discovered by me in two localities in Cumberland. Its distribution is therefore wide, and it is important that, in connection with future records, an attempt be made to show whether or not it is worthy of suspicion as an injurious annelid. I have discussed the question in the 'Gardeners' Chronicle' for the present month.

3. ENCHYTRÆUS PELLUCIDUS, n. s.

I give this name to a species taken by me among old stable-manure at Heaton Moor, Stockport, on March 4th, 1899.

It is a white, pellucid worm, with colourless blood, about three-quarters of an inch in length, and containing some sixty segments. There are usually four setæ in front of the girdle and three behind, equal in length, slender, and with a curve at right angles on the inner extremity, giving the setæ the appearance of a golf-stick. The curve, not as is usual, is very decided, the curved portion being nearly one-third the length of the shaft. The brain, which is about twice as long as broad, is oval, and rounded (not concave or notched) behind. There are no swellings or offgrowths on the nerve-ganglion, which is of practically equal size throughout. The salivary glands are unbranched and club-shaped, being swollen or knob-like at the free extremity. The spermathecae open in the usual place between segments iv-v, without glands, while the internal extremity is somewhat pear-shaped, and without diverticula or sac-like appendages. The girdle is minutely papillose, or presents a fine granular appearance. Very long coiled tube extending back to segment xx, or even as far as xxiv. The first nephridium seemed to lie in segment vii. Perhaps here the most distinctive feature is to be found in the spermathecae, which differ from any I have seen elsewhere. These organs are divided into three parts, each of which is about equal in length to the other. These are (1) a slender tube connected with the gut, (2) the

enlarged pear-shaped body, (3) the tube opening intersegmentally between iv-v.

4. ENCHYTRÆUS ARGENTEUS has just reached me from Kew. It is new to Britain.

I have many other notes on species which are new or little known, and only require time for their fuller study.

NOTES AND QUERIES.

MAMMALIA.

CHIROPTERA.

Leisler's Bat in Cheshire.—When waiting for Bats in Dunham Park, near Bowdon, on May 8th, I noticed a large one with a flight that was different to that of the Noctule. I watched it until too late to get a safe shot, and missed. A few minutes later I saw a second Bat, which I succeeded in shooting, and was surprised to find that it was Leisler's Bat, *Vesperugo leisleri* (Kuhl). I killed it at 7.45 p.m., a short time after I had observed the first Noctules on the wing. The flight was slower and more erratic than that of the Noctule, whose movements early in the evening are usually dashing and rapid. On one or two evenings since I have noticed Bats with similar flight to the Leisler's Bat I shot, and believe that they were also of that species. It is not safe, however, to dogmatise on the difference, for on the 29th I saw a Bat flying slowly, which, when I shot it, turned out to be a female Noctule. Upon picking up the Leisler's Bat which I had shot, I was at once struck by the small size, the dark brown fur, and the absence of the peculiar smell of *V. noctula*; and, upon carefully measuring the animal and examining the teeth, I felt sure that it was *V. leisleri*. Dr. N. H. Alcock and Mr. W. de Winton have kindly confirmed my identification of the species. All the Bats I noticed with this slow erratic flight were flying in one direction along an avenue of beeches. When they had passed I never saw them return, although undoubted Noctules which flew down the same avenue came back again several times. Both the Leisler's Bats and Noctules appeared to come from the same clump of old beeches, though I have not been able to discover from which tree they actually emerged. Noctules are exceedingly plentiful in Dunham Park, passing the day in holes high up in the beeches, and in the evening repairing to one of the glades or open spaces, where they course backwards and forwards high overhead. As a rule, on emerging, they fly higher than the tops of the trees; the Leisler's Bat I shot was a little below the level of the tree-tops. This species has not been previously recorded from Cheshire.—T. A. COWARD (Bowdon, Cheshire).

The Serotine (*Vespertilio serotinus*) near Hastings.—Upon showing the note with this heading (Zool. 1897, p. 141) to my friend the Rev. E.

N. Bloomfield some months ago he informed me that a number of these Bats have established themselves under the eaves of his residence (Guestling Rectory, near Hastings). Since then I have had two opportunities of satisfying myself that the species is rightly identified. I am happy to add that Mr. Bloomfield and his sisters take great interest in the little animals, and will not have them disturbed.—W. RUSKIN-BUTTERFIELD.

RODENTIA.

Albino of the Beaver.—With reference to the communication of Mr. Service in 'The Zoologist' (*ante*, p. 220) concerning a white Beaver (*Castor canadensis*), I should like to record a specimen of a skin exhibiting this abnormality which came under my own notice. In 1893 or 1894 a taxidermist and dealer in Manchester showed me a beautiful albinic skin of this animal. This taxidermist, who was a Canadian, had been a trapper, and himself obtained the animal the pelt of which he showed me.—K. HURLSTONE JONES (H.M.S. 'Repulse,' Channel Squadron).

AVES.

Blackbird and Ivy-seeds.—With regard to the note on a male Blackbird (*Turdus merula*) storing seeds at the nest (*ante*, p. 181), I do not think it is at all likely that a male Blackbird would try to feed his mate on the seeds of the ivy. The berries of the ivy are eaten by Blackbirds and Thrushes in considerable quantities at the end of winter and in early spring. But the seeds are not digested by the birds; they are voided whole, and may be seen at that season piled up in small heaps all about my shrubbery and elsewhere. May I suggest the possibility of the seeds seen by Mr. Lewis piled on the side of the nest having been deposited in this manner?—O. V. APLIN (Bloxham, Oxon).

Is the Whinchat a Mimic?—To this question, propounded by Mr. H. S. Davenport in 'The Zoologist' (*ante*, p. 208) as to whether *Pratincola rubetra* is a mimic, I unhesitatingly answer, Yes. On May 20th, 1897, I was attracted by two Whinchats singing very diverse songs in a thin wood on the Pentlands; one of them was perched on the very summit of a Scotch fir, and began its song with the alarm-cry of the Redshank twice repeated, whilst the other had no such note in its song. I have also noted the Whinchat imitating the Sand Martin, the Sandpiper, and the Yellowhammer; and I believe that the great variations noticeable in the songs of individual birds of this species are the direct result of imitation.—ROBERT GODFREY (46, Cumberland Street, Edinburgh).

Blue-headed Wagtail in Cumberland.—After waiting upwards of seventeen years, I have at last detected *Motacilla flava* in Lakeland. On

the 1st of May I found a single specimen of this Wagtail running over the sea-bank in front of our house, in company with a flock of Meadow Pipits, with which the rarer visitor was probably migrating. The Wild Birds Act prevented my shooting it for the Carlisle Museum, but I watched it closely with my glasses for two hours in pouring rain, and had the pleasure of pointing out its white eye-stripe and other distinguishing characters to a young but promising ornithologist. On the 10th of May I found a single Ray's Wagtail on the same ground, also with some Meadow Pipits. The common Yellow Wagtail was much wilder than the Blue-headed species. I have seen plenty of Blue-headed Wagtails on the Continent, of course, but I never met with *Motacilla flava* in Britain before.—H. A. MACPHERSON (Allonby Vicarage, Maryport, Cumberland).

Abnormal Occurrence of the Pied Wagtail (*Motacilla lugubris*) through the Winter in Aberdeenshire.—I was surprised to see one of the above (a male bird) flying in search of food about my houses on the 29th November, 1898. In fact, it appeared to be so strange to me to see one of these beautiful birds pouncing readily into byres among cattle, or into a stable among horses, in search of food, that I could scarcely realize its identity, the plumage being somewhat rough, there being a pretty sharp snowstorm at the time; but there was no want of vivacity, and the bird contrived to get a good meal before disappearing for the day. It made an appearance again on Dec. 1st, being then engaged searching for suitable sustenance in the mill-dam when the latter was emptied of water by being used for threshing fodder. With a return of fine weather it was not noticed near the houses, but with a recurrence of snow it appeared on the 19th and again on the 25th of December. During January and February it was a very common visitor to the turnip-fields, especially where the turnips were being lifted. There is no doubt that this bird remained here the whole winter. I have seen the bird in this county, but nearer the sea-coast, or at lower levels in mild weather, in January and February, but never so far inland, and withstanding the whole winter. — W. WILSON (Alford, Aberdeen, N.B.).

The Delinquencies of Starlings.—When first I came to live in Derbyshire—ten years ago—I placed boxes on my house to encourage Starlings (*Sturnus vulgaris*). After two or three years' experience I came to the conclusion that these birds were rather too plentiful, and year by year, in May and June, I wish that their numbers were greatly diminished. In the Peak district we often have late frosts and cold easterly winds during spring, and the plants in our gardens are late in flowering. But as soon as a bright blossom appears on our borders the Starlings mark it as suitable building material for their nests; and later, when young plants are bedded out,

they are often very destructive. I have seen them pull up young broad-bean plants; I have known them take, in a few hours, three dozen seedling French marigolds which had just been bedded out. Apparently all this mischief is very useless, as numbers of flowers and plants are scattered on the verandah, or may be found in the gutters between the gables of my house. But this is not their worst fault. At this time of the year it is a great pleasure to see the Swifts racing through the air, and to hear their shrill cries as they chase one another. Several pairs of Swifts nest every year in my house; but before they arrive the Starlings have taken possession of their nesting-holes. This leads to a fierce war being waged between the two species. It is true that now and again a Swift succeeds in throwing one or two unfledged Starlings out of the nest, but more often a battle takes place between the adult birds, and the Swift is very roughly treated. Sometimes he manages to escape, and flies far away hotly pursued by the Starling. But often they both fall to the ground together, and the Swift is left in a state too feeble to rise, and becomes an easy prey to any prowling cat. Several times the Swift's piteous squealing has brought me to the window, and I have seen the Starling hammering him with its beak. Last year I ran out and picked up a Starling and Swift clinging to one another so tightly that at first I could not disentangle them. The Swift was very weak indeed. However, I kept him indoors through the night, and next morning he was able to fly. This year Swifts did not come to us till the 7th of May, and already there were fights on the 15th, 16th, and 17th. Starlings are delightful birds, their varied songs and mimicry are so amusing, and in the winter they are among the few species which come to enliven us; consequently I do not like to shoot them, especially as shooting is apt to frighten the birds in my aviary. And yet they are a terrible nuisance, injuring plants, harrying the Swifts, and filling up ventilators and gutters. I should like to know whether others have observed the same feud existing between Swifts and Starlings. I have known Starlings to oust Sand-Martins, and have read of their taking possession of the holes made by Woodpeckers; but I do not remember ever seeing any note on their interference with Swifts.—W. STORRS FOX (St. Anselm's, Bakewell).

[In 1836 the Rev. T. Salway recorded a discovery of the skeletons of Swifts and Starlings in the tower of the church at Oswestry, Shropshire. As many as fifty-seven were discovered together in a small chamber rather more in size than "half a square foot" (*Mag. Nat. Hist.* vol. ix. p. 350). Swifts are seemingly pugnacious birds. Bree, writing in 1832, says:—"Swifts, I am told (though I never witnessed the fact), will sometimes fight with each other, and in such cases the contending parties are occasionally brought to the ground, and have been found so circumstanced, and with the claws of each mutually clasped into those of the other."—ED.]

Spoonbills near Great Yarmouth. — On May 10th I saw six Spoonbills (*Platalea leucorodia*) on Breydon. They were standing in line by the edge of a "drain" on one of the "flats." They were evidently "taking a nap," but on the near approach of my boat they all assumed a very picturesque attitude, as if listening and watching my progress. Each one's head was thrown at half a right angle, the neck craned into an S-shaped posture, one leg being drawn up out of the water,—whether the left or right I could not distinguish, as the evening was closing in. Presently they took to flight in a long line, and in single file, with bills out forward and legs nearly straight behind. They looked very much like Swans as they sailed silently away towards another "flat." They made no sound whatever, nor are they capable, I think, of doing so. I have seen several of these birds, and kept a tame one many months, but never heard them utter the slightest cry. The six Spoonbills kept about the neighbourhood several days. They are very sociable birds, and an odd one is sure to associate with Gulls, as do any small flocks that visit us; while they appear to trust greatly to the vigilance of the Gulls (mostly the "grey" or immature of the Greater Black-backed species, which are virtually resident on Breydon all spring and summer) for intimation of any intrusion. The Gulls noisily take to flight, the Spoonbills taking the hint after a preliminary look round, and making off to a distance on their own account.—A. PATTERSON (Great Yarmouth).

Black-breasted Partridges.—The Partridges with *black* horseshoes on their breasts, seen in a local game-dealer's shop by Mr. R. H. Ramsbotham (*ante*, p. 224), were doubtless examples of the Bearded Partridge (*Perdix daurica*), which has now been offered for sale (sometimes as the Manchurian Partridge) in the London markets for several years. The range of this bird is described in Mr. Ogilvie-Grant's 'Handbook to the Game Birds' (vol. i. p. 150), as "North-eastern and Central Asia, extending north to Dauria; east to Amoorland, Manchuria, and the mountains near Peking; west to Dzungaria and the Tian-shan Mountains: and south to the sources of the Yangtze-kiang." Further particulars about this bird may be gathered from a correspondence in the 'Field' newspaper for March and April, 1898. The Russian Partridges sold in the shops after the close season have the horseshoe usually of a darker brown than it is in English birds, and the plumage of the upper parts is perhaps of a colder, greyer tint. But the unfortunate liberty to sell "Russian" Partridges in spring, at present enjoyed by game-dealers, undoubtedly would enable an unscrupulous person to sell English birds under that name long after the close season begins.—O. V. APLIN (Bloxham, Oxon).

[Quite recently in these pages (1898, p. 215), Mr. Dresser, under the heading "Rare Partridges in Leadenhall Market," also gave a full account of *Perdix daurica* and its range.—Ed.]

Ornithological Notes from Aberdeen.—**APPEARANCE OF MIGRANTS DURING 1899.**—The Lapwings (*Vanellus vulgaris*) appeared here in flocks on Feb. 9th; the Curlew (*Numenius arquata*) on Feb. 26th, but only solitary birds. It was a week later before they were generally seen about this part, and they continued to arrive even considerably later. A green-billed Gull (*Larus canus*) appeared inland here on March 3rd: a pair of Pied Wagtails (*Motacila lugubris*) on March 8th. On March 23rd two Grey and Yellow Wagtails (*M. melanope*) reached us during the severest snowstorm of the season. A Ring Ouzel (*Turdus torquatus*) I observed on April 20th. A Dunlin Sandpiper (*Tringa alpina*) was noticed on April 30th. The Cuckoo (*Cuculus canorus*) was first heard on May 1st. A flock of Wild Geese crossed over on May 11th, and on the 12th a few House Swallows (*Hirundo rustica*) were flying about; and a few Sand Martins (*Cotile riparia*) on the 15th. About the last two dates some of the migratory small birds, as Warblers, were noticed. But at the date of writing (May 20th) neither Wheatears nor Whinchats, both fairly common here under ordinary circumstances, have been noticed by me. The unparalleled cold spring evidently kept them away at the dates when they usually appear.

SOME PECULIARITIES OF THE SEASON IN BIRD-LIFE.—With such very mild weather in mid-winter, and severe when we usually expect genial weather, it is only reasonable to suppose that something unusual could be observed in ornithological circles. I noticed pairing going on among Red Grouse (*Lagopus scoticus*), and energetic pairing among Partridges (*Perdix cinerea*). I found an egg of the latter in an occasionally utilized water-course on March 17th; it had been recently laid, and the upper part of the shell was quite complete, though brittle with the severe frost prevailing at the time, the part immersed having been much affected by the action of the water, leaving nothing but the skin to cover the contents. I have referred to the Lapwings in a previous communication; they, of course, appeared in flocks early, being beguiled by the warm weather to suffer severely by late snowstorms, and a stray bird or two appeared through the season. We heard the Sky-Lark (*Alauda arvensis*) singing on Feb. 9th, and remaining mute at the usual date at which it sings most. It was noticeable that the wary Curlew did not fall under the spell which misled the Lapwings. It was well into March before they had generally arrived, instead of appearing about the same time as the Lapwings do in normal seasons. Probably also the increase in numbers of the latter, owing to recent legislation, may induce them to extend their haunts with the mild weather. The Curlews are little affected by the Protection Acts, as they are adepts in their breeding grounds at keeping out of harm's way. The Robins (*Erithacus rubecula*) were the tamest on record here about March 22nd. Pied Wagtails have been about in their usual numbers, while the

Grey and Yellow species appeared earlier than usual, and during the height of the snowstorm. The Ring Ouzel seems to vary, over a series of seasons, in its date of appearance, being evidently guided by the nature of each year. These birds certainly came earlier during recent years than formerly; but they were certainly not welcomed, owing to their habit of plundering gardens, but they have probably increased since protection has been resorted to. Sandpipers seem to appear fairly near one date, *viz.* about the end of April. The Cuckoo was evidently early, especially when there was so little genial weather. Local circumstances govern their appearance in our immediate locality, where young wood, with abundance of insects, attracts them earlier than before. But it must be remembered that on moors here Cuckoos choose Mountain Linnets (*Linota flavirostris*) for foster-parents, and the offspring may be hardier and calculated to appear earlier, and remain longer than those brought up by less hardy birds. There were twos and threes flying together a few days after their first appearance, and apparently more notice was taken of them by the Twites than by other birds. It is an open question whether any recognition would occur either between the last season's young or adult Cuckoos, and those Linnets which had been foster-birds. The Wild Geese were evidently later than usual by one month to even six weeks, while the Swallows were pretty early considering the cold season.—W. WILSON (Alford, Aberdeen).

REPTILIA.

The Cape Monitor.—In Mr. C. Haagner's remarks upon *Varanus albigularis* (*ante*, p. 226), I think he must be confusing that reptile with *V. niloticus*, as I have killed several of each species in the north-east of the Transvaal, and never found *V. albigularis* near water, but always far away from it, and invariably taking refuge in clefts of adjacent rocks. Moreover, I have never met with one four feet in length. *V. niloticus* I have found existing in quite large colonies on sunny banks near rivers, into which they invariably plunge on being disturbed; and I have never seen them, when near water, take refuge in rocks. I have noticed them dive headlong from banks quite twenty feet above the level of the water. I have by me several skins of both species, some of *V. niloticus* measuring five feet in length; but those of *V. albigularis*, although when killed apparently covering bodies of full-grown specimens, none of more than three feet in length. I may say that I have carefully compared my skins with the Zoological Society's living specimens of these two species.—CHAS. H. J. TANNER (2, Cardigan Mansions, Richmond, Surrey).

PISCES.

Notes from Great Yarmouth.—On Jan. 5th I saw a stunted Codling (*Gadus morrhua*). Length, 14 in.; of this the head measured 5 in. Depth of

fish, $4\frac{1}{2}$ in. An equally remarkable Herring (*Clupea harengus*) was sent me on Feb. 28th. It was 2 in. deep up to the dorsal and anal fins, but was nearly normal in shape, and then singularly shortened behind. Length, $6\frac{3}{4}$ in.; it should, if perfect for its size, have been 10 in. long. I had a Codling sent me on Jan. 20th, in which the mouth was strangely placed under the head, the snout protruding considerably, the lower lip being singularly like that of a Shark. The tongue formed a kind of ball or stopper which effectually closed the mouth when necessary. Length, $13\frac{1}{2}$ in. On Jan. 16th I met with a Lemon Sole (*Solea lascaris*), which was brought to the fish-wharf. I saw a Brill (*Rhombus lævis*), on March 2nd, which was pure white on the upper surface, with the exception of the extreme margin of the fins; the latter half of the tail was coloured, as was a small ring encircling each eye normally. I was shown a large Turbot (*R. maximus*), on May 29th, which was also white all over the upper surface, save here and there a small spot of grey. Both fish, as in all cases of albino Turbots, were minus the spiny processes which dot the back or upper surface. A small example of the Greenland Bullhead (*Cottus scorpius* var. *grœnlandicus*) reached me on April 29th. On May 21st a local shrimper brought me a fish which was quite new to him. It measured 4 in. in length. On comparing it with Day's plate, I found it to be an example of *Blennius gattorugine*. It was not at all highly coloured, as depicted by Couch, but was of a dull tawny or yellow-brown, the edges of the fins being of a ruddy hue. Day speaks of it being subject to variation according to locality, and no doubt on our sandy coast such a stray fish would assume more sober tints than in its native rocky habitat. Mr. T. Southwell, to whom I sent it for confirmation of my finding, noticed it was not so deep as in Day's figure, and the "slight notch" mentioned between the spinous and soft portions of the dorsal fins did not seem to him to exist in my specimen. This is the first record of *B. gattorugine* occurring in East Anglian waters. The specimen has been spirited, and will be presented to Yarmouth Museum at the Old Tolhouse Hall.—A. PATTERSON (Great Yarmouth).

[The Gattorugine, known to fishermen of the West of England by the homely appellation of Tompot (Couch), has been recorded from the north-east coast. "Included in Sir Cuthbert Sharp's List of Hartlepool Fishes," cf. R. Howse, 'Cat. Fishes of the Rivers and Coast of Northumberland and Durham,' p. 25. It is reported as lying concealed in pools among long seaweeds, where it is probably often overlooked.—ED.]

AVICULTURAL NOTES.

Aviculture and its Scientific Status.—Although for many years the increase in the number of zoological gardens has shown that scientists have desired to become familiar with the living representatives of their cabinet

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specimens, there has been, and still is, a tendency amongst the more conservative even of trustworthy cabinet naturalists to look with pity upon records of the lives of animals as observed in captivity. Every scientific man should bear in mind that the records of new facts in the life-history of an animal, whether observed in captivity or freedom, are a positive gain to science, and of more importance (when not easily discoverable) than the description of a skin, inasmuch as anyone with average ability can describe that upon which he can always lay his hand; but many difficulties may obtrude themselves when an observation has to be made from living subjects.

Aviculture, or the study of birds in captivity, ought to be as scientific as the study of dead birds, and when pursued in a proper spirit it undoubtedly is so. The true aviculturist always has his faculties awake; he must never overlook any detail in the nidification of a species, any change in its plumage, or the colouring of its soft parts; he must observe when and how the change takes place—whether by moult, gradual growth of colour in the feathers, or abrasion of the brittle fringes of overlapping feathers revealing the underlying colour; every courting posture and note must be carefully recorded, and the meaning of the notes studied. Although but little use has been made, by scientific workers, of the valuable facts got together in Dr. Russ's 'Handbuch für Vogelliebhaber,' there is not the least doubt that they are of considerable importance. A bird can never be said to have been perfectly described until the true colouring of the soft parts is included in the description. Very many species have been fully described by Russ, the colouring of the soft parts being carefully noted in nearly every instance; yet how seldom do we see any use made of these records by cabinet workers! Surely this is a mistake.

It has been asserted that birds cannot be properly studied, even in large aviaries, because they are under unnatural conditions. This is not only untrue, but in many instances it is practically impossible to study their habits under any other conditions. Probably the only reason why the nidification of many of the commonest small birds has never been noted by collectors is because they have only come across them on the edges of morasses, or the outskirts of dense jungle and thicket, into which the birds could penetrate with ease, but the observer could not follow. When impenetrable scrub is represented by half a dozen bushes, the conditions (if not the same as when the bird is wild) can hardly be called unnatural, and observation of the nesting habits becomes easy. The fact that unnatural birds (*i. e.* what are known as fanciers' birds), when turned out into a large aviary, frequently construct the typical nests of their remote ancestors, is an argument (I think) against the assumption that aviary life is unnatural, and therefore untrustworthy. The young plumages of many

common foreign birds are still unknown to recognized ornithologists, and unrepresented in our museums. The aviculturist who describes these young plumages, or supplies the gaps in collections, is undoubtedly doing good ornithological work, and has as much claim to the title of scientist as any other man who adds to the sum of general knowledge.

For the reasons adduced above, I think it would be an excellent thing if the Editor of 'The Zoologist' would open a column in its pages for new scientific facts observed by aviculturists. I feel sure that, from time to time, Messrs. Meade Waldo, St. Quintin, the Rev. H. A. Macpherson, and other well-known reliable students of birds in captivity, would be able to add to the general store of ornithological knowledge.—A. G. BUTLER.

[We have great pleasure in opening a column for the communications of aviculturists. The aviary, like the aquarium, should afford some much desired zoological information, where observations may be made on the habits of animals which are practically unattainable elsewhere. Zoological gardens in all civilized countries sufficiently attest the scientific importance of the study of animals in captivity. Those who keep birds purely for pastime are equivalent to those who shoot them only for sport, and do not affect the argument.—ED.]

Longevity of Red-headed Cardinal.—It may interest some of your readers to know that I have just lost by death a Red-headed Cardinal (*Paroaria cucullata*), which I bought in February, 1874, and which had therefore lived for twenty-five years and four months in captivity, always in a cage.—WALTER CHAMBERLAIN (Bromesberrow Place, Ledbury).

NOTICES OF NEW BOOKS.

The Geography of Mammals. By WILLIAM LUTLEY SCLATER, M.A., F.Z.S., and PHILIP LUTLEY SCLATER, M.A., Ph.D., F.R.S. Kegan Paul, Trench, Trübner & Co., Ltd.

DR. P. L. SCLATER has made the problem of the geographical distribution of animals peculiarly his own. By a circumstance which seldom occurs to most specialists, his son has inherited his tastes, and shares his studies on the subject. Most zoologists will have read, or at all events be cognizant of, the latter's papers on the Geography of Mammals published in 'The Geographical Journal' (1894-97), while Dr. Sclater's communication "On the Distribution of Marine Mammalia" appeared in these pages (1897, pp. 217-28). These together are now republished, with many illustrations and some additional matter.

This branch of zoological science in its present conception is inseparable with this country and the present century. Dr. Prichard, in his memorable 'Researches into the Physical History of Mankind,' was one of the first to give a reasonable working hypothesis. This was followed by Swainson in his 'Geography and Classification.' In 1857 Dr. Sclater proposed his divisions as applied to Birds before the Linnean Society, which was further elaborated and upheld at the Bristol Meeting of the British Association in 1875. Wallace in the main adopted these views, and they are now generally accepted, subject, of course, to some criticism in detail incidental to all widely accepted generalizations.

The main divisions or regions are mostly maintained in the sense originally proposed, though some qualification is to be found in the sub-regions. This is to be particularly noticed in the Ethiopian region, in which the Cape sub-region now includes "the whole country as far north as Angola on the west, and up to the Tana river on the east," and may probably in time be made to include Somaliland as well. Many zoologists have advocated

the union of the Palæarctic and Nearctic regions from the similarity, or rather the many similarities, to be found in their faunas, but the Sclaters argue that these affinities are only of recent origin, and that "palæontological evidence seems to show that, out of all the four regions embraced under the term 'Arctogœa,'* the North American or Nearctic Region was the first to be separated from the main mass, and that the similarity is a comparatively modern element in the character of the two faunas."

It is unnecessary to refer to the most original contribution to this volume, in the chapter on the Distribution of Marine Mammals, for, as before mentioned, this article has already appeared in these pages. Now that the Terrestrial and Marine Mammals have been treated on the Sclaterian method, we may hope that the other orders may be studied and published in the same manner. Of the fifty illustrations contained in the text, no fewer than forty have been designed by T. Smit for this work; there are also eight coloured maps; and the volume may be well accepted, so far as Mammals are concerned, and for a long time to come, as the last authoritative statement on the subject.



Outlines of Vertebrate Palæontology for Students of Zoology. By ARTHUR SMITH WOODWARD. Cambridge: at the University Press.

THE study of Prehistoric Man was once completely relegated to the domain of Archæology: it is now no longer neglected by the historian. It is one of the greatest benefits arising from the evolutionary method in the proper study of Zoology, that both Embryology and Palæontology are now considered of primary importance if we wish to understand the problem of present animal existence. Science to-day is more interested in the past than in the future of animal life, and when we really know the first we may perhaps be able in some sense to predicate the second. It is the hither that will guide us to the whither. As we read these pages, commencing with the speculative Palæozoic Conodonts,

* Europe, Asia, Africa, Asiatic islands down to Wallace's line, and North America down to the Isthmus of Tehuantepec.

and arrive at the Pliocene *Pithecanthropus erectus*, we feel that we are contemplating an era of which as yet so little is known, and of which so much more must yet be told. The chances against finding organic remains are innumerable; "every item of knowledge acquired may indeed be literally described as owing to a chapter of accidents"; to the palæontologist the knowledge of the past must often seem to be as carefully guarded as the portals of the future. And yet, with all the "imperfection of the geological record," palæontological interpreters—among whom will always be mentioned Owen and Marsh—have given a knowledge which may without offence be designated as a revelation.

With the fascination incidental to the study of a past era and an unseen fauna, caution is a first and last word, in fact, the alpha and omega of palæontological speculation. Mr. Woodward is careful to explain that, "owing to the imperfection of the geological record and the incomplete exploration of most formations, any statement now formulated may eventually prove to be quite a partial account of the facts, and every conclusion must be more or less provisional and tentative"; while "the known facts of geology are still too few to restore the life-provinces of the globe at the various stages of its past history." This is a good book for the zoological library; it may be, as the author modestly suggests, "an elementary handbook," but at the same time it conveys an indispensable information which by many zoologists is necessarily possessed in a more than elementary manner.

New Zealand Moths and Butterflies (Macro-Lepidoptera). By G. V. HUDSON, F.E.S. London: West, Newman & Co.

THE Butterflies and larger Moths of New Zealand have now procured a satisfactory treatment, and by the aid of this fully illustrated work it is possible to form a conception of the interesting but modest lepidopteral fauna of "Te Ika a Maui." In 1855 the missionary Richard Taylor, in his account of the islands, gave us a few coloured figures of the butterflies and moths found there; Butler subsequently figured the Rhopalocera, whilst Meyrick has described and enumerated very many of the Heterocera, so that the time was ripe for a fully illustrated

monograph. Mr. Hudson is a conscientious follower of Meyrick's views in classification, and this is the first time we have seen that proposed arrangement followed of the butterflies being included between the Notodontina and the Psychina—in other words, immersed in the moths.

In the introduction Mr. Hudson discusses most of the modern theories connected with the Lepidoptera, though of "warning colours" he can only suggest one example of a moth in New Zealand, while he states that not a single instance of "mimicry" can yet be adduced in the Lepidoptera of the islands. In connection with the butterfly *Anosia crippus*—formerly generally known as *Danais archippus*, and which in quite recent times has spread over a large surface of the earth—it is interesting to note that it was observed in New Zealand as early as 1840. The cosmopolitan *Pyrameis cardui*, our "painted lady," is found in New Zealand, and so is *Protoparce convolvuli*, the Convolvulus Hawk-Moth, known so well at home and seen so generally abroad.

The plates are chromo-lithographed by West, Newman & Co. and in colour leave nothing to be desired. We have seen even more artistic work from this firm when they have had the insects themselves to portray; but in this case coloured drawings were sent home to be reproduced, which have been most faithfully copied. We trust that the author may fulfil his half-implied promise of publishing a similar work on the Micro-Lepidoptera of New Zealand.

EDITORIAL GLEANINGS.

THE death is announced, at Melbourne, of Prof. Sir F. McCoy, who had for the last five-and-forty years made his home in Australia. Prof. McCoy was an able geologist and palæontologist; he was Professor of Natural Science in the University of Melbourne, and to him was due the formation of the Melbourne National Museum, which he directed. The well-known publication, 'Prodrômus of the Zoology of Victoria, or Figures and Descriptions of the living Species of all Classes of the Victorian Indigenous Animals,' he commenced in 1878. Twenty decades were published up to 1890, when the work ceased.

PROF. LUDWIG BÜCHNER died on April 30th last. Büchner's name was once somewhat freely anathematized as that of the author of 'Kraft und Stoff' and 'Natur und Geist,' but he will be best remembered by zoologists in connection with a volume which appeared in an English translation in 1880 under the title of 'Mind in Animals.' He also translated into German Lyell's 'Antiquity of Man,' and published 'Die Darwinsche Theorie.'

THE death has been announced, at Hull, of Mr. Henry Bendelack Hewetson, surgeon, of Leeds. In the science of natural history he was quite an enthusiast. In 1885 he was elected President of the Leeds Naturalists' Club and Scientific Association, and during that year he obtained from the Corporation the grant of a room in the Municipal Buildings for the housing of the collections and library and holding of meetings of that body. At the close of the year the rules were altered to permit of the re-election of a President for a second year, and he was accordingly made President for the following year. In 1896 he was again elected President, a position which he once more filled in 1897. As President he constantly advocated the foundation of a Scientific Institute by the joint action of the several scientific societies of Leeds, and in 1896 a decided step was taken in this direction, but unfortunately without success. As an ornithologist, Mr. Hewetson recorded several new visitors to our shores, and, in conjunction with other observers, did much good work, especially in regard to the study of migration. He also assisted in the exploration

of the famous "kitchen middens" in the Holderness district of East Yorkshire. On his visits to the North Coast of Africa he made valuable collections of the birds and insects of that region. In this department of his recreations his artistic abilities were of great service, for he could depict natural history objects in colours with wonderful fidelity. His incursions into the realm of photography were limited to the use of a hand camera, with which he was fairly successful. 'Thoughts on Ornithology' and 'Nature Cared for and Uncared for' were subjects upon which he wrote with knowledge. He was a Fellow of the Royal Geographical Society, a Fellow of the Linnean Society, a Fellow of the Zoological Society, and a member of the British Ornithological Union.

THE greatest of animal painters has passed away. Mlle. Rosa Bonheur died at Fontainebleau on May 26th. Although the deceased artist did not rank as a zoologist, still the painter of the "Horse Fair" studied and knew her subjects, and in art reflected nature beyond the capacity, as a rule, of those who paint or those who observe.

At the meeting of the Royal Microscopical Society on May 7th, the Fellows, assisted by many friends of the Quekett Microscopical Club, gave an exhibition of Pond-life. The exhibition was highly successful, the many beautiful objects exciting much admiration. Among them may be mentioned *Lophopus crystallinus*; *Daphnia pulex* (this entomostracan was stained with a solution of fuchsin, which a depraved taste had induced it to imbibe, apparently without harm, but which caused its internal economy to be very conspicuous); *Hydatina senta* was exhibited; and specimens of *Melicerta ringens*, a tube-dwelling rotifer which is its own brickmaker and bricklayer. *Hydra viridis* was on view, showing ovary and testes, the ovary in the amœboid stage. From Dundee came *Bursaria t.*, *Conochilus*, *Mastigocerca bicarinata*, *Notommata collaris* of Ehrenberg, *Stephanoceros*, &c. There were also exhibited *Rivularia* and *Draparnaldia*, a highly attractive exhibition of hundreds of brilliantly illuminated rotifers of various species, careering in all directions on a dark background, and *S. serrulatus*, an entomostracan hitherto unrecorded in Britain; the water-mite (*Hydryphantes dispar*), another mite (*Limnesia hystriónica*), and *Notops brachionus*, which is one of the most beautiful of the free-swimming rotifers.

At the meeting of the Linnean Society of April 20th the Rev. O. Pickard-Cambridge communicated a new list of British and Irish spiders. After reviewing the existing literature on the subject, and the materials

which had come to hand since 1881 for a new and revised list of species, the author pointed out that the present paper was not intended merely for the use of authors or collectors interested in local faunas, but to give (with references to primary authorities) the spiders at present known to belong to Great Britain and Ireland, leaving the question of their distribution, abundance, or scarcity to be dealt with at some future time, when the present scanty number of spider-collectors might have increased. At present large areas of varied natural characters, in some cases whole counties, and many maritime districts, were entirely unexplored, so far as their arachnology was concerned. With respect to nomenclature and systematic arrangement, the author had mainly followed the plan of 'The Spiders of Dorset' (1881); but in dealing with the large groups represented by Mr. Blackwell's *Neriene*, *Linyphia*, and *Walckenaera*, he had to a great extent followed M. Simon's lead in breaking up these genera in order to bring a large heterogeneous mass of material into a fairly workable form.

THE Report of the Council and Auditors of the Zoological Society for 1898 is now before us. A continual increase in the number of members is again shown, which has now been going on for the past six years, and the number of Fellows is now in excess of what it has been in any year since 1885. A new Llama-house has been constructed. The reconstruction in an improved form of the Llama-house, one of the oldest buildings in the Gardens, has long been a matter of urgency. It is believed that the new house, which has been built upon the same site from plans drawn up by Mr. C. B. Trollope, is well adapted for the purpose for which it is intended. It is a well-lighted and airy building, and gives excellent accommodation to the Society's stock of these animals. The new Llama-house was built by Messrs. Smith & Co., at a cost of £767 7s. 2d., which has been charged to the extraordinary expenditure of the year 1898. More space being required for the proper accommodation of the Society's fine series of Zebras and Wild Asses, it was determined by the Council, in 1898, to erect a new Zebra-house immediately adjoining the existing Zebra-house, in the further corner of the Middle Garden, upon the site then occupied by the old Ostrich-house, which had become available on the transfer of the Ostriches and Cassowaries into the new Ostrich-house in the South Garden. The new Zebra-house, which was designed by Mr. Charles B. Trollope, and built by Messrs. Smith & Co., will, it is believed, be found to give excellent accommodation to these favourite animals, and at the same time replace an old and ruinous building by an elegant and ornamental structure. The total number of deaths of animals in the gardens during the year 1898 was 1054, showing a decrease of 142 as compared with the previous year. Of these deaths the more important were:—The young Giraffe which was

purchased on July 6th. This animal only lived for one month in the Gardens; the principal post-mortem appearance was the œdematous condition of many of the internal viscera. Three Chimpanzees and three Orangs have died during the year, and no fewer than twenty-six Kangaroos of various species. Of the latter some five or six appear to have suffered from a contagious fever. Two Ostriches, a Tiger, two Three-toed Sloths, and four Leopards were the principal remaining losses of importance.

The following is a list of the more noticeable additions made to the Menagerie during the year 1898 :—

A fine young female Mountain Zebra (*Equus zebra*), bred in the garden of the Zoological Society of Amsterdam; a young male Leucoryx Antelope from Senegal; a young male Reindeer (*Rangifer tarandus*), from Newfoundland; two examples of Forster's Lung-fish (*Ceratodus forsteri*), from Queensland, purchased of Mr. D. O'Connor, who has successfully conveyed from Australia to England four fine living specimens of this remarkable Dipnoan Fish, believed to be the first ever brought to Europe alive; a young pair of White-tailed Gnus (*Connochates gnu*), presented by Mr. C. D. Rudd, F.Z.S., who kindly brought them from his park at Fernwood, Newlands, near Cape Town, in order to make a change of blood in the small herd of these Gnus in the Society's Gardens; a young male Lesser Koodoo (*Strepsiceros imberbis*), from Somaliland, being the third example of this rare Antelope received by the Society; an example of an apparently new African Monkey of the genus *Cercopithecus* (proposed to be called *C. lhoesti*), received from Congoland by the Zoological Society of Antwerp, and obtained in exchange from that Society; a gigantic Centipede (*Scolopendra gigas*), from Trinidad; a series of fifty-two large Tortoises from the Galapagos Islands, deposited by the Hon. Walter Rothschild on July 20th. Nineteen of these, from Duncan Island, appear to be referable to *Testudo ephippium*, and thirty-four, from Albemarle Island, to *Testudo vicina*; a very fine and large specimen of the Reticulated Python (*Python reticulatus*), which exceeds in size the specimen which lived for twenty years in the Society's Gardens; twelve African Walking-fish (*Periophthalmus koelreuteri*); an adult male example of the Duke of Bedford's Deer (*Cervus xanthopygius*), from Northern China; and a young male Siamang (*Hylobates syndactylus*) from the native state of Negri Sembilan, Malay Peninsula, being the first individual of this extremely interesting Anthropoid Ape that has reached the Society in a living state.

THE Year Book of the United States Department of Agriculture for 1898 has just reached our hands. As usual, this volume is not one alone for the agriculturist or horticulturist. In a large sense it is distinctly

zoological. The communication by Mr. T. L. Palmer on "The Danger of introducing Noxious Animals and Birds" is well worth the most careful perusal. Some facts relating to accidental or involuntary migration may be repeated. "In November, 1895, a Central American Mouse of the genus *Oryzomys*, concealed in a bunch of bananas shipped from Puerto Limon, Costa Rica, was captured alive in a commission house in Washington, D. C. A young murine Opossum from Tropical America was discovered in a bunch of bananas at Ames, Iowa, during the summer of 1882, and was kept alive for some time. If such cases were frequent, it can be readily seen how a species might gain a foothold in new regions, provided the conditions were favourable for its increase." Members of the Sparrow cult will not find agreeable reading in the account of "the true character of the bird" as detailed in these pages. The expenditure for its destruction in Illinois (1891-95) and Michigan (1887-95) amounted to about 117,500 dols. The introduction of the Sky-Lark (*Alauda arvensis*) and the Blackbird (*Turdus merula*) into New Zealand, where the first has become the scourge of the turnip field, eating the seeds soon after planting, and the second is well known as a champion fruit destroyer, induces the remark that both these birds "are noted singers; but the charms of their song hardly compensate for damage to crops."

MR. J. W. WILLIS BUND has republished a paper read at the Victoria Institute, Worcester, on "The Life of a Severn Salmon." Much has still to be learned respecting this fish, as we read that no one can give a really satisfactory statement as to the length of time a Salmon will live if it escapes death by the hands of its numerous enemies, nor can tell with accuracy the time it takes to produce a twenty-pound Salmon. We cannot say we know even the outlines of the life-history of a Salmon in fresh water. "A question of some interest arises as to the age to which a Salmon will live. Here again more evidence is wanted; a twenty-pound fish cannot be less than four years old, and is probably older. He would be hatched out, say, in 1890, would descend as a Smolt in 1891 at the earliest, and perhaps not till 1892. If he went down in 1891, he would probably return as a Grilse in 1892, as a Gilling in 1893, as a Salmon in 1894; but he might not go down till 1892, and his return in any of the stages might be prolonged, so that it will be safe to say that a twenty-pound fish is probably seven years old, and very possibly older. One fact seems clear, that the male Salmon grows larger, and so presumably lives longer than the female; it is the exception to get a female Salmon over thirty pounds, while it is common to get males over that weight. Why this is, I cannot explain; I only state the fact. Against this must be set the assertion that at spawning-time the mortality of males is said to be greater than the mortality of females."

IN the 'Annals of Scottish Natural History' for April, Mr. J. A. Harvie-Brown has published "Notes on some Scottish *Salmonidæ*." In the well-known angling county of Sutherland, with its innumerable lochs and streams, there are many interesting varieties of *Salmonidæ*. All of these, however, rank, as the writer believes with Dr. Day, only as varieties of the principal species or types recognized in that author's 'History of British Fishes,' and still more recently accentuated in his 'British and Irish Salmonidæ.' These species are:—The Salmon, *Salmo salar*, L. ('British and Irish *Salmonidæ*,' p. 51); the Sea-Trout, *Salmo trutta*, L. (*op. cit.* p. 149); the Fresh-water Trout, *Salmo fario*, L. (*op. cit.* p. 182); the Char, *Salmo alpinus*, L. (*op. cit.* p. 112); and all other so-called species must, Mr. Harvie-Brown considers, have their names sunk to the value of mere varieties—such as the Great Lake Trout (*Salmo ferox*), and many others, not speaking, of course, of aberrant forms of the *Salmonidæ*, such as the Sperling (*Osmerus eperlanus*). The notes refer mainly to certain varieties of the *Salmonidæ* belonging to the above species which are found in different lakes and rivers in Scotland, such as the Loch Maidaith and Smoo Burn-Trout; Crasspuil Trout; Loch Sean Trout; the Tidal Trout of the rivers Inver and Kirkaig, known to the natives as "Fossacks"; Parr-marked Trout of Loch na Sgeirach; and Hump-backed Trout of Fheoir Lochan.

A WRITER in the 'Westminster Gazette' has called attention to the decrease of Salmon in the Welsh Dee:—"This river is peculiarly fitted by nature for the abode of Salmon. Deep, swirling pools alternate with rapid runs and long sluggish reaches. It possesses a noble estuary, and numerous tributary streams, admirably adapted for breeding purposes, flow into it. From various causes the supply of Salmon has declined of late years, and at the present time the Fishery Board finds its operations seriously hampered. Its income is derived entirely from the licences taken out by rod and net fishers, and so marked is the scarcity of Salmon this year that there has been a great falling-off in the number of net licences, with a corresponding decline in the revenue. It is, of course, possible that an improvement may take place ere the close of the season, but present conditions do not favour the supposition, and there is reason to fear that, in common with many other rivers, the Dee is steadily deteriorating as regards the stock of Salmon. It is evident that as the income of the conservators falls off so does their ability to preserve the river. In the absence of funds they cannot pay watchers to guard it, and nowhere in the kingdom is poaching more rife during the close season than in North Wales. The state of affairs is serious, for when once a certain limit of scarcity is reached on Salmon rivers, matters are likely to go from bad to

worse unless prompt and energetic action be taken. On various English rivers scarcity has led by gradual degrees to the extinction of the *Salmonidæ*; the Thames is a notable instance in point, and there are streams on the east coast of England, where Salmon once were numerous, in which nowadays the king of fresh-water fishes is never seen. I am far from suggesting that such misfortune is in store for the Welsh Dee, but the river is in an unsatisfactory condition, and has been for some years. Among the causes which are contributing to its decline the presence of Pike in large numbers, both in the main river and its tributaries, is not the least injurious; these predatory fish destroy enormous quantities of Salmon fry, and are equally harmful to the Trout-fishing. During the spawning season gangs of men raid the tributary streams by night, and it is manifestly impossible for one or two watchers to cope with these lawless intruders. Apart from these causes it is difficult to account for the deterioration of the Dee. It is not seriously polluted. The Fishery Board has been at considerable pains to improve it by putting up fish passes and a Salmon hatchery, and one can only conjecture that over-netting in past years is responsible for the present scarcity. The conservators would perhaps be well-advised to raise the charge for net licences; by seeking the co-operation of the riparian owners they might still make adequate provision for watching the river."

IN the 'Transactions' of the South African Philosophical Society (vol. x. part 2) appears a very welcome "Bibliography of Books, Pamphlets, Maps, Magazine Articles, &c., relating to South Africa, with special reference to Geography. From the time of Vasco da Gama to the formation of the British South Africa Company in 1888." The compilation is by Mr. H. C. Schunke Hollway, and comprises 2099 separate entries. Although zoological publications have not been made a specialty in the compilation, the zoologist who wishes to read the observations of early travellers will find this bibliography a guide to much neglected and little-known literature on the subject. The zoologist will, however, find in the same publication vol. x. part 3) a "Résumé of recent scientific publications bearing on South Africa from January 1st, 1897, to June 30th, 1898," which we hope will be continued.

THE Tres Marias Islands are situated off the west coast of Mexico, about sixty-five miles west from the port of San Blas. Their natural history had been very moderately detailed. Grayson, a naturalist, made three trips to the islands in 1865, 1866, and 1867, and, in conjunction with Laurence and Bryant, published several papers thereon. Forrer collected there for the British Museum in 1881, but no detailed account of

his work has been published. In the spring of 1897 E. W. Nelson and E. A. Goldman made an expedition to the Tres Marias, and the results are embodied in No. 14 of the Memoirs devoted to the North American Fauna published by the U. S. Department of Agriculture at Washington. Mammals, Birds, Reptiles, Crustacea, and Plants are described by Nelson, Steineger, Rathburn, and Rose. The number of species of animals and plants now known for the Tres Marias are 11 Land Mammals, 83 Birds, 18 Reptiles, 2 Fresh-water Fish, 1 Fresh-water Shrimp, and 6 Land Molluscs. The plants enumerated are 136. The surprising result is in the number of species peculiar to these islands, which are clearly continental islands from the absence of a deep separating channel. Thus in species and subspecies, 7 Mammals, 23 Birds, and 1 Reptile appear to be peculiar to the islands. Mr. Nelson also adds a bibliography of the Tres Marias Islands.

AMERICA is still the head-quarters for Economic Entomology. We have just received a lengthy and well-illustrated memoir published by the University of Kansas, and forming the sixty-fifth contribution from the Entomological Laboratory. It is entitled "Alfalfa, Grasshoppers, Bees: their relationships," by S. J. Hunter. *Melanoplus differentialis* is the destructive locust which is particularly referred to, and its anatomy is well illustrated. "In alfalfa culture, if the Grasshopper proves an incentive to proper cultivation, the insect is a blessing in disguise. Disking alfalfa fields in the early spring, after the frost has left the ground, and before vegetation has well started, increases the yield of the first crop one-third; matures the second crop earlier, and brings from it an equally increased yield; destroys the native Grasshopper eggs placed therein, and kills the native grasses which frequently threaten to reclaim the field."

THE Royal Mail steamer 'Stola,' according to the 'Aberdeen Journal,' has just had the not unique experience of running down a Whale. The steamer was on her passage on Wednesday, April 26th, between Stromness and Scapa, in the Orkney Isles, when a violent shock was felt abreast of Swanbister. Immediately afterwards a large Whale rose under her quarter with a fearful gash in its body, and throwing up blood and water from its blowhole to a height of fifteen feet. The 'Stola' was steaming twelve knots, and must have nearly cut the Whale in two. As the captain had the mails on board he could not stop, but as long as the Whale was visible it was seen to be lashing the water furiously.

THE 'Daily Chronicle's' Liverpool Correspondent says:—"A gem of French colonial protectionist policy reaches me from Loango. The

authorities of the French Congo, being rather short of money, have issued a decree placing a tax of fifty centimes on every Parrot exported from that colony to Europe."

WE are glad to notice the growing recognition of "Zoology" as an applied science. In the 'Pharmaceutical Journal' a course of "Zoological Notes for Pharmacists" is now in course of publication.

ON Thursday afternoon, Oct. 6th, 1898, Mr. J. Passmore Edwards laid the first stone of the Essex Local and Educational Museum of Natural History. The Museum, designed by Messrs. Gibson and Russell, will ultimately be a very handsome structure, adjoining, but distinct from, the Technical Institute of the West Ham Corporation in the (Main) Romford Road, Stratford. The cost of the building and ground will be about £6000, towards which Mr. Passmore Edwards munificently contributes £2500, on condition that the Museum shall contain the Essex Field Club's County Collections of Natural History. The balance of the cost, and the up-keep of the building, will be defrayed by the Corporation of West Ham, acting through their Technical Instruction Committee. In accordance with the scheme of the Agreement made between the Corporation of West Ham and the Essex Field Club, dated 25th July, 1898, the Museum will be carried on as a Permanent Institution under that Agreement as follows:—

(a) The Corporation agree to dedicate the main portion of the building to the purposes of a Museum of Local (Essex) Natural History, Prehistoric Archæology and Anthropology, and of educational series relating to the same; to warm, light, and provide for the caretaking of the building; that the Club shall have the sole scientific control of the collections, and the appointment of the Curator, and be allowed to keep its Library in the building; the Corporation also agreeing to make a grant of not less than £100 per annum towards the curatorial expenses.

(b) The Club agree to place their county collections, cases, and cabinets in the Museum (excepting the Epping Forest collections, which are to be retained in the Forest Museum at Chingford); to do their best to increase and improve the same; to undertake the selection and scientific control of the collections; to raise a certain capital sum for the further equipment of the Museum; to appoint a Curator, and to devote a sum of £50 per annum towards the curatorial expenses.

As at least £1000 will be required for the wall-cases, table-cases, cabinets, and other equipments necessary to a Natural History Museum, donations are invited, which may be paid to Lloyds' Bank (Essex Field Club Account—Town Side), 72, Lombard Street, E.C.; or to the Treasurer, W. C. Waller, Esq., Loughton, Essex.

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BIOLOGICAL SUGGESTIONS.

MIMICRY.

BY W. L. DISTANT.

PART I.

“Evidence has three degrees of force: demonstration, probability, plausibility.”—MATTHEW ARNOLD.

“The essence of *originality* is not that it be new.”—CARLYLE.

“Nature suffers nothing to remain in her kingdoms which cannot help itself.”—EMERSON.

IF, as we have before suggested, our only clue to the original, or even primitive, colouration of animals is lost and buried in the records of the geological past, in which we find structure—scantly and often confined to typical portions—but of colour nothing,* a much larger field is open to the palæontologist who seeks for the origin of that animal structure which is so often alike described under the terms of “protective resemblance” and “mimicry.” Friends and foes of those theories too frequently—both for attack and defence—conceive the wonderful protective disguises in nature as having been evolved during the time of present

* In the years to come, when we shall be estimated only as advanced teleologists, science may probably have solved the problem of animal colouration. When that is effected, who dare say that the inductive process will be unable to exhibit the long past in varied and tinted landscape on the walls of the museum, where now osteology only holds her cold and partial sway?

natural conditions;* whereas we should think not of years but of geological epochs, for time is only an imaginary quantity, alike useful to the mathematician and historian, a result of expressing the term of our short lives. Thus we may seek to multiply the years of our fugitive existence into a product which shall represent the limits of an unknown past, whilst we can only imagine space by the equivalent of time.

We have already ventured some suggestions on the subject of assimilative colouration, and we now approach a different class of phenomena, where the resemblance is not of colour alone, but also frequently of structure, by which animals exhibit a close resemblance to some inanimate object, and to which the term "Protective Imitation of Particular Objects" has been aptly proposed by Mr. Wallace.† One of the most striking examples is found in the Orthopterous family *Phasmidæ*,‡ and in what are generally known as the "Walking-stick insects." To use the graphic and accurate description of Mr. Wallace:—"Some of these are a foot long, and as thick as one's finger, and their whole colouring, form, rugosity, and the arrangement of the head, legs, and antennæ, are such as to render them absolutely identical in appearance with dead sticks. They hang loosely about shrubs in the forest, and have the extraordinary habit of stretching out their legs unsymmetrically, so as to render the deception more

* Mr. Sedgwick is of opinion that there is much to be said for the view that the greater part of evolutionary change had already taken place in pre-Cambrian times before the fossiliferous period. "If this view was correct—and the probability of it should be borne in mind—the main part of the evolution of organisms must have taken place under totally different conditions to those now existing, and must remain for ever unknown to us." (Proc Fourth Internat. Congr. Zoology, Cambridge, 1898, p. 75.)

† 'Darwinism,' p. 202.—Mr. Skertchley distinguishes "protective resemblance" as copying stationary objects, and "mimicry" as simulating moving ones (Ann. & Mag. Nat. Hist. ser. vi. vol. iii. p. 478).

‡ Some Phasmas vary in colour in the same species, as noticed in Mauritius. Cuvier was not unobservant of these peculiarities, as, referring to the *Phasma rossia*, from the South of France, he describes it as either of a yellow-green or greyish brown. (Quoted by Nicholas Pike, 'Sub-Tropical Rambles,' p. 164.) It is interesting to note a superficial parallelism in structure in the Skeleton-Shrimps (*Caprellidæ*) with the *Phasmidæ*, and in Mantis-Shrimps (*Stomatopoda*) with the *Mantidæ*, of which a good example may be found in the *Squilla mantis*, Rondel.

complete.”* Mr. Wallace travelled both in the western and eastern tropics. The late Prof. Drummond records similar impressions in Africa :—“ On finding one of these insects, I have often cut a small branch from an adjoining tree, and laid the two side by side for comparison ; and when both are partly concealed by the hands so as to show only the part of the insect’s body which is free from limbs, it is impossible to tell the one from the other. The very joints of the legs in these forms are knobbed to represent nodes, and the characteristic attitudes of the insects are all such as to sustain the deception.”† Every writer, in fact, who approaches the subject of animal disguises, whether evolutionist or not, quotes these insects as one of the strongest illustrations he can find, and with ample warrant, for we may take these “ Stick-insects ” as affording a typical instance of what is understood as protective resemblance. The protection, however, cannot be complete, for Wallace found the stomachs of certain Cuckoos full of them.‡

Now, it is a general postulate that this highly imitative and protected form is due to the action of “ natural selection,” acting on some incipient and original element of variation. As Mr. Bates observed :—“ Natural selection having, from the first, favoured the species which offered variation in these parts, the tendency to variability has become perpetuated by inheritance.”§ Or, as Mr. Darwin put it :—“ Assuming that an insect originally happened to resemble in some degree a dead twig or a decayed leaf, and that it varied slightly in many ways, then all the variations which rendered the insect at all more like any such object, and thus favoured its escape, would be preserved, whilst other variations would be neglected and ultimately lost ; or, if they rendered the insect at all less like the imitated object, they would be eliminated.”|| We should therefore expect, if a perfect geological record could unfold the ancestry of these insects, to trace a gradual evolution of form for protective purposes under

* ‘ Contributions to the Theory of Natural Selection,’ p. 64.

† ‘ Tropical Africa,’ 4th edit. p. 173.

‡ ‘ Tropical Nature,’ p. 93.—In North America “ Walking-sticks (*Diaperomera*) are eaten by the Crow-Blackbird and two species of Cuckoos.”—S. D. Judd (*American ‘ Naturalist,’* vol. xxxiii. p. 462).

§ “ Descriptions of Fifty-two New Species of *Phasmidæ* ” (*Trans. Linn. Soc.* vol. xxv. p. 323).

|| ‘ Origin of Species,’ 6th ed. p. 182.

the influence of natural selection. Such an investigation has been attempted, and such a result apparently obtained by Mr. Cameron, in his search for "the origin and purpose of the horns and antlers of ruminants." He concludes "that the horns and antlers of ruminants are the result of a defensive adjustment in biological answer to carnivorous teeth and claws, and consequent upon the relations of destroyer and destroyed which obtained between carnivores and ungulates throughout Tertiary time. . . . Their historical appearance in the Miocene age of the Tertiary period is contemporaneous with a vast extinction of hornless ungulate families, and their subsequent development in an ascending scale corresponds with the gradual thinning out of unarmed ungulate genera, and the gradually increasing destructive pressure upon those, whether armed or unarmed, that survived. Their evident loss of calibre since palæolithic times may be traced chiefly to the coming of man with missile weapons, which, in altering the character of the destroying agency, discounted the value of cranial armature in the struggle for life."*

It is a remarkable fact with these *Phasmidæ* that giant forms are said to have existed even in the Carboniferous fauna. Among other Orthoptera belonging to that era were "the giant Walking-sticks recently brought to light from the coal-measures of France, the *Titanophasma fayoli*, which measure in length (in one specimen) upwards of twelve inches, and are therefore, by linear measure, very nearly the largest of recent as well as fossil insects."† It is necessary, however, to observe that much caution must be exercised in the identification of these fossil remains. Dr. Sharp is at least sceptical, for he writes:—"In the Carboniferous layers of the Palæozoic epoch there are found remains of gigantic insects that may possibly be connected with our living *Phasmidæ*."‡ The same writer, however, has subsequently given a less undecided opinion: "*Phasmidæ* are insects of extreme interest; they appear to be the nearest living repre-

* 'Zoologist,' 3rd ser. vol. xviii. pp. 291-2.

† Heilprin, 'Geograph. and Geol. Distr. of Animals,' p. 150.—*Pharnacia serratipes*, from Borneo, the largest known species, is stated by Mr. Kirby to measure nearly thirteen inches from the front of the head to the extremity of the abdomen (Trans. Linn. Soc. vol. vi. (2nd ser.) p. 448).

‡ 'Cambridge Nat. Hist.' vol. v. p. 276.

sentatives of an insect fauna that was predominant in the Carboniferous epoch.”* Brongniart and Scudder have proposed a distinct family—*Protophasmidæ*—for these fossil remains, though Scudder’s “restoration” of *T. fayoli* is perhaps, and necessarily, somewhat imaginary. Mr. Comstock maintains that “we must turn to the Carboniferous as the earliest epoch from which we have data to base our conclusions regarding the structure of the primitive insect wings”;† whilst Huxley believed that “the Carboniferous Insecta and Arachnida are neither less specialized, nor more embryonic, than those that now live.”‡

If, however, we suppose, as we may reasonably do, that these Carboniferous *Phasmidæ* must have been protected forms of insect life at that period—for it is by their peculiar structure that the fossil remains are recognized—the imitative resemblance would also have a different meaning and a diverse reference to what now obtains. Respecting fossil Cockroaches, Mr. Scudder states:—“The first Cockroach wing ever described was first described as a fern leaf, and in all, or nearly all, the localities where their remains have been found they are associated with fern leaves in immense abundance. While searching for their remains in the Permian deposits at Carsville, I was much struck by this resemblance, and was repeatedly obliged to use the glass to determine whether it was the wing of a Cockroach or the frond of a fern I had uncovered, and the instances are not rare where they agree completely in size. The general distribution of the nervures is to cursory view the same in each, and the form is often nearly identical.”§ The flora of the Carboniferous era was very different to that of the present epoch. The mighty forests of gigantic horse-tails, club-mosses, and tree-ferns replaced or anticipated the jungles and woods of to-day; and, as Haeckel truly observes:—“It is difficult for us to form any idea of the very peculiar nature of those gloomy palæolithic fern-forests, in which the whole of the gay abundance of flowers of our present flora was entirely wanting, and which were not enlivened by any bird

* In ‘Zool. Results of Arthur Willey Exped.’ pt. i. p. 78.

† ‘Evolution and Taxonomy.’—‘The Wilder Quarter-Century Book,’ p. 56.

‡ ‘Collected Essays,’ vol. viii. p. 297.

§ ‘Bull. U.S. Geol. Surv.’ No. 124, pp. 30-1 (1895).

or mammal.”* Prof. Geikie describes it as “marked by a singular monotony of character all over the world from the Equator into the Arctic Circle, the same genera, and sometimes even the same species, appearing to have ranged over the whole surface of the globe. It consisted almost entirely of vascular cryptogams, and pre-eminently of *Equisetaceæ*, *Lycopodiaceæ*, and Ferns. Though referable to existing groups, the plants presented many remarkable differences from their living representatives. In particular, save in the case of the ferns, they much exceeded in size any forms of the present vegetable world to which they can be assimilated. Our modern horse-tails had their allies in huge trees among the Carboniferous jungles, and the familiar club-moss of our hills, now a low-creeping plant, was represented by tall-stemmed *Lepidodendra* that rose fifty feet or more into the air. The ferns, however, present no such contrast to forms still living. On the contrary, they often recall modern genera, which they resemble not merely in general aspect, but even in their circinnate veneration and fructification. With the exception of a few tree-ferns, they seem to have been all low-growing plants, and perhaps were to some extent epiphytic upon the larger vegetation of the lagoons.”† Now, if we keep in mind this description of the very different flora that then existed, we cannot help recognizing the fact that these Stick-insects would either have a totally different relation to the trunks of those tree-ferns to what they bear to the branches and twigs of trees as known to ourselves, or that they then—as is more probable—by a difference of form to their present descendants, assimilated to their then environment.

Again, the more ancient existence of the *Phasmidæ*, prior to the Carboniferous epoch, is implied, for it is impossible to imagine on any evolutionary principle that these giant insects came suddenly into existence at that era, especially if, as we believe, their imitative structure is due to the action of natural selection. In that case there must have been antecedently less specialized forms, less imitative structure. “Considering the abundance of Walking-sticks in Paleozoic rocks, the absence of

* ‘History of Creation,’ 4th ed. vol. ii. p. 123.

† ‘Text-Book of Geology,’ pp. 724-5.

their remains from Mesozoic strata is rather remarkable.”* But the difficulties in the clear conception of this question do not end here. As early as this Carboniferous epoch, these insects appear to have possessed what we naturally consider as a protected or imitative structure, and this view is inconceivable without the antecedent proposition that their enemies then existed, and that the imitative guise was that of the oft-devoured against the would-be-devourer. But it is affirmed that Lizards do not appear before the Permian epoch,† birds as certainly not before the Jurassic‡ or perhaps the Triassic formation. “It is quite possible that birds existed during the Triassic period, but at present there is no proof of it.”§ And if these facts were taken as final, then an insuperable difficulty would exist as to the structure of these *Phasmidæ* being due to a gradually acquired protective character. But the same argument applies to these ancient Lizards as to our Carboniferous Stick-insects. As Huxley remarks, “These Permian Lizards differ astonishingly little from the Lizards which exist at the present day”; and again, “It is perfectly clear that if our palæontological collections are to be taken, even approximately, as an adequate representation of all the forms of animals that have ever lived, and if the record furnished by the known series of beds of stratified rocks covers the whole series of events which constitute the history of life on the globe, such a fact as this directly contravenes the hypothesis of evolution; because this hypothesis postulates that the existence of every form must have been preceded by that of some other form different from it.”|| If we study the records of

* Scudder, “Syst. Rev. Pres. Knowl. Foss. Ins.” (Bull. U.S. Geol. Surv. No. 31, p. 49 (1886)).

† This seems to be the current statement based on present knowledge; but, as Huxley has observed, analogy seems to be rather in favour of, than against, the supposition that Amphibia and Reptilia, or even higher forms, may have existed, though we have not yet found them in the Devonian epoch (‘Collected Essays,’ vol. viii. p. 385).

‡ The oldest known bird—*Archæopteryx*—comes from the Solenhofen Limestone in the Upper Jurassic series—a rock which has been especially prolific in the fauna of the Jurassic period (A. Geikie, ‘Text-Book of Geology,’ 2nd edit. p. 783).

§ O. C. Marsh, ‘Sixteenth Ann. Rept. U.S. Geol. Survey,’ p. 147 (1896).

|| ‘Collected Essays,’ vol. iv. p. 85.

animals that have lived at a former period of the world's history, but have at present no representatives, we shall find,—to again quote our previous authority, “ Among the Mammalia and birds there are none (orders) extinct; but when we come to the reptiles there is a most wonderful thing: out of the eight orders or thereabouts which you can make among reptiles one-half are extinct.”* Amphibia, however, certainly existed, and were apparently abundant in the Carboniferous age; and, as Mr. Thomson remarks, “ the food of adult amphibians usually consists of insects, slugs, and worms.”† We may surmise that many were arboreal in their habits, and these, before the advent of the true reptiles and birds, must have constituted the principal insect enemies. We must also recollect that the Pterodactyles, or Flying Dragons, during the long reptilian period, “ played the rôle of the bats and birds of the present day.”‡ The imperfection of the geological record is, however, no argument against evolution, though it seems strange it has not even been made of much more use by some opponents. The struggle for life is an ancient one, but the combatants have not always been the same. In Pliocene times, as Prof. Owen has stated, “ Bats, Moles, and Shrews were then, as now, the forms that preyed upon the insect world in this island.”§ The number of mammals which devour insects seem sometimes overlooked, and this fact can be easily realized by looking through the pages of any good treatise on the Mammalia, and tabulating the nature of the food used by the different animals. For the purpose of the present discussion it should be remembered, as remarked by Mr. W. L. Sclater, that the conclusion is more than probable “ that before the commencement of the Tertiary epoch the whole world was, so far as is at present known, inhabited by small insignificant mammals distinctly allied to the marsupials.”||

Perhaps one of the inevitable faiths is that of the man of science who neither disguises the necessity of the halt, nor disbelieves in the certainty of the forward march, and these Carboniferous

* ‘Collected Essays,’ vol. ii. p. 354.

† ‘The Study of Animal Life,’ 2nd edit. p. 258.

‡ ‘Roy. Nat. Hist.’ vol. v. p. 8.

§ ‘Hist. of British Fossil Mammals,’ p. xxv.

|| ‘Geographical Journal,’ vol. vii. p. 295.

Phasmidæ almost prove the pre-existence of the Permian reptiles and the Jurassic birds.* If these stick-insects really possessed, and did not derive their imitative structure for protective purposes, then the whole theory of "Protective Resemblance" among insects may go to the wall. The need of protection must undoubtedly have existed in Carboniferous times, if this hypothesis is to stand, and such a view helps to prove, as Huxley has already urged, a pre-Permian existence for reptiles,† and, we may add, a greater antiquity also for birds, both of which, we may presume, were, as now, great enemies to insect-life.

The only other explanation—known to the writer—which has been offered to account for the peculiar structure of these Stick-insects, is one proposed by the late Prof. Karl Semper, which would have received additional emphasis had that naturalist been aware (he at least does not allude to the fact) of the *Phasma* being found as a Carboniferous fossil. Prof. Semper's proposition is that the structure denotes what has been styled "‘Larva-forms,’ a name given to all animals which possess the characters of the larvæ of other species, and are nevertheless capable of sexual reproduction." The opinion is amplified by the following explanatory illustration:—"Thus species of the same genera, perhaps even the very same species, in our damp and cold climate, do not produce a new generation till they are fully grown; while in the dry warm region of the Mediterranean they have produced two generations before they are fully grown."‡ This would be somewhat on a line with the suggestion we have made that most unicolorous animals are survivals from an original assimilative colouration, and have thus survived by being in

* These birds were, however, probably most divergent from present avian types. Such an example is the *Archæopteryx* of the Jurassic or Oolitic epoch, which was not only furnished with teeth, but had a long tapering tail, with other indications of reptilian affinity.

† T. G. B., reviewing in 'Nature' (vol. xlix. p. 196), 'Some salient Points in the Science of the Earth,' by Sir J. W. Dawson, speaks of the larger reptiles crawling over the soft mud, and leaving tracks in the coal-fields of Nova Scotia, and remarks: "These discoveries came as a complete surprise to the scientific world in days when few or no reptiles were known of earlier date than the Permian."

‡ 'Nat. Condit. of Existence as they affect Animal Life,' p. 126.

harmony with their surroundings, and thus coming under the sanction and perpetuating influence of natural selection. On this theory the Stick-insect would be merely the survival of an ancient "Larva-form" which fulfilled the same purpose, and thus also came down to us unchanged under the fostering care of the same selective influence. But Prof. Semper, further speculating on the fact of these insects comprising winged and wingless forms, is inclined to account for the same by the "optimum temperature"* under which the eggs have been matured. A fuller knowledge of these *Phasmidæ* will scarcely support this proposition. What we find is a most graduated and complicated connection between the winged and wingless forms. The late Prof. Westwood, a most determined opponent to evolution in any shape or form, contributed—as so many other opponents have done before and since—unconscious testimony to the same, in an artificial classification which he proposed for the family.† As summarized by Mr. Bates:—"The groundwork of this classification is the gradation or development of the wings from genus to genus. Thus it begins with those genera which are wingless in both sexes, these forming one *Division*, and passes through those in which the males are winged and the females wingless, or in which the wings are rudimentary, to the genera which have well-formed wings in both sexes—the whole of the latter forming the second *Division*. The wingless series commences with those forms which have much abbreviated antennæ and very attenuated bodies, and progresses to those having long setiform antennæ, or bodies of much more compact structure. The winged series progresses gradually from those genera in which the upper and lower wings are either rudimentary, or developed in one sex only, to those in which they exist in both sexes (but the upper wings of extreme shortness), ending at length with genera in

* Prof. Semper's definition of the "optimum temperature" seems to be contained in the following sentence:—"The interval between the daily extremes may be great or small without any alteration in the daily meteorological mean; moreover, the favourable temperature—the optimum of temperature for the animal—may either coincide with the meteorological mean, or lie nearer to one of the extremes—the maximum or minimum—than the other."

† 'Catalogue of Orthoptera in the Brit. Museum's Coll.' Pt. i. *Phasmidæ* (1859).

which both upper and lower wings have become elongated in an approach to due proportion.”* This complicated classification, which expresses the difficulties and intricacies of evolution in every sentence, naturally sometimes fails in the details of its own arrangement, but is sufficient to throw more than grave doubts on the explanation offered by Prof. Semper. The consideration of the present knowledge applicable to these *Phasmidæ* appears to warrant the following conclusions:—

1. The Walking-stick insects are usually considered by naturalists to be undoubted examples of “Protective Resemblance,” due to a process of “Natural Selection.”

2. If they are found with a somewhat similar structure in the Carboniferous fauna, they must therefore be the result of a previous course of evolution.†

3. Reptiles and birds, well-known insect enemies, are generally considered as posterior to the Carboniferous epoch.

4. But as the Permian reptiles were fully developed as we know them now, they must have had an earlier and less differentiated structure; the same suggestion being applicable to the Jurassic birds.

5. The presence of the imitative *Phasmidæ* in the Carboniferous epoch implies the existence of enemies, probably reptiles, and possibly a transitional form of bird-life.

Good cause is shown why we should seek in past geological epochs for the earliest traces of protective resemblances and mimicry, for the absence of observed attack in the present time does not disprove a great danger and want of protection in the dim eras of the past. “In studying protective resemblance and mimicry among living animals, the exceedingly common occurrence of these phenomena has often forced upon me the con-

* “Descriptions of Fifty-two New Species of *Phasmidæ*” (Trans. Linn. Soc. vol. xxv. p. 323).

† Our knowledge of pre-Carboniferous insects is limited, but present knowledge goes to prove that a considerable insect-fauna existed in more ancient times. Thus, as Mr. Comstock has observed:—“Of Devonian insects we know several. . . . These differ among themselves to such an extent that we are forced to conclude, without taking into account the two known Silurian insects, that already at that early time there was a large and varied insect-fauna, of which the more primitive forms have not been discovered” (‘Evolution and Taxonomy—The Wilder Quarter-Century Book,’ p. 55).

clusion that they have not been limited in their scope to recent times, but must have existed in past epochs, and even, to some extent at least, in very remote epochs.”* When gadflies are about, the Ox “seems to be seized with an unreasoning paroxysm of fear.” “In modern times the gadfly merely causes some fear and a little discomfort to an animal, and some loss of money and temper to its owner when he finds that the hide has been perforated, and is therefore held cheap by the tanner. But there must have been occasions when the war between gadflies and cattle was a much more serious affair. So strongly marked a protective instinct can only have been produced at a time when the very existence of the species was threatened by parasites of this order.”† Sir Charles Lyell, as early as 1836, and before much had been thought or expressed on the subject—for Darwin had not then returned from his epoch-making voyage—appears to have had clear conception of the phenomena, though based on very different philosophical views to those he embraced and enunciated later on. In a letter to Sir John Herschel, he advances probable causes that may aid a species’ duration in time. “Now, if it be an insect, it may be made in one of its transformations to resemble a dead stick, or a lichen, or a stone, so as to be less easily found by its enemies; or, if this would make it too strong, an occasional variety of the species may have this advantage conferred upon it; or, if this would be still too much, one sex of a certain variety. Probably there is scarcely a dash of colour on the wing or body of which the choice would be quite arbitrary, or what might not affect its duration for thousands of years. I have been told that the leaf-like expansions of the abdomen and thighs of a certain Brazilian *Mantis* turn from green to yellow as autumn advances, together with the leaves of the plants among which it seeks for its prey. Now, if species come in succession, such contrivances must sometimes be made, and such relations predetermined between species, as the *Mantis*, for example, and plants not then existing, but which it was foreseen would exist together with some particular climate at a given time.”‡

* S. H. Scudder, ‘Bull. U.S. Geol. Surv.’ No. 124, p. 30 (1895).

† Louis Robinson, ‘Wild Traits in Tame Animals,’ p. 150.

‡ ‘Life, Letters, and Journals of Chas. Lyell,’ vol. i. p. 468.

If we were referring to insects in general, and not to these *Phasmidæ* in particular, we should not lay such stress on the probability of their enemies in the past being largely reptiles* and birds. No one who has collected insects beneath an electric light, as I have frequently done at Pretoria, attended in the same pursuit with the shadowy rushes of Bats above, and a host of patient Batrachians beneath, can doubt what wholesale insect destroyers are found in the ranks of the Chiroptera and Amphibia. But although I have found all orders of insects attracted by these lights, including Orthoptera—comprising *Mantidæ*, *Achetidæ*, *Forficulidæ*, *Blattidæ*, *Gryllidæ*, and *Locustidæ*—I personally never met with any representatives of the *Phasmidæ*, though of course these insects may also prove to be nocturnal in their habits, and to be also attacked by Bats. But as these animals have not been traced further back than Eocene times, we can scarcely regard them as having proved enemies to the Carboniferous Stick-insects. With the Amphibia the case is different, and, according to the late Prof. Martin Duncan, “the most ancient Amphibia appear to have first lived during the Carboniferous age, and all were tailed, had pleurodent teeth, simple in their construction. . . . Some were Lizard-like and others were serpentiform. . . . They are the Microsauria (Dawson), and the genera *Hylerpeton* (Owen), *Hylonomus* (Dawson), *Brachydices* (Cope), and *Ophiderpeton* (Huxley) are typical.” † Here we have a host of contemporary Carboniferous enemies who may indeed have proved a great trial to the existence of unprotected *Phasmidæ*, and who may synchronously with the evolution of themselves have indirectly caused or induced a protective evolution in the structural form of these insects, by the mutual interdependence in those relations of cause and effect which can be expressed by the well-known appellation “natural selection.” And so, for the sake of the argument, dismissing even the agency of either reptiles or birds, we still have abundant reason for believing that, though the protective resemblance of these *Phasmidæ* was already acquired in Carboniferous times, the presence

* “In the earlier periods of the earth’s history, reptiles were no doubt the principal enemies with which butterflies had to deal” (Beddard, ‘Animal Coloration,’ 2nd edit., p. 211).

† ‘Cassell’s Nat. History,’ vol. iv. pp. 379–80.

of Amphibia in an evolutionary sense is quite sufficient to account for it. This prompts two reflections: one that we ought to look a long way back for the origins of these protective and mimetic guises; and the other, that we may reasonably hope to find them. The present attitude of many champions of the cause, who seek to find, or to invent, present factors for producing these phenomena, seems fraught with peril for the whole theory; and with the same weariness and perseverance with which the original promulgators thought out the doctrine, we must go on searching for further proofs, which will necessitate our appealing to the Cæsar of the past—the ever-growing science of palæontology.* In this domain many similar problems still remain unsolved. In the old red sandstone of Scotland are abundant remains of fishes, such as *Osteolepis*, but the reason why these and so many other ancient creatures were enveloped or armed in coats of mail, or rather the antecedent factors provocative of the evolution, has not yet been discovered.

In taking leave of these protected *Phasmidæ* we will record two—and only two—testimonies to their imitative deception, one old and the other modern.

When Pigafetta visited the island of Palawan, he saw many wonders, and described one as follows. There “are found certain trees, the leaves of which when they fall are animated and walk. They are like the leaves of the mulberry tree, but not so long; they have the leaf-stalk short and pointed, and near the leaf-stalk they have on each side two feet. If they are touched they escape, but if crushed they do not give out blood. I kept one for nine days in a box. When I opened it, the leaf went round the box.”† This may be taken as a strong, and, what is more, *then unsolicited*, testimony to the efficacy of protective resemblance among insects. Linnæus, doubtless with the true inwardness in his mind, wrote:—“Anyone who happens to see, in the Indian

* Among the slow Lemurs or Galagos we find enemies of the *Phasmidæ*. Mr. Lydekker, though not giving his authority, writes: “Some of the smaller species will readily devour Locusts, and the peculiar leaf-like Mantides, or praying insects” (‘Royal Nat. Hist.,’ vol. i. p. 223); but as no fossil lemuroid forms are at present known anterior to tertiary times, these records do not affect our enquiry.

† “The First Voyage round the World by Magellan” (Hakluyt Society).

woods, the falling leaves of trees apparently become alive, and creep upon the ground.”*

Our second illustration is from the pen of that keen and excellent observer, Mr. Belt:—“I was much surprised with the behaviour of a green leaf-like Locust. This insect stood immovably among a host of Ants, many of which ran over its legs without ever discovering there was food within their reach. So fixed was its instinctive knowledge that its safety depended on its immovability, that it allowed me to pick it up and replace it among the Ants without making a single effort to escape. This species closely resembles a green leaf.”†

If we consider it unsafe to predicate the colours of animals in past geological eras on the basis of their present hues and markings, it is as equally unwarranted to conclude that the nature of their food was the same then as now. And therefore we must be prepared to admit that probably insects had enemies in the past which are now only known as non-insectivorous, and the same suggestion will apply to other animals. This line of argument is prompted by the many recorded examples of wild and domesticated animals who have taken to a food totally different to that of other members of their family and even genus. It is necessary to give some examples, for, if not overlooked, such facts seem little taken into consideration. At the same time only some among many instances can be quoted.

MAMMALS.—*Macacus cynomolgus*, a well-known Monkey of Malasia, according to Sir Arthur Phayre, frequents salt water creeks and devours shell-fish, thus being known among naturalists as “the Crab-eating Macaque.” “A l'égard des jeunes oiseaux, le gorille et le chimpanzé font preuve d'une telle voracité qu'ils avalent leur proie sans la déplumer.”‡ Bonvalot narrates that small Thibetan Horses “feed on raw flesh, as we have seen with our own eyes.”§ Sandeman, writing of South Africa, observes that, though many of the Horses never get over their dislike to

* Preface to the ‘Museum Regis Adolphi Friderici,’ transl. by Jas. Ewd. Smith (1798).

† ‘The Naturalist in Nicaragua,’ p. 19.

‡ L. F. de Pauw, ‘Bull. Soc. Anthropol. Bruxelles,’ 1894, p. 140.

§ ‘Across Thibet,’ vol. ii. p. 64.

the smell of blood, he possessed one that rather liked it, and found him one day "licking the bleeding carcass of a newly-skinned Bôk."* It has been stated that "African Horses very commonly eat their own dung; and numbers have been destroyed in consequence of taking into the stomach vast quantities of flinty sand."† Dr. Stockwell, writing from Ontario, Canada, states:—"At certain points on the shores of Lake Huron the soil is quite sterile,—that is, very sandy,—and those who attempt to cultivate frequently use as compost fish caught in seines from the lake. These fish are chiefly Suckers (*Catostomidæ*), Dog-fish (*Amiidæ*), Herrings and Lesser Mackinaw Trout (*Coregonus artedi*, Le Sueur, and *Salvelinus*, both of the *Salmonidæ*). Frequently the maize which is planted in hills along with fish fails to exhibit a vigorous growth when cattle are turned in to graze them." But not only the cattle are attracted by the fish. "Some twenty years since a gentleman in the States imported a herd of a hundred and eighty Horses from the Shetlands, and was obliged to keep them for some time close to tide water, where they could get salt sedge grass and a diet of fish, such as they had been accustomed to. Gradually they were weaned to feed upon hay and grain. I have repeatedly seen Horses from this herd, or their descendants, if offered a piece of raw fish devour it with the greatest gusto."‡ Other animals embrace a fish diet with avidity. In Kamschatka during the long winters, when it is difficult to procure food of any kind, there is a consequent necessity of fish as an article of diet for almost every living creature in the settlements—"the Cows and Horses even not excepted."§ In the same country when the streams are surcharged with fish, the Bears "live entirely upon Salmon. Later, when this diet fails them, they take to berries, upon which they live until the time of hibernation."|| "There are indeed but few animals, apparently, which do not live on Salmon in Kamschatka."¶ Gilbert White has remarked "on the violent fondness for fish" possessed by common house Cats, when, "of all quadrupeds, Cats are the

* 'Eight Months in an Ox Waggon,' p. 174.

† J. Barrow, 'Travels in the Interior of Southern Africa,' vol. i. p. 53.

‡ 'Badminton Magazine,' vol. ii. pp. 840-1.

§ Guillemard, 'Cruise of the Marchesa,' 2nd edit. p. 68.

|| *Ibid.* p. 76.

¶ *Ibid.* p. 88.

least disposed towards water, and will not, when they can avoid it, deign to wet a foot, much less to plunge into that element."* To this Mr. Harting adds a note:—"It is generally supposed that Otters live exclusively on fish, but such is not invariably the case. They are carnivorous as well as piscivorous, and have been known to eat Ducks and Teal, and, while in confinement, young Pigeons. Frogs form part of their bill of fare, and even Mussels at times furnish food to these animals."† The Common Armadillo (*Dasypus villosus*) is an adroit capturer of Mice, and Mr. Hudson "frequently found their stomachs stuffed with clover, and, stranger still, with the large hard grains of the maize swallowed entire."‡ "The Zoo Otters have conformed to the universal tendency to extend the range of diet by eating ship-biscuit as well as fish."§ According to Mr. Lydekker, Otters have been known when hard pressed during winter to make occasional raids on the farmyard, where they have been asserted not only to kill poultry, but also young Lambs and Pigs. || As stated by Mr. Dimmock, "Adolph Müller mentions that his Cat regularly hunted at twilight the moths, chiefly *Noctuidæ*, in his garden" ('Zool. Garten,' Aug. 1880, jahr. 21, pp. 253-4). He also states, from his own experience: "About 1870 I had a Cat that nearly every hot afternoon in summer and autumn caught Grasshoppers (*Caloptenus* and *Ædipoda*), and brought me her insect captures alive before eating them, with as much pride as if she had taken Mice or birds." He also noticed "several Cats capture and eat beetles of the genera *Lachnosterna* and *Prionus*; the odour of the beetles of the latter genus seems sufficiently pungent and repulsive to drive away Cats, since they dislike most pungent odours; but I have seen two Cats that apparently regarded *Prionus* as a delicacy, for they would eat dead, mutilated, sometimes half-decayed beetles of this genus which they found about the yard."¶ Of the North American *Mustela vison* Darwin relates, "During the summer this animal dives for and

* 'Nat. Hist. Selborne,' Harting's edition, p. 96.

† *Ibid.* p. 97, note.

‡ 'The Naturalist in La Plata,' pp. 60 and 71.

§ C. J. Cornish, 'Animals of To-day,' p. 235. For other instances of changed diet, *cf. ibid.* p. 185.

|| 'Royal Nat. Hist.,' vol. ii. p. 93.

¶ 'American Naturalist,' Sept. 1884.

Zool. 4th ser. vol. III., July, 1899.

preys on fish, but during the long winter it leaves the frozen waters, and preys, like other Polecats, on Mice and land animals."* The Bactrian Camel (*Camelus bactrianus*), instead of confining itself to a strictly vegetable diet, will, according to Prejevalski, when pressed by hunger, readily devour almost anything that it may come across, including felt blankets, bones and skins of animals, flesh, and fish.† That prolific pest in Australia—the Rabbit—is now said to have learned to live and thrive on bark and the twigs of bushes, and even to have developed the power of getting up trees‡ in search of food, going up as high as eight feet, using their teeth to climb with.§ When the Hamsters (*Cricetus frumentarius*) issue in the spring from the burrows in which they have passed their winter hybernation, "they devour ravenously almost anything that comes before them, not refusing an occasional young bird, a mouse, or a beetle."|| As is generally known, the usual food of these animals is of a vegetable nature. "Reindeer devour hundreds and thousands of Lemmings."¶ Mr. J. A. Thomson states that he had a report on creditable authority that in the hard winter 1894–95, Stags in Aberdeenshire were known to have eaten Rabbits.** The Chacma Baboon in some parts of the Cape Colony "has largely taken to killing Lambs for the purpose chiefly of sucking the milk with which they have filled their stomachs."†† In Egypt, Hyænas are "said to feed on Indian corn, and be destructive to the crops."‡‡ In the Scottish Highlands, near the head of Loch Garry, Foxes were strictly preserved and plentiful. A year or two ago, when their cubs were ravenous, these Foxes took to killing Lambs in the fields around, and the unusual spectacle in Britain "was seen of large fires kept burning all night to scare them away, while slumber was

* 'Origin of Species,' 6th edit. p. 138.

† Lydekker, 'Roy. Nat. Hist.,' vol. ii. p. 411.

‡ "In California it has forgotten how to burrow" (C. J. Cornish, 'Wild England of To-day,' p. 189).

§ Writer in the 'Times'; quoted in 'Spectator,' January 4th, 1896.

|| Lydekker, *loc. cit.* vol. iii. p. 125.

¶ Brehm, 'From North Pole to Equator,' p. 75.

** *Ibid.* editor. note, p. 567.

†† S. Schonland, 'Zoologist,' 4th ser. vol. i. p. 155.

‡‡ A. Leith Adams, 'Naturalist in Nile Valley and Malta,' p. 47.

driven away from the eyelids of those who lived near by the incessant blowing of tin trumpets and firing of guns charged with powder only."*

BIRDS.—Ostriches, according to Mr. Cronwright Schreiner, have been known to swallow oranges, peaches, small Tortoises, Fowl and Turkey chickens, and kittens.† The Spree (*Spreo bicolor*) "was formerly never known to touch fruit, its food consisting entirely of insects; but during recent years it has, at all events on some farms with which I am acquainted, become very destructive to fruit."‡ Dr. A. G. Butler, who has much experience in aviculture, states that he has "seen the American Bluebird, the English Starling, the Robin, Redstart, and many other insectivorous birds swallow quantities of seed, and benefit greatly in consequence."§ "It is within the memory of some still living that the Rooks first commenced to eat turnips about fifty years ago."|| Perhaps the most remarkable case is found in the New Zealand Kea or Parrot (*Nestor notabilis*), which has recently developed a taste for a carnivorous diet. As described by Mr. Wallace: "It began by picking the sheep-skins hung out to dry or the meat in process of being cured. About 1868 it was first observed to attack living sheep, which had frequently been found with raw and bleeding wounds on their backs. Since then it is stated that the bird actually burrows into the living Sheep, eating its way down to the kidneys, which form its special delicacy."¶ The absolute accuracy of this explanation of the bird's intentions, has been denied by Messrs. Taylor White and Huddelston, both New Zealand authorities. According to these writers, "the bird settles on the sheep above the kidneys because it is the broadest part, and it can there obtain the best grip of the wool; and Mr. White considers that blood rather than flesh is what the bird desires.** On the island of Porto Santo, near

* Rev. M. G. Watkins, 'Longman's Magazine,' February, 1886.

† 'Zoologist,' 4th ser. vol. i. p. 106.

‡ S. Schonland, *loc. cit.* vol. i. p. 155.

§ *Loc. cit.* vol. i. p. 253.

|| Wm. Wilson, Jun., 'Investigations into Applied Nature,' p. 44.

¶ 'Darwinism,' p. 75.

** 'Zoologist,' 3rd ser. vol. xix. p. 293; also *cf.* Godfrey ('Zoologist,' 1898, pp. 216-17). Another New Zealand Parrot (*Strigops habrotilus*) has lost its power of flight, and lives in burrows or other natural cavities when not abroad.

Madeira, the stomach of a Kestrel was found to contain "nothing but seven Snail shells (*Helix pisana*), which had been swallowed whole."* As Darwin enquires, "Can a more striking instance of adaptation be given than that of a Woodpecker for climbing trees and seizing insects in the chinks of the bark? Yet in North America there are Woodpeckers which feed largely on fruit, and others with elongated wings which chase insects on the wing."† The Great Titmouse (*Parus major*), by its larger size and stronger bill, is adapted to feed on larger insects, and is even said sometimes to kill small and weak birds. The smaller and weaker Coal Titmouse (*Parus ater*) has adopted a more vegetarian diet, eating seeds as well as insects, and feeding on the ground as well as among trees.‡ It has been stated that "on Cocos Islands, when the Boobies are not nesting and have consequently left, the Frigate birds (*Tachypetes aquila*) are unable to procure their ordinary food, which consists of fish taken from the Boobies, and that they then swallow seeds of *Guilandina* and beans, which they find floating in the sea, and on flying to the land vomit them up again, apparently merely using them to fill up temporarily the empty crops."§ Mr. Watson, in describing the effects of illegitimate fishing in our own country, writes, "In one outlying village during last close season poached Salmon was so common that the cottagers fed their poultry upon it right through the winter."|| "After Hunter had fed a Sea Gull on grain for a year, he found that the inner coat of its stomach had grown hard, and its muscles had thickened, thus forming a true gizzard, although the Sea Gull normally has a soft stomach, as it lives upon the soft flesh of fishes."¶

Dr. Vosseler, in making some experiments on young Salamanders (*Salamandra maculata*), inadvertently left some in an aquarium for over a year unfed. "Investigations showed that these creatures, which usually fed on worms, all kinds of larvæ, &c., had nourished themselves with *Algæ* together

* Hon. Cecil Baring and W. R. Ogilvie Grant ('Zoologist,' 3rd ser. vol. xix. p. 403).

† 'Origin of Species,' 6th edit. p. 141.

‡ A. R. Wallace, 'Darwinism,' p. 108.

§ G. Clunies Ross, 'Natural Science,' vol. viii. p. 190.

|| 'Sketches of British Sporting Fishes,' p. 127.

¶ Cf. Brooks, 'The Foundations of Zoology,' p. 57.

with *Infusoria*. They had thus become almost complete vegetarians."*

INSECTS.—Numerous instances will occur to most entomologists, and are to be found scattered in entomological literature. We will again quote from other writers: "Many caterpillars, though plants are their proper food, will occasionally exhibit depravity of taste, and if kept with their own kind or with the larvæ of other moths, may turn cannibal, and make away with the company. Similarly the large green Grasshopper will eat insects smaller than itself, as well as its ordinary vegetable diet."† The household beetle pest *Dermestes*, whose larvæ not only prey on fitches of bacon, meat in larders, bladders covering jam-pots, and even books and papers, "have sometimes actually imitated the example of *Anobium*, and bored into wood, feeding on the timber as they advanced."‡ In various places, such as parts of India, for example, Mosquitos are found in swarms in spots never visited by human beings, and in which there are no large mammals. It has been suggested that, failing to obtain blood, Mosquitos support themselves on the juices of plants, but no observations in support of this have been recorded.§ Even the sexes in some insects are totally diverse in the nature of their food. In the Diptera, of the families *Culicidæ* and *Tabanidæ*, according to Prof. Westwood, "it is only the females of these insects which are blood-suckers, the males being found on flowers; and Meigen discovered that the mouth of the latter sex is destitute of mandibles."||

MANKIND.—Even man can acquire a partiality for salt or brackish water. Barrow relates that an old man in the Bokkeveld of South Africa, "who from his infancy till a few years past had lived in Zwartland, never missed an opportunity of sending thither a few bottles to be filled with the briny water for his own particular use; the pure stream of the mountain, as he asserted, not being able to quench his thirst."¶ The South Australians

* Eimer, 'Organic Evolution,' Eng. transl., p. 108.

† Badenoch, 'Romance of the Insect World,' p. 45.

‡ A. E. Butler, 'Our Household Insects,' p. 25.

§ R. J. Pocock, 'Roy. Nat. Hist.,' vol. vi. p. 52.

|| 'Modern Classification of Insects,' vol. ii. p. 541.

¶ 'Travels in the Interior of Southern Africa,' vol. i. p. 360.

first learnt from Europeans to eat Oysters.* The Australians do not, however, eat everything indiscriminately, but reject several things eaten by Europeans, as certain fish, crustaceans, or fungi; yet they feel no disgust at such things as maggots or rotten eggs, or even the contents of the intestines of animals taken in hunting.†

PLANTS can also vary the nutrient salts they absorb according to the supply of the same. In the yew (*Taxus baccata*) there is frequently a replacement of calcium by magnesium. On comparing the quantities of calcium and magnesium in the ash of yews grown on lime and on gneiss, respectively, with those yielded in the case of serpentine formation, we find that magnesia preponderates considerably in weight over lime in a yew from serpentine rocks (which are in the main a compound of magnesia and silicic acid), whilst the proportion between these two salts is reversed in a yew grown upon limestone. The obvious inference from the table is that, in plants from a serpentine ground, lime is to a great extent replaced by magnesia.‡

Among other vagaries in animal diet may be mentioned that of Snails, who also devour insects, particularly Coleoptera.§ On the other hand, the operation is sometimes reversed. M. Flaminio Baudi found *Cychnus cylindricollis* feeding on the body of *Helix frigida*; || and Mr. Trovey Blackmore had observed *Carabus stenocephalus* to feed on the abundant Snails in Morocco.

Such facts as these tend to prove that a fauna is not happy by having no history, as is so often and so easily imagined; but rather that its history is like that of a continental humanity—one series of wars, attack not on all sides at once, but ever recurring from one quarter or another. The friend of to-day may have been the enemy of a long ago. Environmental changes may have produced, by a scarcity of usual food, a change of diet, and then a race of animals hitherto enjoying a comparative immunity from attack may suddenly become almost annihilated by unexpected foes. Thus we may now find an inherited mimetic resemblance

* Ratzel, 'History of Mankind,' vol. i. p. 337. † *Ibid.* p. 361.

‡ Kerner and Oliver, 'Nat. Hist. of Plants,' vol. i. p. 70.

§ Cf. Wollaston and other observers, 'Zoologist,' vol. i. p. 201; vol. iii. pp. 943, 1035, 1038.

|| 'Petites Nouvelles Entomologiques.'

among insects and other living creatures which we seek in vain to explain by observed attack, and consequently cannot prove the present need of protection. These disguises are often like remains of old earthworks which we find on our peaceful downs; reminiscences of past struggles, records that such did once exist. And thus the suggestion is forced upon us that much present mimicry in nature is obsolete, more to be studied and explained by a zoological archæologist than by an outdoor observer, and accounts for the frequent remarks made from time to time to the writer by candid and competent naturalists abroad, that so much convincing theory at home receives little support when nature is cross-examined in her tropical and sub-tropical fastnesses.

In a book written by a popular writer, the late Prof. Henry Drummond, and which must have been read largely by the general public, for before us is the fourth edition of 'Tropical Africa,' which is described as "completing twenty-fifth thousand," there is a chapter devoted to "Mimicry; the ways of African insects."* "Protective resemblance" would perhaps have been a more applicable title to the phenomena considered than "mimicry," † which the author defines as "imposture in nature." But the peculiarity in this chapter is that the author, after agreeing in the fullest manner with the usual conception of the term "mimicry," as held by most biologists, and stating that "mimicry depends on resemblances between an animal and some other object in its environment of which it is a practical gain to the creature to be a more or less accurate copy," ‡ appears to altogether explain away that conclusion by the subsequent remark that, "while in some animals the disguises tend to become more and more perfect, the faculties for penetrating them in other animals must continually increase

* Gordon Cumming as early as 1850 drew attention to "mimicry" or "protective resemblance" among insects. He did not use the terms, but clearly described the facts. 'Five Years' Hunting Adventures in South Africa' (Compl. Pop. Edit.), p. 132.

† This word is now becoming not uncommon in general literature, and its original meaning—at least as used in biology—will tend to become obscured. Thus Max Nordau writes of "the religious mimicry of the French bourgeoisie, which was to make them resemble the old nobility" ('Degeneration,' p. 113).

‡ 'Tropical Africa,' 4th edit. p. 162.

in subtlety and power.”* This argument, if it could be substantiated, appears to be, and has always impressed the writer, as one of the most complete answers to the whole theory of the protective meaning of these disguises. For if by the slow process of adaptation all variations tending to these disguises were increased and perpetuated by the process we express as “natural selection,” thus ever helping the “survival of the fittest,” and at the same time these changes or developments were equally studied and more keenly detected by the attentive and hungry host of insect enemies, the relations between the attackers and the attacked, the eaters and the eaten, would remain much the same at the commencement and end of the process. And therefore what becomes of Prof. Drummond’s conception of mimicry, with its “practical gain,” if the enemies sought, or supposed to be deceived thereby have their penetrating faculties continually increasing in subtlety and power? A moth, *Agrotis cursoria*, not uncommon to the sand-hills on the coast of our own country, “hides in the daytime in dense tufts of *Ammophila arundinacea* (Marram grass) close to the surface of the sand, and among other plants on the sea sand-hills.” But “its partiality for this shelter is apparently well known to the birds, as is testified by the numbers of detached wings to be seen lying about.”† Mr. Rodway gives a similar experience in the Guiana Forest:—“Invisibility is a striking characteristic of every living thing in the forest. At first a stranger observes nothing but a scene of desolate confusion. Later, however, he begins to distinguish one tree from another, and learns where to look for a particular animal. Then he wonders how he could have missed the signs which now impress themselves upon his eyes.”‡ It is similar to the extra thickness in the armour of the ironclad, which is always influencing the construction of guns possessing greater penetrating power. It is like the acquired aptitude of the village

* ‘Tropical Africa,’ 4th edit. p. 180. A similar opinion was expressed by the late Fras. Pascoe: “It is not likely that animals whose lives depend on their sight should be easily deceived; though with our mostly unobservant eyes a green caterpillar on a green leaf may easily escape notice” (‘A Summary of the Darwinian Theory of the Origin of Species,’ p. 13).

† C. G. Barrett, ‘The Lepidoptera of the British Islands,’ vol. iii. p. 330.

‡ ‘In the Guiana Forest,’ p. 48.

bird-nesting boy, who with difficulty succeeds in making the town lad see the concealed nest he is about to take; or the experienced eye of the angler which recognizes the Trout, undetected by the ordinary walker on the bank. Or again, watch the rambles of the out-door collector and the closet-naturalist; or the entomologist who discovers and captures, and the other entomologist who only classifies and describes. It is the old remark of "Eyes" and "No Eyes."* If then we can for the purpose of sport or science pit our discerning faculties against the extreme power of animal disguises,† how much more must that detective discrimination have been acquired by those creatures whose very lives are so largely passed in the search, and depend on the capture of these mimicking fugitives. Even the obscure Coccids are preyed upon by birds. Mr. Newstead found specimens in the stomach of the Blue Tit (*Parus cæruleus*), and remarks:—"These birds must have keen eyes to distinguish this species, for it is well protected both in colour and texture. The central red-brown speck in the scale is the only indication of its presence, and altogether it may be considered the best protected of any of our British *Coccidæ*."‡ Again, birds learn to recognise hurtful as well as advantageous objects as exemplified by telegraph wires. When these were first elevated they caused great mortality among birds which flew against them, but after a time the wires were avoided, and that loss in avian life was vastly reduced. Birds certainly acquire experience and avoid dangerous food. Frank Buckland relates that a keeper at Castle Forbes poisoned dead Rabbits, and "picked up as many as twenty-one Magpies and Crows to one Rabbit at one time." But "the cunning birds found out that it was dangerous to peck at dead Rabbits, in vain therefore were they laid down; the Crows and Magpies were for a season triumphant. But the keeper

* Tennyson was an acute observer of nature. He once asked Miss Thackeray to notice whether the Sky-Lark did not come down *sideways* on the wing. (W. J. Dawson, 'The Makers of Modern English,' 3rd edit. p. 182.)

† My friend Dr. Percy Rendall, then at Barberton in the Transvaal, a most enthusiastic and successful collector, in reply to my expressed wish that he would still keep a sharp look-out for *Phasmidæ*, replied: "I am keenly on the look-out for them, and will in most cases back my eyes against almost any kind of insect protective resemblance dodges."

‡ 'Entomol. Month. Mag.,' ser. 2, vol. vi. p. 85.

substituted Wood Pigeons for Rabbits, and the 'vermin birds' once more fell victims."* It is not related how long this bait sufficed. Eimer relates that, requiring Sparrows for the zootomical studies of his students, he procured a new and ingeniously constructed trap. "The result of the use of my trap was surprising; almost immediately quite a dozen Sparrows were caught in it. These were brought away as carefully as possible, so that none were taken out in sight of their companions. The trap was again set, and this time nine Sparrows were caught equally quickly. I was very pleased with the invention, for it seemed likely to put an end for the future to all my difficulties. But it was to be otherwise. I noticed already that all the Sparrows caught were young birds, hatched the same spring, and therefore of little experience. Not a single old Sparrow had entered the trap. And when I set it for the third time, not one Sparrow went into it—it stood for week after week; the yard was full of Sparrows, but I caught no more. However, I looked forward confidently to the next year—then I thought, young Sparrows will get caught again; and about two dozen would have been enough material for my purpose. But I had reckoned without the intelligence of the Sparrows. When I got out the trap again next year, and had it set, not a Sparrow went into it. But a curious spectacle was observed: apparently several Sparrows had the desire and the intention to go into the trap, and these were obviously the young inexperienced birds which had been hatched since the trap was last set; but others, of course the older birds who had learnt the danger of the wire-basket from the loss of their families, kept them back by constant earnest warnings, for the males, as soon as one of the yellow beaks approached the cage, uttered their warning cry most loudly, the cry which they always make when danger is present, and which consists in a long shrill rattling 'r-r-r-r-r.'"[†] It is well known to poachers that when once a Hare has been netted, there is no chance of its being taken again in like manner. Rather than go through a second time, even though a "lurcher" be but a yard behind, it will either "buck" the gate, or take the

* 'Curiosities of Nat. Hist.,' pop. edit., 2nd ser. pp. 97-8.

† Eimer, 'Organic Evolution,' Eng. Transl., pp. 235-6.

fence.* Grazing cattle will not touch plants that would be deadly or hurtful to them; but if taken to a distant land, to another continent where unknown herbs grow they are unable to distinguish, they sicken or die of the poison they have eaten.†

But perhaps it is only by recognizing the full force of the objections that we can hope to fairly realize the strength of the theory thus called in question. If these mimicking or protective disguises have not been incidental to a phase of evolution, they must have been created as they are, and even the advocates of this view—if any competent are left—would surely not enunciate the idea of a purposeless creation, or the fanciful freaks of a Demiurgos, for such must be the case if no purpose is served by these extraordinary imitations. On the other hand, what can the evolutionist reply when he is confronted with the only other postulate of astonished ignorance expressed in the terms of “a freak of nature”?‡

The solution of the difficulty may—we repeat—probably be found in ceasing altogether to explain some biological features of the past by causes operating in the present, and perhaps only in the present epoch. In fact, many animals affording undoubted instances of protective resemblance and mimicry now show in the observed dangers of their lives, so little *raison d'être* for these wonderfully evolved assimilations in colour and structure, that it seems more philosophical to conceive them as survivals of a past when there was a greater danger and a larger need.

* John Watson, 'Poachers and Poaching,' p. 270. "A new trap catches more than a better old one until the animals have learned to understand it, and young animals are trapped more easily than old" (Prof. Tyler, 'The Whence and the Whither of Man,' p. 119).

† Heyn and Stallybrass, 'The Wanderings of Plants and Animals,' p. 402.

‡ How different are the theological or teleological views of the Middle Ages to the scientific conception of the struggle for existence as held to-day. We can no longer apostrophize the order Aves in the delightful utterances of the good and saintly Francis of Assisi:—"Brother birds, you ought to praise and love your Creator very much. He has given you feathers for clothing, wings for flying, and all that is needful for you. He has made you the noblest of His creatures; He permits you to live in the pure air; you have neither to sow nor to reap, and yet He takes care of you, watches over you and guides you" ('Life of St. Francis of Assisi,' by Paul Sabatier, Eng Transl., pp. 176-7). Rather now we see

"The grub eats up the pine,
The finch the grub, the hawk the silly finch."

(To be continued.)

NOTES ON THE ZOOLOGICAL COLLECTIONS OF
AMSTERDAM, ROTTERDAM, AND ANTWERP.

BY GRAHAM RENSHAW.

HAVING recently had the opportunity of visiting these magnificent collections, perhaps the following notes which I have made may be of interest to readers of 'The Zoologist.'

The entrance to the Amsterdam Gardens, the property of the Society "Natura Artis Magistra," is in the Kerk Laan. The visitor, on entering, is provided with a guide-plan of the Gardens, and photographs of the various animals, including the rare Mountain Zebra (*Equus zebra*), may also be purchased. The series of animals in the Monkey-house included a full-grown Chimpanzee (*Anthropopithecus niger*), the largest I have ever seen, in the best of health and spirits, protected from draughts by glass. In the same house was an Echidna (*Echidna aculeata*) buried under a heap of straw. The keeper obligingly removed the straw for me, but all efforts to move the Echidna, even by leverage with a stout pole, were quite ineffectual. The Lion-house was roomy and well lighted, but presented no special features. The small Cats'-house contained two Geoffroy's Cats (*Felis guigna*), and a pair of the now rare Tasmanian Devil (*Sarcophilus ursinus*). The series of Bears included an interesting albino of the Himalayan Black Bear (*Ursus torquatus*), kept in the same cage with a normal specimen. Amongst the Ungulates, the most interesting animal was a European Bison (*Bos bonassus*), placed in a pen adjoining that of the American Bisons (*B. americanus*), so that the two species could be readily compared. The Anoa (*Bos depressicornis*), which unites the Oxen to the Antelopes, was also represented. The Antelopes included a fine Waterbuck (*Cobus ellipsiprymnus*), and a brindled Gnu (*Connochætes taurina*). The coat of the Gnu was of a beautiful and distinct blue-grey colour. A specimen of the Mountain Zebra (*Equus zebra*) was placed next to the Burchell's Zebra (*E. burchelli*); the Burchell's Zebra belonged to the typical form with very thick dark stripes on the body and none whatever on the legs. By the kind help of the keepers I was enabled to photograph the animal as it stood in its yard. In the same building with the Zebras was an extensive ornithological museum.

There were several aviaries in the Gardens, and the Bird Gallery was

well stocked. Two beautiful Boat-billed Herons (*Canchroma cochlearia*) sat on their respective perches, one bird having the feathers at the base of the bill a delicate lemon-yellow, the other bird having the same feathers white. *Photodilus badius* sat sleepily on its perch, gazing on the spectator with all the dignity expected of an Owl which unites in the anatomy of its skull the characters of the *Strigidae* and *Bubonidae*. The glossy Starlings were well represented by the West African *Juida aenea*, with its long tail; *Lamprotornis chalybea*, metallic green; *L. nitens*, a lovely bird with bright bluish reflections on side of breast; and the yet more lovely *L. aurata*, metallic greenish blue all over head and breast, with metallic purple reflections under chin, and green wings and tail. The smaller birds included the *Estrelata cœrulescens*, of an exquisitely delicate bluish grey, with crimson lores and under tail-coverts. The collection of Parrots was very comprehensive, and contained the rare Hawk-billed Parrot (*Deropternus accipitrinus*). The Cockatoos were lively and in fine voice, screeching furiously and unitedly to form a most unmelodious concert. The Parrotlets were represented by the pretty little *Psittacula galgula*, with green plumage, varied by the yellow on the nape of the neck and the crimson of the throat and upper tail-coverts. The Kiwis (*Apteryx mantelli* and *A. oweni*) slept snugly under their straw, till I was able to induce the keeper to dislodge them for me to photograph. Cranes were represented in great variety, and amongst other allied birds I noted were the Goliath Heron (*Ardea goliath*), the Straw-necked Ibis (*Ibis spinicollis*), and the White Egret, so shamefully persecuted for its plumes, which now everywhere (including, I am sorry to say, Holland and Belgium) adorn women's hats under the name of "aigrettes." In an adjoining aviary was a beautiful Rose-coloured Pastor (*Pastor roseus*), and several Bower-birds. I was much interested to hear the vocal performance of the Parson-bird (*Prothemadera novæ-zealandiæ*), consisting of a few musical notes followed by a harsh clanking sound. The extensive list of birds of prey included the American Black Vulture (*Catharista atrata*) and the Fishing Owl (*Ketupa ceylonensis*).

The Aquarium was a splendid building, the interior being very fine. Perhaps the prettiest tank was one full of large Gold-fish of a fiery red, contrasting well with the sanded floor and the delicate green *Vallisneria* plants. The tanks faced each other; on one side of the hall were the marine tanks, on the other fresh-water fish were exhibited. In the marine series I may mention the viviparous Blennies (*Zoarcès viviparus*), crowded together at the bottom of their tank in dozens; Herrings (*Clupea harengus*) in multitudes; a huge grey Wolf-fish (*Anarrhichas lupus*), its great jaws almost touching the glass; and some small Sturgeons (*Acipenser sturio*) of different sizes. Three Silurus (*Silurus glanis*), each about five feet long, were shown in a tank of fresh water. The room at the end of the Aquarium-

hall contained Paradise-fish (*Macropodus viridi auratus*), colours very vivid ; Peacock-fish (*Trichogaster fasciatus*), in dazzling iridescence of green and orange. The following amphibians were also shown :—*Bombinator pachypus*, *Rana esculenta*, *R. temporaria*, *Bufo calamita*, *Triton tæniatus*, *T. alpestris*, *Salamandra maculosa* ; also seven large Axolotls in a tank, greyish green, marbled and mottled with darker green.

A good Museum, the cases all painted white, was attached to the Aquarium building, and contained a collection of Snakes and Tortoises, well mounted in spirits, and also several other zoological collections.

The Insect-house, close to the Bird-gallery, contained living insects, such as *Papilio machaon* and large silk moths, in great variety, and in various stages of metamorphosis.

At Rotterdam, the Gardens, which are close to the Delftsche Poort Station, possessed two examples of the Thibetan Black Wolf (*Canis niger*) ; a very interesting Siberian Tiger, the fur of which was remarkably delicate, the stripes being long and thin, and the whole animal presenting a pale washed-out appearance, contrasting markedly with the darker coat of the Malaccan Tiger in the next cage.

The Eagle aviaries were fine and spacious, and the Heron-pond of very ample dimensions. It was curious to note that just outside the wires a colony of free Herons had taken up their abode.

The Antwerp Zoological Gardens, which are very fine, are close to the principal railway-station ; admission one franc. The Monkey-house, a handsome building, contained amongst its inmates a very rare and little known *Cercocebus* from the Belgian Congo ; an example of *Cercopithecus brazzae* (Brazza's Monkey), smaller apparently than the specimen in London ; and many other animals. Perhaps the most curious building is the Elephant-house, the front of which is decorated, in Egyptian fashion, with figures of the Mountain Zebra and other animals painted on the outside. The Ungulates are well represented at Antwerp, the most noteworthy being two Mountain Zebras (*Equus zebra*) ; a Giraffe (North African form), protected from draughts by a huge sheet of plate-glass in front of its cage ; a European Bison (*Bos bonassus*) ; two short-horned African Buffaloes, darker perhaps than normal (*Bubalus pumilus*) ; several American Bison (*Bos americanus*) ; Malayan Tapir (*Tapirus indicus*), in the very best health, as a glance at its beautiful coat testified ; Sable Antelope (*Hippotragus niger*) ; Roan Antelope (*H. equinus*) ; Brindled Gnu (*Connochætes taurina*) ; Dama Gazelle (*Gazella dama*) ; Addax (*Addax nasomaculatus*) ; and a Sumatran Rhinoceros (*Rhinoceros sumatrensis*). The Lions, Tigers, and other large Carnivora were provided, as in London, with outdoor cages.

Birds, as at Amsterdam, are well represented : Hornbills, Barbets, Fiuches, and hosts of other tropical forms are displayed in the aviaries. One aviary compartment, I noticed, was provided with rows and rows of perches, on which nestled a crowd (probably hundreds) of tiny Finches—a pretty sight.

All the three Gardens are well timbered, and the grounds themselves elegantly laid out. The buildings are very imposing and beautiful. I must here express my thanks to the Director of the Amsterdam Gardens for his kind permission to photograph some of the animals; and to the keepers for their kind and willing assistance to me, a stranger in a strange land.

NOTES AND QUERIES.

MAMMALIA.

CARNIVORA.

The Grey Seal on the Coast of Sussex.—Hearing, on June 5th, that a Seal had been shot at Littlehampton, I proceeded to make enquiries, and, if possible, identify the species. I was informed that it had been skinned, that it was between five and six feet in length, and weighed ninety-five pounds. The large size pointed to the conclusion that it might be the Grey Seal (*Halichærus gryphus*), a very rare visitor to the south coast, and, so far as I am aware, the first instance of its occurrence in these parts. Being, therefore, desirous of obtaining the skull as a means of identification, I asked what had become of it, and was informed that it had been “thrown into the river.” Offering a reward, I left word that in the event of its being recovered, as I suggested it possibly might be at low tide, it should be brought to me. This was done, and I find that it corresponds in all essential particulars, as regards dentition, flattened head, &c., with the illustrations of the skull of the Grey Seal in the second edition of Prof. Bell’s ‘British Quadrupeds’; also teeth in the upper jaw, plain, smooth, and slightly curved, and not serrated, or placed obliquely and close together, as is the case in the Common Seal. I would also observe that in the specimen I have imperfectly endeavoured to describe, the two oblique orifices in the palate are placed near the canine teeth (see Bell, p. 268); whereas in the Common Seal (*Phoca vitulina*) they occur much farther back, and are longer in form (see Bell, p. 246). In ‘The Zoologist’ for 1897, I reported the appearance of the Common Seal in the Arun for the first time; I have now the pleasure of recording the capture in this district of the much rarer animal.—PERCY E. COOMBE (Surrey House, Arundel).

AVES.

Thrush’s Nest piled up with Ivy-berries.—By some accident the April number of ‘The Zoologist’ never reached me, and I have only lately seen Mr. Stanley Lewis’s note in that issue (*ante*, p. 181). In May I received from Pembrokeshire a nest of the Song-Thrush, the sides of which were thickly piled up with berries which had originally (*i. e.* at the end of February) been of a beautiful ruddy colour; some of them still show faint

traces of pink. The nest is described by the lady who sent it to me as having been a very beautiful object, and it was difficult to believe that the berries had not been stuffed into the structure of the nest for purposes of ornamentation. They turned out to be ivy-berries which had been passed through the body of the bird, the seeds, as Mr. Aplin has pointed out, being voided with the membrane containing them, while the soft parts of the berries were absorbed. It seems to be the membrane which takes the pink hue after extrusion. Mr. Aplin, who has seen the nest, thinks that the seeds were dropped upon it without definite purpose; Mr. Lewis, who does not mention the red colour, seems to be clear that the male bird brought them as food for the female. I should like to ask him whether the female consumed the berries, and whether he noticed any seeds of a red or pink hue. I have given up the idea of ornamentation, which was tempting at first sight; if the incubating female was fed by the male, and then extruded the seeds in a gelatinous state, they would easily have got fixed into the structure of the nest in such a way as to hold there firmly even after they had dried up.—W. WARDE FOWLER (Kingham, Chipping Norton).

[Many of the seeds forwarded by Mr. Stanley Lewis were of a red or pink hue.—ED.]

Large Clutch of Wheatear's Eggs.—Mr. Davenport states (*ante*, p. 203) that he has never known of a clutch of eggs of the Wheatear (*Saxicola œnanthe*) to number eight. It may interest him to learn that a nest containing that number was found in a hole in the walls of an old ruined castle in North Lancashire on May 11th, 1888. I saw the eggs immediately after they were discovered, and seven of them are now in my collection; the eighth was unfortunately broken by the finder to ascertain "if it was fresh." Excepting in this instance, six is the largest number I have taken; but I believe a seven or eight clutch is in the possession of my friend Mr. R. W. Calvert.—T. H. NELSON (The Cliffe, Redcar).

Hawfinches near Bradford.—On the 20th May last, whilst watching from behind a tree a Goldcrest feeding in a larch in Bingley Wood, a Hawfinch (*Coccothraustes vulgaris*) flew just past, alighting at some distance on an oak tree, but flew off again, immediately on my attempt to approach, along with another bird which I took to be of the same species. Formerly the Hawfinch was quite unknown in this district, but scarcely a year now passes but it is to be seen, or its nest found, and is undoubtedly extending its range in a northward direction. Recently a friend of mine, who had had his pea-crop attacked, was for some time quite ignorant of the cause of destruction; but early one morning he accidentally discovered that this species was the culprit.—E. P. BUTTERFIELD (Wilsden, near Bradford).

Cirl Bunting in Carnarvonshire.—As an interesting fact bearing upon the apparent extension of the range of the Cirl Bunting (*Emberiza cirulus*) in North Wales (if, indeed, it really is extending its range, and has not merely escaped notice until recently in some localities it is now known to inhabit), I should like to record that on the 29th June I watched, and listened for some time to the song of, a male of this species at Llanbedrog, about four miles west of Pwllheli. I could hear another bird singing at a little distance. The particular spot was the beautiful sheltered garden of Glyn-y-Weddw, which is heavily planted with conifers and other trees, and partly surrounded with plantations. Here, in the soft air, myrtles, escallonias, bays, fuchsias, and even camellias and other tender plants flourish in the open. The fact of the Cirl Bunting singing on and off from noon to two o'clock on that particular day, when the leaden sky, growling thunder, and warm heavy air were enough to depress all living creatures, shows that this species, like the Corn and Yellow Buntings, is a persistent singer after the early freshness of the day and the summer is past.—O. V. APLIN (Bloxham, Oxon).

Appearance of the Great Spotted Woodpecker (*Dendrocopus major*) in Yorkshire.—While I was sitting in a small wood some three miles from Beverley, my attention was attracted by the violent actions of two birds which seemed to be mobbing something. In a short time they came closer, and I saw that the object of their ire was a Great Spotted Woodpecker. The smaller birds were Greenfinches, and they were making furious dashes at the Woodpecker as he hung on to the trunk of a tree. The reason for their attack was obvious, as, when the Woodpecker had gone, I found a Greenfinch's nest, with the bird sitting on it, quite close to the spot. This was on May 27th.—A. H. MEIKLEJOHN (104, Gilda Brook Road, Eccles, Lancashire).

Economy of the Cuckoo.—Referring to the notes of Mr. Tuck (Zool. 1898, p. 477) on the economy of the Cuckoo (*Cuculus canorus*), it is not an exceptionally rare occurrence to find two eggs deposited in one nest in this district; but the Cuckoo scarcely or ever selects the nest of the Hedge-Sparrow. Roughly speaking, 80 per cent. are laid in the nest of the Titlark, 5 per cent. in that of the Whinchat, and the rest in nests of various species. My sons once brought me an egg which had been laid in the nest of a Ring-Ouzel. Whilst at Marley some time ago, with Mr. Carter, of Bradford, we found a Titlark's nest containing two Cuckoo's eggs, which were remarkable on account of the fact that both the Titlark's and Cuckoo's eggs deviated in a marked degree from the normal type, the former being scarcely distinguishable from the Pied Wagtail, with which, in colour and markings, the eggs of the Cuckoo very closely

assimilated. In the course of a recent conversation with a friend, he informed me that some time ago he shot at a Cuckoo, flying over a disused quarry, in the very act of singing, wounding it in its wing, thus rendering it unable to continue its flight, though otherwise apparently uninjured. To his astonishment, whilst killing it, an egg was deposited in his hand. If this statement be true—and I have no reason to dispute it, as I have in the past ever found his statements unimpeachable—then the position of those who assert that it is the male bird only that sings is untenable. I pointed out to him that perhaps after all the song might have proceeded from a male bird in the immediate neighbourhood. He, however, denied that he could possibly be mistaken under the circumstances. — E. P. BUTTERFIELD (Wilsden, near Bradford).

Cuckoo's Egg in Nest of Red-backed Shrike.—As I called attention to the extreme rarity of the Cuckoo's egg in the Shrike's nest (*ante*, p. 223), I ought to mention that on June 15th I had one brought to me in East Suffolk with three eggs of the Red-backed Shrike. A few days previously I saw a Nightingale's nest *in situ*, with three eggs of the foster-parent and one Cuckoo's egg, which, by the kindness of the owner of the property, I was allowed to acquire. A neighbour was recently watching a Hedge-Sparrow's nest which he thought might produce an egg of the Cuckoo, and visited it one day, when it contained four eggs of the owner; next day one of the eggs was gone, and a Cuckoo's egg was left in its place. This Cuckoo's egg, to my friend's utter astonishment, was well advanced in incubation, while the eggs of the foster-parent were almost fresh. Where and how had the incubation of the Cuckoo's egg taken place?—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Arrival of Spring Migrants in Yorkshire.—I herewith send a list of spring migrants, as observed by myself and son, with dates of first appearance for the current year:—

Wheatear, April 2nd	Wilsden.
Chiffchaff, April 3rd	Bingley.
Ring-Ouzel, April 6th	Wilsden.
Willow-Warbler, April 16th	Bingley.
Tree-Pipit, April 18th.....	Bingley.
Swallow, April 19th	Bingley.
House-Martin, April 19th (one), early	Bingley.
Cuckoo, April 20th	ShIPLEY.
Redstart, April 21st	Bingley.
Sand-Martin, April 21st (late) ...	Bingley.
Ray's Wagtail, April 23rd.....	Bingley.
Blackcap and Garden Warbler, April 30th.....	Cartmel, near Grange-over-Sands.
Whitethroat, Sedge Warbler, and *Corncrake, May 1st	Walney Island.

Whinchat, May 2nd	Morecambe Bay.
Wood-Wren, May 4th	Bingley.
*Reed-Warbler, May 8th	Keighley.
*Spotted and *Pied Flycatcher, May 8th	Bolton Wood.
Swift, May 10th	Barden Tower, Wharfedale.
Fieldfare, May 10th (last seen)...	Bingley.
Nightjar, May 18th.....	Goit Stock Valley, Bingley.

As to those species against which an asterisk is placed it cannot be taken as absolutely certain whether the dates of first appearance as observed by us were coincident with their arrival; but as to the remainder, the dates as specified we have every reason to believe indicate their actual arrival. Neither the Chiffchaff nor Stonechat breeds in this neighbourhood, or, if so, but rarely (although both occur occasionally on migration), which is a curious feature in their economy, especially when taken in connection with their habits as stated in most manuals on ornithology. We should be extremely obliged to any of your readers who would forward notes to supply material for the better working out of the distribution of these two species, stating particulars under the following heads, *viz.*:—Altitudinal range, whether well wooded, and, if so, what species of tree predominates, and whether of young or old growth; relative abundance or otherwise of allied species, such as Wheatear, Whinchat, Wood-Wren, and Willow-Warbler; or do they occur on migration only, as in this district, or breed? It may be said in passing that this district is well wooded, the trees chiefly oak, birch, and beech, the former predominating; it has an extensive altitudinal range (400–1300 ft.), most of which, over 1000 ft., consists of moorland.—E. P. BUTTERFIELD (Wilsden, near Bradford).

Songs of Birds affected by Temperature.—In the April number, Mr. H. S. Davenport takes me to task for my conclusions on this point. No doubt the sentence he quotes is too strongly expressed; in fact, a modifying word had slipped out of my type-written copy in that particular sentence. But the experience of years makes me feel sure that temperature as such does not seriously affect the singing of most birds. This morning, for example, in a very cold wind from W.N.W., there was far more singing going on in the osier-bed, where I watch the Marsh-Warbler, than there was in the warm weather of a fortnight ago. So, too, birds will sing in severe cold, if the air is clear, as it usually is in the hardest frosts. But they will cease singing in cold rain, in snow, or in depressing chilly fogs; this at least is my experience. A low temperature often invigorates the human frame, if not continued too long; and so long as the birds can find food and get some amount of sun, they seem brisk and lively, and will sing up to noon in great cold. In the later hours of a winter day I hardly ever hear any but the Robin and Wren. The following is one of many

entries in my diary on which I based my conclusion:—"Feb. 7th, 1895 (Oxford). Observatory thermometer went down to 9° last night; on ground, 0·3°. Birds singing: Chaffinch, Dunnoek, Robin, Wren, Great Tit, Blue Tit; Starlings very lively. Snow Buntings near Cumnor Hurst."—W. WARDE FOWLER (Kingham, Chipping Norton).

AVICULTURAL NOTES.

On Sexual Differences in the Superb Tanager (*Calliste fastuosa*).—In scientific descriptions of this bird we read, "Female similar to the male, but rather less brilliant in colour." Dr. Russ, in the second volume of his 'Fremdländischen Stubenvögel' (p. 444), says, "Das Weibchen soll übereinstimmend und nur matter gefärbt sein," which is the same statement over again; but then he proceeds to stultify his own remark by continuing, "Ich glaube jedoch, dass es nicht den gelben Unterrücken hat, den ich besass einst solchen Vogel, der bei kaum bemerkbar matteren Farben das lebhaftere Gelb garnicht und anstatt dessen einen fahlbräunlichschwarzen Unterrücken zeigte." His duller bird with brownish rump was probably an immature plumage, and he evidently guessed its sex from the fact that its colouring throughout was not perfected. In the spring of 1897 I purchased my first Superb Tanager, which in the late summer moulted into the most brilliantly coloured and most perfect example of the species that I have even seen. The damp cold weather of December, 1898, brought on a sort of weakness which I could only regard as a form of influenza, and this bird was one of the first of sixty victims which succumbed to the disease during December and January. When opened it proved, to my great surprise, to be a hen. In March, 1899, I purchased four examples of the species, and in April two more (all freshly imported); one of these died soon afterwards, being ragged and in poor condition; one died in good condition from apoplexy at the beginning of June, and a third a week later from inflammation of the vent. These last two were examined, and proved to be both cocks. The differences in the sexes are as follows:—The male, as with many Finches, has the crown broader, the base of the beak much broader, distinctly more triangular, when viewed from above, than the hen. In the latter sex, the beak being much narrowed, is more gradually tapered; viewed from the side, the culmen of the male beak is a little more arched. In colouring the sexes show distinctly different shades of colour; the male has the head and mantle of a distinctly more golden green than the female (this sex, though equally brilliant, is bluer than the male). The lower back and rump in the male are of a fiery orange colour; in the female the same parts are golden orange, distinctly yellower at the junction of the orange with the blue-black of the back. In selecting a pair for breeding in

an open-air aviary, I believe that if birds showing deep orange and golden orange were purchased they would prove to be sexes ; and I am certain that examples having the two distinctive forms of beak would prove to be so.—
A. G. BUTLER (Beckenham Road, Beckenham, Kent).

PISCES.

Gattoruginous Blenny in Essex.—With reference to Mr. Patterson's note (*ante*, p. 273) that his Great Yarmouth specimen of this little fish "is the first record of *B. gattorugine* occurring in East Anglian waters," I should like to record that I have one caught in the Essex Blackwater, off Stansgate, on Aug. 19th, 1898, by Sampson Wright. It is typical with Day's figure and description, and measures $5\frac{1}{2}$ in. long. I have it preserved in 4 per cent. formalin, and it looks as fresh as when I had it alive.—
EDWARD A. FITCH (Maldon, Essex).

NOTICES OF NEW BOOKS.

Proceedings of the Fourth International Congress of Zoology.
Cambridge, 22nd–27th August, 1898. C. J. Clay & Sons.

THE meeting of the fourth International Congress of Zoology in England was the most important scientific event in the zoological annals of last year. It is possible that the published proceedings of a Congress do not altogether represent the work achieved, for if in the multitude of counsellors there is wisdom, there is also the creative impulse that potentially exists wherever real workers and students are gathered together. It is thus frequently that the most important results of a Congress are not incorporated in published Proceedings. It still remains, however, that this volume is zoologically a most valuable one, and that perhaps not by the record of any new discovery, but by the detailed discussions on many knotty points. We may instance that on the position of Sponges in the animal kingdom opened by Prof. Yves Delage. Up to the end of the first half of the nineteenth century it was still an open question whether Sponges were plants or animals. In the discussion on the origin of mammals, Prof. Seeley inclined to a reptilian derivation. "The remains thus far discovered in Permian rocks show so near an approach of the higher reptiles to the lower mammals, that it is reasonable to believe that the interval between them is now so small that it may be obliterated by future discoveries." Prof. Osborn, of New York, referring to the Permian records and the temptation to connect the herbivorous section of Anomodonts with the Monotremes, considered the many striking points of resemblance between these reptiles and mammals as due to parallelism, similar characters having been independently acquired. Prof. Marsh—who is, alas! no longer with us—held to the opinion that in the amphibians, especially in the oldest forms, there are hints of a true relationship with both reptiles

and mammals. "It seems to me, therefore, that in some of the minute primitive forms, as old as the Devonian, if not still more ancient, we may yet find the key to the great mystery of the origin of mammals." Mr. Sedgwick pointed out the necessity of remembering the decided imperfection of the geological record, and the doubt as to whether we shall ever find the past evidences of early organic evolution. Prof. Hubrecht predicted that one great battlefield in the future of this controversy would be over the question whether mammals other than Monotremes had descended from oviparous ancestors. Such authoritative opinions more truly canonize a Congress than the ancient practice of formulating dogmas.

Prof. Haeckel's paper on "Our Present Knowledge of the Descent of Man" has already been noticed in these pages (*ante*, p. 82), and this referred more or less to the "Remarks upon the Brain-cast of *Pithecanthropus erectus*," by Dr. Eug. Dubois. It is, however, impossible here to give a digest of the various contents of the volume, which embraces "Recent Legislation on the Protection of Wild Birds in Great Britain," and so technical a subject as a long correspondence on the "Nomenclature of Lepidoptera." It is a publication which may indeed be called "advanced zoology," which sufficiently repays the long journeys made by some of the delegates to Cambridge; and, further, is a more than creditable testimony to the unusual secretarial energy which marked this Congress.

An Illustrated Manual of British Birds. By HOWARD SAUNDERS, F.L.S., F.Z.S., &c. Second edition, revised. Gurney & Jackson.

THE second edition of this indispensable vade-mecum will be hailed with delight by all who take an interest in British birds. The number of books published on this subject cannot be considered few, but many are sketchy, some of an anecdotal character, others containing unverified records, or not including occasional visitors. None of these remarks can be alleged against a volume that gives the experience of a life-long attachment to ornithology, combined with the critical faculty of sifting evidence. This

of course can be sifted too finely sometimes, but perhaps a large mesh seems the best net for enclosing ornithological narratives.

The first edition was completed in November, 1889, and then enumerated 367 species considered as British. In this edition the total is raised to 384, and some of the new additions will be familiar to the readers of this magazine. Of the 384 species described, "those which have bred within the United Kingdom during the present century may be taken as 199 (if the extinct Great Auk is included); about 74 non-breeding wanderers have occurred fewer than six times, and 66 others are more or less infrequent visitors; while 45 species annually make their appearance on migration or during the colder months, in some portion of our long narrow group of islands or upon the surrounding waters." A too insular standpoint for studying our British avine fauna is negated by the inclusion of three coloured maps. The first and second are bathy-orographical of the British Isles and Europe respectively, showing the comparative elevation of the land in the United Kingdom, and the depth of the surrounding seas; the third is a North Polar Chart to facilitate the enquiry into the range of the birds which breed in the Arctic regions.

We need say nothing further of a book of which a first edition of three thousand copies was exhausted in eight years. Apart from the ornithological bookshelf, it is a volume that should also be in every school and village library in these islands.



Bird-life in a Southern County, being Eight Years' Gleanings among the Birds of Devonshire. By CHARLES DIXON.
Walter Scott, Limited.

WE seem to hear too little now of the natural history of such a glorious county as Devonshire, and certainly so in the pages of the 'Zoologist.' For years it was the home of Montagu. It is, as Mr. Dixon remarks, rich in species so far as sedentary birds are concerned. "But the same can scarcely be said of migratory species, the county being very unfavourably situated for them. Indeed, next to Cornwall, I should feel inclined to class Devonshire as the poorest littoral county in England for normal migratory birds, lying, as it does, too far to the south-west." But, as

we all know, "so far as abnormal migrants are concerned, Devonshire can compare favourably with any other county."

This book is not a monograph of the birds of Devonshire, it does not describe the contents of cabinet drawers, but details the observations of a field ornithologist; it is an avian handbook for the county, and, as such, should be procured and read. We are glad to find that the Peregrine Falcon is still indigenous to Devonshire. "Notwithstanding almost ceaseless persecution, the bird somehow manages to hold its ground, and eyries are situated here and there along the coast." Mr. Dixon is very optimistic as to the little destructive effect on some main features of our avian fauna made by the construction of railway lines. He instances the many birds to be seen close to the line as the train rushes through Devonshire, an observation we have made ourselves both in that county and abroad. He concludes: "there can be little doubt that railways would never have exterminated the Great Bustard from the open wolds and plains, and its absence must be ascribed to far more direct causes." Alas! for two of our old Devonshire friends, the Chough and the Jackdaw. The first is not now known by the author to have any breeding station on the south coast, and "whether the species will ever again recover itself in the county seems doubtful." The decrease of the Jackdaw may possibly be attributed to the numbers shot by the owners of Pigeons, which are attacked by the Daws.

The volume is full of interesting ornithological facts and observations; but how can either author or publisher imagine that such a publication unprovided with an index can ever serve a referential purpose?

Sport in East Central Africa, being an Account of Hunting Trips in Portuguese and other Districts of East Central Africa.
By F. VAUGHAN KIRBY. Rowland Ward, Limited.

MR. VAUGHAN KIRBY is well known as an experienced and successful hunter of South African animals, and, although the sportsman appears in the pages of the above work in rather an inverse ratio to that of the naturalist, we still obtain much of that zoological information which can only be procured by those who have the health, inclination, and opportunity to wander, rifle

in hand, in quest of wild beasts in a wild country. To the zoological reader the crack of the rifle and the details of the death of the victim are perhaps rather too much in evidence; we would rather have more particulars of the animal's life than description of the method of his quitting it. However, all learning is by much travail, zoology not being an exception to the rule; and the careful reader will find very many natural history records not obtainable elsewhere, many corroborations of traditional statements, and some corrections of hearsay information. Thus we read of the Crocodiles as found near Chinde:—"They may often be seen lying fast asleep on the sand-banks with their jaws open; and the disputed fact can be verified by any observer with a pair of field-glasses, that the Spur-winged Plovers not only warn the Crocodiles of the approach of danger by their plaintive cries, but act as tooth-picks for the saurians, picking out what are evidently considered dainty bits from between the great teeth."

An Appendix of Zoological Field Notes concludes the volume. Mr. Kirby is as a rule unable to detect any difference between the Lion of Central and that of South Africa, though he thinks "male Lions with dark skins (dark grey or brown shaded) and full black or blackish brown manes occur less frequently north than south of the Zambesi." Seasonal colouration appears to obtain in the Eland (*Taurotragus oryx*). "The colour of Elands in Central Africa varies much in individuals, especially in the winter time, when many shades of yellow, dun, and tawny may be observed, as well as darker shades inclining to deep slate-colour amongst the old bulls. During the rains, when their hides are sleeker, a tawny dun predominates among the cows and young animals, while the bulls become darker." This is a book in which much interesting information will be never used, as it lacks an index.

EDITORIAL GLEANINGS.

THE Presidential Address to the Yorkshire Naturalists' Union by Sir Michael Foster, Secretary of the Royal Society, &c., is a very important and welcome deliverance in the cabal of modern biological scholasticism. The Tower of Babel finds its equivalent in the current methods of building the city of Natural Knowledge, and raising the "tower of Science." Amidst the plethora of much scientific jargon, Sir Michael well remarks, "the old example of the plain of Shinar bids every thoughtful man to ask himself the question, Is not this confusion of languages hindering and spoiling the work, even if it will not, as it did of old, stop it altogether?" We have specialized ourselves to the point of ignorance. Take the Royal Society and its purview of ascertainable knowledge. Our authority cites as an example the papers read before a single meeting, that of June 16th, 1897. He observes:—"I make bold to say that neither the President of the Society, nor any other of the officers, nor any one of the Fellows, could of his own knowledge state what was the exact meaning of each of all those titles. If you asked such a one to do it, he would tell you that he did not understand the speech of most of them. . . . The tower has risen to a considerable height since the Royal Society was founded, and its Fellows are no longer able to understand one another's speech." We wish we could print the whole of this address; no extracts do it justice. "There is a good old word 'Naturalist,' which, though it originally had to do with the nature of all things which exist, has in course of time been narrowed to the things which are alive. In this sense the naturalist was a man who busied himself with 'Nature' as manifested in living creatures, who sought to solve all the problems which life presents. Form, structure, function, habits, history, all and each of these supplied him with facts from which he wrested his conclusions. Observation was his chief tool, and the field his main workshop. To him invidious distinctions between different parts of biologic learning were unknown. He had not learnt to exalt either form or structure or function to the neglect of the rest. Everything he could learn came to him as a help towards answering the questions which pressed on him for an answer. A naturalist of this kind, however—a whole-minded inquirer into the nature of living beings—is for the most part a thing of the past. He has well-nigh disappeared through the process of differentiation of which I have spoken."

AT the Annual Meeting, on the 25th of June, of the Société Nationale d'Acclimatation de France, M. le Myre de Vilers, President, in the chair, the large silver medal of the Society, bearing the portrait of Geoffroy Saint-Hilaire, was decreed to Miss Eleanor A. Ormerod, of St. Albans, England, for her work in Economic, or Applied, Entomology. Miss Ormerod will be heartily congratulated by her numerous agricultural and other friends on the receipt of this distinguished mark of appreciation of her disinterested labours.

WE read in 'The Shooting Times and British Sportsman' that at the end of May the Tyneside Naturalists' Field Club held their first meeting at Beal, and inspected, with the permission of Mr. C. J. Leyland, of Haggerston Castle, the large collection of animals and birds which he has collected from all parts of the world. Perhaps the most important feature of Mr. Leyland's collection is the herd of American Bison. In this connection the owner of Haggerston Castle is conducting the experiment of attempting to perpetuate, by breeding from animals kept in confinement, the American Buffalo, which is rapidly disappearing from the North American prairies. The herd exceeds thirty in number, and the results so far attained promise that the experiment will be attended with a fair measure of success. Mr. Leyland, who began his Bison experiment on a small scale about eight or nine years ago, has added considerably to his herd, and there are several additions as the result of cross-breeding with Highland Cows. The little humped cattle of India and Afghanistan form another interesting feature of the collection, as well as the Gnus, Antelopes, and Deer, not omitting the Wapiti, or North American Deer, besides the Kangaroos and Ostriches. An inspection was next made of a number of Nyghaus, a species of Antelope from the Neilgherry Hills, several of which have been bred on the Haggerston estate. The Indian cattle also were a fairly numerous company. Among birds were Crowned Cranes from Africa, Screamers from South America, Emus, Ostriches, and Black Swans from Australia. An Ostrich was disturbed sitting on nine huge eggs, and beat what some of the company termed a "cowardly" retreat, leaving the eggs exposed.

IN these pages (*ante*, p. 41) we referred to a paper on "White Cattle: an Inquiry into their Origin and History," in which the conclusion was reached that these White Cattle "are simply the descendants of Roman cattle imported into the country during the Roman occupation." We have just received the Annual Report and Transactions of the North Staffordshire Field Club for 1898-99, which contain an illustrated paper by Prof.

Boyd Dawkins on "The Chartley White Cattle." The Professor's opinion as to the origin of these cattle is not in unison with the writer of the previously mentioned memoir, who discarded the conclusions of Rütimeyer, and accepted those of Prof. McKenny Hughes. Prof. Dawkins considers that the breed of these large White Cattle was "domesticated on the Continent, as Rütimeyer has shown, in the Neolithic age, and occurs in the refuse-heaps accumulated round the pile-dwellings in Switzerland. It is descended from the great wild Urus, which abounded in the forests of the Continent in pre-historic times, and lingered in Europe as far down as the time of Charles the Great. It has nothing to do with the large fawn-coloured cattle of Italy, as suggested by Prof. McKenna Hughes. These are derived from the east, and probably from Egypt. This larger breed spread over the Continent of Europe through the Pre-historic and Early Historic period, and became defined from all others by its white colour and red or black ears, not merely in the British Isles, but also in Spain."

The ultimate conclusions are:—

"1. That the beautiful Chartley breed was originally introduced into this country along with the closely allied breeds of Chillingham and other places, in a domesticated condition, from the Continent, where they had been carefully selected by man during long ages.

"2. That they were introduced about the time of the English or Danish conquests.

"3. And, lastly, that the shyness and wildness of the breed is due to the fact of their never having been confined in small enclosures, where they would come into close contact with man."

THE Linnean Society's Journal—Zoology—contains a paper, read last December, by Mr. H. J. Elwes, "On the Zoology and Botany of the Altai Mountains," the results of a journey made in that region last summer. Mr. Elwes remarks that the Altai Mountains are almost unknown to English naturalists, and practically less known to naturalists as a whole than many parts of Central Africa. So far as he was aware, "the only travellers who have written on the natural history of the country are Pallas, whose great work is well known, though now rather out of date; Ledebour and Bunge, who sixty years ago compiled an excellent account of the botany of the Altai; Helmersen, who has described the geology of the country; and Tchihatcheff, a well-known Russian traveller, who published an account of his travels, in French, in 1852."

As regards the Mammalia, we learn that the Ibex of the Altai (*Capra sibirica*, Pallas), the head and horns of which were exhibited, is nearly allied to the Himalayan Ibex, and is common in some parts of the moun-

tains, though very difficult to get at in summer. The Elk was formerly more numerous in the northern districts, but has now become extremely rare; and the single head which Mr. Elwes brought back resembles those which he had seen from European Russia, differing somewhat in the set of the horns from the Elk of Norway. The Roe (*Capreolus pygargus*, Pallas) is very common in some parts of the Altai and Sayansk Mountains, and is a very much larger and finer animal than the European Roe. The wide spread of the horns is not a peculiarity of this species, as it would appear from the nine heads which were exhibited—six from the Upper Yenesei Valley and three from the Altai—that this peculiarity is by no means constant, and that there is nothing but their size to distinguish them from the European race. The Musk-Deer is also very abundant near the upper limit of forest growth, and is snared in quantities by the natives. As many as two hundred skins were seen in one merchant's store. Reindeer are said by Radde to occur in some parts of the Eastern Sayansk range, where they are also kept in a domesticated state; but, so far as could be ascertained, they do not exist in any part of the Altai.

Birds were not so numerous as expected, although Cranes and Ducks were plentiful in the marshes of the Kurai and Tchuja Steppes. Mr. Elwes was astonished to find a Scoter breeding here, which proves to be the species described as *Oidemia stejnegeri*, and which is an inhabitant of the N.W. American coast and North Pacific. It has never been hitherto procured, as he was informed by M. Alpheraky (who is at present engaged on a monograph of the *Anatidæ* of the Russian Empire), farther west than the Upper Amur.

Game-birds were very scarce, though Capercaillie, Ptarmigan, and Quail were observed; and in the highest and barest parts of the mountains the magnificent *Tetragallus altaicus* was not uncommon, though very hard to approach.

The fauna and flora are materially influenced by the very peculiar climate of the Altai, which has great extremes of heat and cold, and is subject to heavy thunderstorms, which fall as snow and hail in the higher regions, almost daily throughout the summer. During the whole of the two months the party were in the mountains they only had seven or eight days quite free from rain or snow. These heavy storms seem mostly to come from the eastward, and from the high mountains at the source of the Kemchik River, which is the westernmost tributary of the Yenesei. To show what sort of climate it is, it was mentioned that there were large beds of unmelted snow close to the camp, at about 7000 ft., all through July.

LAST year the Hon. Cecil Rhodes had five hundred young Rooks sent out to South Africa in order to establish a colony in his country place, and

the experiment has been so successful that a similar lot has been sent this spring, the last consignment leaving by the 'Dunvegan Castle' on June 10th.

WITHOUT expressing any opinion on the subject of vivisection, in connection with the death of Mr. Lawson Tait, the well-known surgeon of the Midlands, it is interesting to recall some words written by him in a letter addressed to the 'Medical Press and Circular':—"Some day I shall have a tombstone put over me, and an inscription upon it. I want only one thing recorded on it, and that to the effect that *he laboured to divert his profession from the blundering which has resulted from the performance of experiments on the sub-human groups of animal life, in the hope that they would shed light on the aberrant physiology of the human groups.*"

At the meeting of the Zoological Society, on June 20th, Dr. Woods Hutchinson read a paper on Zoological Distribution of Tuberculosis from Observations made mainly in the Society's Gardens. Of 215 autopsies made in the Prosector's Room during the past six months, forty-nine presented the lesions of tuberculosis, *i. e.* 25.3 per cent. of the mammals and birds. This mortality fell most heavily upon the Ruminants and *Gallinæ*, and least so upon the Carnivores and Raptores. Race or family appeared to exert little influence upon susceptibility, mode of housing only a small amount, and food and food-habits much more. A close correspondence appeared to exist between immunity and the relative size of the heart in both birds and mammals.

It is estimated that the loss to farmers from the "warbled" condition of the hides of their cattle by the well-known Ox Warble Fly, or Bot Fly (*Hypoderma bovis*), averages £16,000 for every 100,000 hides. Mr. Child, the Managing Secretary of the Leeds and District Hide, Skin, and Tallow Co., Ltd., we are informed, calculates that on 30,000 hides that passed their hands in one year, the net loss to the farmers was no less than £1500 from this cause alone.

WE greatly regret to announce the death, on the 1st inst., of Sir William Henry Flower, President of the Zoological Society, and late Director of the Natural History Department of the British Museum. An obituary notice by Dr. P. L. Sclater will appear in our next issue.





SIR WILLIAM HENRY FLOWER, K.C.B., F.R.S.

THE ZOOLOGIST

No. 698.—August, 1899.

THE LATE SIR WILLIAM HENRY FLOWER,
K.C.B., F.R.S.

(PLATE II.)

OUR Science of Zoology has suffered a most severe loss by the death, at his residence, 26, Stanhope Gardens, on the 1st of July last, of Sir William Flower, until lately Director of the Natural History Departments of the British Museum, and for the last twenty years President of the Zoological Society of London.

Sir William had been, as is well known, in failing health for the past two years, and was compelled in 1898, under medical advice, to resign his important office at South Kensington. He passed the last winter with his family at San Remo, where it was hoped that perfect rest in a favourable climate might tend to restore him. But this was not to be the case, and he came back to England in May last with but little prospect of an ultimate recovery, as was painfully evident to the few friends who saw him after his return.

William Henry Flower, the son of Mr. Edward F. Flower, and member of a well-known family at Stratford-on-Avon, was born on Nov. 30th, 1831, and was educated for the medical profession at University College, London. When the Crimean War took place he entered the army as Assistant Surgeon, and served in the hospitals throughout the campaign, receiving the Crimean Medal with four clasps, as well as that given by the Turkish Government. On his return to this country young Flower, who

had always shown a strong inclination for natural history and scientific work, and had become a Fellow of the Zoological Society of London in 1851, was appointed Assistant Surgeon and Demonstrator of Anatomy at Middlesex Hospital. He soon became a regular attendant at the scientific meetings of the Zoological Society, and in June, 1860, read an excellent paper on the structure of the gizzard in the Nicobar Pigeon and other granivorous birds. Flower's thorough and accurate style of investigation soon attracted attention, and led to his appointment, in 1861, as Conservator of the Museum of the Royal College of Surgeons. Here for twenty-three years he did excellent work in arranging and cataloguing the specimens, and in making large additions to the magnificent series of anatomical preparations belonging to that institution. Throughout this period Flower was also a frequent contributor to the publications of the Zoological Society, as will be seen by his numerous papers published in their 'Proceedings' and 'Transactions.' The difficult group of Cetaceans was one of Flower's favourite subjects, and six well-illustrated memoirs upon various members of this group in the Zoological Society's quarto 'Transactions' were the results of his labours. In 1869 Flower was chosen Hunterian Professor of Comparative Anatomy, and in 1870 published an important volume of introductory lectures. In the same year was also issued his 'Introduction to the Osteology of Mammals,' which went through two subsequent editions. During this period of his career his Catalogue of the specimens illustrating the Osteology and Dentition of Man and Mammals was prepared, besides numerous other papers and memoirs.

On the retirement of Professor Owen in 1884, Flower was appointed Director of the Natural History Museum at South Kensington, and during the fourteen years for which he held that post continued to exhibit the same admirable qualities in the discharge of his official duties which had signalized his career in Lincoln's Inn Fields. Every branch of the Institution under his government was carefully tended and improved, and the deficiencies existing in various parts of that vast establishment were one after another searched out and remedied. During this period the Director's time was, as might well be supposed, much taken up by his official duties; notwithstanding this, however, as

will be seen by reference to the Zoological Society's publications, constant communications were made to that Society (of which he had become President in 1879, on the death of the late Marquess of Tweeddale) on various zoological subjects to which he had devoted attention. Until this last two years, in fact, when failing health kept him at home, Flower was most constant in his attendance at all the meetings of the Society, both those for scientific purposes and those for ordinary business, and always manifested the greatest interest in every branch of the Society's affairs.

Flower was elected a Fellow of the Royal Society at the early age of thirty-three, and received one of its Royal Medals in 1882. In 1878 he was President of the Biological Section of the British Association, and in 1881 Chairman of the Department of Anthropology. In 1889 he became President of the whole Association for the meeting at Newcastle-upon-Tyne, and delivered the excellent address on Museums and their construction and management which was published in the Report of the Association for that year. From 1883 to 1885 Flower was also President of the Anthropological Institute. He was nominated President of the International Zoological Congress which met at Cambridge last year, but failing health compelled him at the last moment to transfer this office to Sir John Lubbock. He had likewise received honorary degrees from Oxford, Cambridge, and other Universities, and was a corresponding member of the Institute of France. He received the honour of the Commandership of the Bath in 1887, and was made K.C.B. in 1892. Finally, we may truly say that in private life no one was ever more deservedly esteemed and beloved than the late Sir William Flower. Most kind and affable to all classes, he was friends alike with all—high and low, rich and poor. No one ever heard him utter a rough word; no one met with otherwise than a most courteous reception when a question was to be asked or his advice was sought. During a very long and intimate acquaintance with the late Sir William Flower, the writer of this article never heard him utter an unkind expression towards anyone, or knew him swerve in the slightest degree from the most inflexible rectitude of purpose.

The published works and memoirs of the late Sir William

Flower are very numerous, but of these we may select his admirable 'Introduction to the Study of Mammals' (in which he was assisted by Mr. Lydekker) as being perhaps the most useful and generally known of any of them.

We add the titles of fifteen others of his more important publications.

P. L. S.

1. Introductory Lectures to the Course of Comparative Anatomy, delivered at the Royal College of Surgeons of England, 1870. 8vo, London, 1870.

2. An Introduction to the Osteology of the Mammalia. 8vo, 1870.

——— 2nd ed., 1876.

——— 3rd ed. Revised with the assistance of Hans Gadow. 8vo, 1885.

3. Catalogue of the Specimens illustrating the Osteology and Dentition of Vertebrated Animals, Recent and Extinct. Part I. Man; Part II. Mammalia. 8vo, London, 1879-84.

4. Fashion in Deformity (Nature Series). 8vo, London, 1881.

5. List of the Specimens of Cetacea in the Zoological Department of the British Museum. 8vo, London, 1885.

6. Recent Memoirs on the Cetacea by Professors Eschricht, Reinhardt, and Lilljeborg. Edited by W. H. Flower. (Ray Society.) Folio, London, 1866.

7. The Horse: a Study in Natural History. 8vo, London, 1891.

8. Essays on Museums, and other subjects connected with Natural History. 8vo, London, 1898.

9. Description of the Skeleton of *Inia geoffrensis*, and of the Skull of *Pontoporia blainvillii*, with Remarks on the Systematic Position of these Animals in the Order Cetacea. Trans. Zool. Soc. vi. p. 87. (1866.)

10. On the Osteology of the Cachalot, or Sperm-Whale (*Physeter macrocephalus*). Ibid. vi. p. 309. (1868.)

11. Description of the Skeleton of the Chinese White Dolphin (*Delphinus sinensis*, Osbeck). Ibid. vii. p. 151. (1870.)

12. On Risso's Dolphin, *Grampus griseus* (Cuv.). Ibid. viii. p. 1. (1872.)

13. On the Recent Ziphioid Whales, with a description of the Skeleton of *Berardius arnouxi*. Ibid. viii. p. 203. (1872.)

14. A further Contribution to the Knowledge of the existing Ziphioid Whales: genus *Mesoplodon*. Ibid. x. p. 415. (1878.)

15. On the External Characters of two Species of British Dolphins (*Delphinus delphis*, Linn., and *D. tursio*, Fabr.). Ibid. xi. p. 1. (1880.)

BIOLOGICAL SUGGESTIONS.

MIMICRY.

BY W. L. DISTANT.

(Continued from p. 315.)

In all reflections on the wonderful adaptations in nature by which living creatures obtain a protection from their enemies by assimilative colour or structure, we must remember that in the struggle for existence fecundity plays no small part in producing survival. As De Quincey spoke of man in China as being but a weed, so throughout nature we often find excessive reproduction alone preventing extermination, and quite replacing the aid of protective or mimetic disguise in the "survival of the fittest." It is no longer the protection of the few, but the superfluous number of the attacked that militates against annihilation. As Mr. Harting has observed:—"The enormous rate of increase in fish, as compared with the rate of increase in their natural enemies, will always result in there being enough to spare for man and Otter—ay, for Kingfisher and Heron too."* Weismann recognizes the same truth in the remark:—"No better arrangement for the maintenance of the species under such circumstances can be imagined than that supplied by diminishing the duration of life, and simultaneously increasing the rapidity of reproduction." † Take the Orthoptera as found on the Transvaal veld—where most of these pages were written—which not only during the summer season literally supply the almost sole avian banquet, but are doubtless the prey of other enemies as well; and, although the usual colouration of these insects is more or less approximate to the short grasses among which they live, no apparent protection is afforded thereby, and their great reproductive powers seem their only protection against extinction. The American Lobster is another case in point. Mr. F. H. Herrick, of the United States Fish Commission, who suggests that its habits are the same as that of the European representative, states that out of the 10,000 eggs produced at one time, not more than two arrive at maturity, and that even that estimate is probably too high, as the fisheries are

* 'Zoologist,' 3rd ser. vol. xviii. pp. 44-5

† 'Lectures on Heredity,' &c. Eng. Transl. 2nd edit. vol. i. p. 17

now declining.* This diminution may well take place, for, according to Prof. Henry Woodward, of the common species *Homarus vulgaris*, as many as 25,000 live specimens "are often delivered at Billingsgate in one day. If only as many are eaten in the whole of England as in London, this would be at the rate of 50,000 per day, or 18,250,000 annually. . . . From Norway as many as 600,000 are received annually."† Marine animals commonly produce far more eggs than insects. The dangers of the shallow seas are so great that a small proportion only of the young animals come to maturity. Hence the enormous fertility of common marine animals, except such as are able to nourish or defend their young. Vast numbers of Zoœa are swept into mid-ocean or into tidal rivers, or are devoured. It is only a chance remnant that survives.‡ Prof. Möbius says that out of a million oyster embryos only one individual grows up, a mortality due to untoward currents and surroundings, as well as to hungry mouths.§ Leuckart calculates that a tapeworm embryo has only about one chance in 83,000,000 of becoming a tapeworm.||

The fecundity of fish is shown by the following table of the number of ova in different species, as found by Frank Buckland's observations:—

Name of Fish.	Weight of Fish.		No. of Eggs.
	lb.	oz.	
Salmon. (The average number of eggs in a Salmon is 850 to each pound weight) ..	12	0	10,000
Trout	1	0	1,008¶
Carp	14	8	633,350
Perch	3	2	155,620
„	0	8	20,592**

* 'Zoologischer Anzeiger,' xvii. no. 454; summarized in 'Nature,' vol. L. p. 553.

† 'Cassell's Nat. Hist.' vol. vi. p. 205; also *cf.* W. B. Lord, 'Crab, Shrimp, and Lobster Lore,' p. 95.—According to Bertram, 'As a general rule, the great bulk of Lobsters are not much more than half the size they used to be' ('The Harvest of the Sea,' p. 274).

‡ L. C. Miall, 'Nature,' vol. liii. p. 154.

§ *Cf.* Thomson, 'The Study of Animal Life,' 2nd edit. p. 43.

|| *Ibid.* p. 48.

¶ "There is not a living creature," said Mr. Francis Francis, "which inhabits the waters which does not prey more or less on Trout ova" ("The Trout" (Fur, Feather, and Fin Series), p. 171.

** The number of eggs produced by this fish has been given as much greater by more recent writers. "Upwards of two hundred and eighty

Name of Fish.	Weight of Fish.		No. of Eggs.
	lb.	oz.	
Jack	28	0	292,320
„	32	0	595,200
„	4	8	42,840
Roach	0	12	480,480
Conger Eel	28	0	15,191,040
Smelt	0	2	36,652
Lump Fish	2	0	116,640*

The Codfish (*Gadus morrhua*) is a good example of survival through fecundity. In a specimen weighing thirty pounds, with a roe of only four pounds and a quarter, it has been calculated that there were as many as 7,000,000 eggs, and in some cases the number may be 9,000,000.† Here, besides other natural enemies, man again is a great destroyer. Describing the Cod-fishing off the coast of Labrador during the time of his visit (1833), Audubon writes:—"As there may not be less than one hundred schooners or 'pickaxes' in the harbour, three hundred boats resort to the bank each day; and, as each boat may procure two thousand Cods per diem, when Saturday night comes about six hundred thousand fishes have been brought to the harbour."‡ According to Prof. Seeley:—"The banks of Newfoundland and adjacent coasts have been fished since the year 1500. Here one man may take upwards of five hundred fish in a day, and in a year he is reckoned to capture ten thousand, though sometimes fifteen thousand may be caught in a single voyage."§ As regards the wholesale destruction of the spawn of this fish, a single instance will suffice. In one bird colony alone on the wild coast of Norsk Finmarksen—that of Svaerholt-Klubben—are "millions upon millions" of the small Gull (*Rissa tridactyla*). The food of these multitudes of birds during the summer months consists for thousand have been taken from a fish of half a pound in weight" ('Royal Nat. Hist.' vol. v. p. 336).

* 'Life of Frank Buckland,' by G. C. Bompas, 2nd edit. p. 252. — "A Turbot of 8 lb. carries 300,000 eggs; a Sole of 1 lb. 130,000 eggs" (*Ibid.* p. 263).

† It has been suggested that the greatest loss to the succeeding generation takes place at the very earliest stage of the egg, in that a large proportion of the ripe eggs discharged in the water are not fertilized by the spermatozoa, and hence perish (McIntosh and Masterman, 'The Life-Hist. Brit. Marine Food Fishes,' p. 236).

‡ 'Audubon and his Journals,' vol. ii. p. 422.

§ 'Cassell's Nat. Hist.' vol. v. p. 59.

the most part of fish-spawn, more particularly that of the Codfish, which is abundant in these northern waters.* The annual take of Herring is prodigious. It has been computed that a million of barrels, representing 800,000,000 fish, are taken in Scotland; the Norwegian Herring fishery is as productive as the Scotch fishery; the English, the Irish, the French, and the Dutch fisheries are also very productive. Estimating the gross produce of these four fisheries at only the same amount as the Scotch fishery, 2,400,000,000 Herring must be annually taken by these four nations—the British, the French, the Dutch, and the Norwegian. Yet the destruction of Herring by man is probably insignificant compared with that wrought by other natural agencies. Mr. James Wilson, in his ‘Tour round Scotland and the Isles,’ vol. ii. p. 106, says, when describing St. Kilda:—“Let us suppose that there are 200,000 Solan-Geese in the colony of St. Kilda (we believe, from what we saw, the computation moderate), feeding there or thereabouts for seven months in the year. Let us also suppose that each devours (by itself or young) only five Herrings a day—this amounts to one million; seven months (March to September) contain 214 days, by which, if we multiply the above, the product is 214,000,000 of fish for the summer sustenance of a single species near the island of St. Kilda.”† Cod and Ling, of which three and half millions were taken in Scotland in 1876, feed largely on Herring, six or seven being often found in the stomach of a Cod. These, it is thought, may consume twelve times as many Herring as the four nations together. Gannets, of which 10,000 dwell on Ailsa Craig, must catch more Herring than all the fishermen of Scotland; Whales, Porpoises, Seals, Codfish, Dogfish, predaceous fish of every

* G. Lindesay, ‘Fortnightly Review,’ November, 1894.—Codfish are also infested with parasitic Copepoda. According to Surgeon Bassett-Smith, it is rare to find a fairly grown Cod without being able to take many specimens of the small semitranslucent *Anchorella uncinata* attached to the folds about the lips and in the gill-cavity. In its mouth and on the palate will be seen frequently half a dozen specimens of *Caligus curtus*; on the gills, deeply embedded, a *Lerneæ branchialis*, and on the body sore places where a number of *Caligus mülleri* have been fixed. And, although this investigator considers that in the great majority of cases these parasites are not prejudicial to the life of the fish, he describes *Lerneæ branchialis* as a certain exception to the harmless rule (Ann. & Mag. Nat. Hist. 6th ser. vol. xviii. pp. 9 and 10.

† Cf. J. M. Mitchell, ‘The Herring, its Nat. Hist. and National Importance,’ p. 37.

description, are constantly feeding on them from the moment of their birth. The shoals of Herring in the ocean are always accompanied by flocks of Gulls and other sea-birds, which are continuously preying upon them, and it seems therefore no exaggeration to conclude that man does not destroy one Herring for every fifty destroyed by other enemies. The destructive power of man therefore is insignificant when it is compared with the destructive agencies which nature has created; and nothing that man has done, or is likely to do, has produced, or will probably produce, any appreciable effect on the number of Herring in the open sea.* In 1781 the town of Gottenburg alone exported 136,649 barrels, each containing 1200 Herrings, making a total of about 164,000,000; but so rapid was the exhaustion of the fish from this keen pursuit, that in 1799 it was found necessary to prohibit the exportation of them altogether.† This is a conclusion somewhat opposed to the opinion of Frank Buckland, as related above; but our aim here is only to show what multifarious dangers the Herring survives.‡

The Salmon deposits nearly a thousand eggs for every pound of its live weight. But nature is prolific in her waste, and a whole army of her poachers have to be satisfied. "So true is this, that the yearly yield of the largest Salmon-producing river in the kingdom is computed at about the produce of *one female fish* of from fifteen pounds to twenty pounds in weight."§ Mr. J. W. Willis Bund, the Chairman of the Severn Fishery Board, estimates that of Salmon eggs only 10 per cent., or 100,000 per million, hatch out. "Nothing Trout like better than Salmon ova; Eels regard it as a delicacy; while Water-hens, Water-Ouzels, Crows, and other birds, as soon as any part of the bed of the stream is either uncovered, or has only a few inches of water in it, go over it again and again, picking out the tit-bits the ova are to them."|| As to the mortality at the subsequent stages, estimating the number of ova hatched as 1,000,000 out of

* 'Life of Frank Buckland,' by G. C. Bompas, 2nd edit. pp. 313-14.

† 'Das Leben des Meeres,' p. 182. — Cf. Marsh, 'Man and Nature,' p. 120, *note*.

‡ The excessive spermatozoa of the Herring sometimes whitens the water for scores of square miles (Matthias Dunn, 'Contemp. Rev.' lxxvi. p. 200).

§ Thomas Watson, 'Poachers and Poaching,' p. 165.

|| 'The Life of a Severn Salmon,' p. 7.

10,000,000 in the Severn, it is estimated that between 50 and 75 per cent. of the Alevins pass into the Fry stage, thus bringing the quantity to about 700,000. "In the Fry and Samlet stage the mortality increases to what degree is mere guess, as there is little, if any, evidence; but the mortality must be 50 per cent., so that there would be 350,000 Smolts. Among the Smolts there is also a very high rate of mortality, say, at least 75 per cent., so that the fish that reach the Grilse stage would be something like 40,000 out of 10,000,000 ova, or 4000 per million, about 4 per cent."* In Kamschatka the Salmon have probably fewer enemies, as the rivers literally swarm with them; and Guillemard refers to one "little village" where, during the season, "20,000 fish would be no uncommon catch for a single day."† The same author describes his impressions when standing on the banks of a little branch of the Avatcha River, not more than eighteen inches deep. "Hundreds were in sight, absolutely touching one another, and, as we crossed the river, our horses nearly stepped upon them. Their back-fins were visible as far as we could see the stream, and aground and gasping in the shallows, and lying dead or dying upon the banks, were hundreds more. . . . The millions of fish that are caught, and form the food throughout the year of almost every living creature in the country, are, however, as nothing compared with the countless myriads that perish naturally."‡ Krashenniker, writing more than one hundred years ago, says:—"The fish come from the sea in such numbers that they stop the course of the rivers, and cause them to overflow the banks, and when the waters fall there remains a surprising quantity of dead fish upon the shore, which produces an intolerable stink." Guillemard considers that the vast majority—practically all, in fact—ascend the streams to spawn, and, having once done so, die. In the case of some species every fish appears to perish; in others a few get back to the sea.§ Besides other enemies, when Salmon are abundant and lie close a dreaded disease makes its appearance. This shows as a white fungus about the head and shoulders, and gradually spreads until the fish sickens and dies.|| The female

* 'The Life of a Severn Salmon,' p. 11.

† 'Cruise of the Marchesa,' 2nd edit. p. 68.

‡ *Ibid.* p. 73.

§ *Ibid.* p. 92.

|| John Watson, 'Sketches of British Sporting Fishes,' pp. 3-4.

Sturgeon (*Acipenseridæ*) deposits enormous numbers of extremely minute eggs, the product of a single individual having been estimated at upwards of three millions during a season. This fecundity is necessary to preserve the species, when, apart from other enemies, we read that upwards of fifteen thousand have been taken by fishermen in a single day at one of the fishing stations on the Russian rivers.* Many other instances of great fecundity among fishes might be given, but at least reference may be made to the testimony of Mr. Henry Lee, that a large Octopus produces in one laying, usually extending over three days, a progeny of from 40,000 to 50,000; and the same authority, confirming the observations of Johann Bodasch, found that in the mop-like mass of spawn belonging to a Squid (*Loligo vulgaris*) there were probably 42,000 perfect young Squids.†

Among mammals, the Rat is very prolific. Frank Buckland was told by a trustworthy Westminster ratcatcher that the Rat will breed every seven weeks, and that the female will begin to have young as early as fourteen weeks old.‡ The same author, referring to a little book on the Rat written by a Mr. Shaw, "of ratcatching notoriety," states that "his little dog Tiny, under six pounds weight, has destroyed two thousand five hundred and twenty-five Rats, which, had they been permitted to live, would, at the end of three years, have produced one thousand six hundred and thirty-three millions, one hundred and ninety thousand, two hundred living Rats."§ "Every wild Rabbit who lives to old age has probably been concerned during its life as one of two partners in the production of not less than three hundred young Rabbits." Yet in England no perceptible increase is visible, and we must conclude "that out of three hundred Rabbits born, only two survive to middle age, on the average; the rest being either killed and eaten by carnivorous animals, or (more rarely) dying through inability, for some reason or another, to obtain food."|| The Hamster (*Cricetus frumentarius*) possesses marvellous powers of reproduction, and frequently appears in count-

* 'Royal Nat. Hist.' vol. v. p. 514.

† Cf. H. Woodward, 'Cassell's Nat. Hist.' vol. v. pp. 161 and 166.

‡ 'Curiosities of Nat. Hist.' Pop. edit. vol. i. p. 69.

§ *Ibid.* p. 70.

|| Wells and Davies, 'Text-Book of Zoology,' p. 128.

less swarms. They have a host of enemies, and Buzzards, Owls, Ravens, and other predaceous birds thin their ranks by hundreds; while among four-footed foes, Polecats and Stoats follow the track of the advancing legions, and kill them where and when they can. The Polecat and Stoat are, moreover, able to follow the Hamster into the recesses of their burrows, where they probably destroy them by hundreds.*

Innumerable illustrations might be chosen from the life-histories of insects. Prof. Miall observes:—"Winter, of course, brings many hardships upon aquatic insects, as the great reduction in their number proves. The enormous number of eggs laid by so many of them is doubtless connected with the heavy risks to which they are exposed during half the year."† Of one of the May-flies (*Polymita arcys virgo*) Réaumur states:—"The short life of the winged female compels her to deposit her 700 or 800 eggs at once, without much discrimination of likely and unlikely places." Of the Pine Sawfly (*Lophyrus pini*), whose larvæ are frequently found in such numbers in pine-woods, it has been said:—"When young, and also just before turning into pupæ, the grubs are very susceptible to sudden cold or heavy rain, which kill off thousands. In addition to these destructive agencies, nearly forty different kinds of parasites infest the grubs, while mice devour numbers of the pupæ."‡ Among the Threadworms (*Nemathelminthes*) parasitic Nematodes produce enormous numbers of eggs. Van Beneden states that 60,000,000 have been computed in a single Nematode, and this multiplication of ova is absolutely necessary, for the chance of the embryo reaching the right host, in which alone it can develop, is always a small one.§

This excessive fecundity in some animal life finds its parallel in plants. Thus it has been computed that a plant of *Sisymbrium sophia* yields 730,000, one of *Nicotiana tabacum* 360,000, one of *Erigeron canadense* 120,000, and one of *Capsella bursa-pastoris* 64,000 seeds yearly.|| Probably in this case, and in a state of

* Lydekker, 'Roy. Nat. Hist.' vol. iii. p. 126.

† 'Nat. Hist. Aquatic Insects,' p. 18.

‡ F. O. Pickard-Cambridge, 'Roy. Nat. Hist.' vol. vi. p. 17.

§ Cf. A. E. Shipley, 'Cambridge Nat. Hist.' vol. ii. p. 162.

|| Kerner and Oliver, 'Nat. Hist. Plants,' vol. ii. p. 878.

nature, a great check to increase is to be found in the difficulty the seeds experience in finding a proper soil in which to germinate, as well as in other sources of destruction.

The advantages of, or the part played by fecundity in the preservation of many species is evidently of the most complete and far-reaching character. This seems particularly and more frequently the case with fishes,* the reasons for which are not difficult to comprehend. It has been urged that the pale colour of the under side of fishes makes it more difficult for enemies to detect them from beneath; but this is probably a truism without denoting any evolved protection, and may be due to other causes. The survival is probably owing to fecundity alone, which prevents extermination from the many foes and adverse conditions which environ their lives. One may stand before the tank in a large aquarium, and be impressed with the assimilative colouration of the upper sides of flat-fishes to the sandy or pebbly bottom on which they rest, but still no difficulty is experienced in distinguishing the living creatures; and if this be so, and with our untrained perceptions, how much stronger must be the detective powers of those natural enemies whose prey is their necessity! The 130,000 eggs said to be carried by a Sole of one pound weight is probably the factor which prevents annihilation, and not a moderate disguise which, without deceiving ourselves, is still less likely to mislead enemies whose lives depend on its destruction. Nature is here quite "careless of the single life," but, by fecundity, "so careful of the type." In our oceans and rivers the course of evolution has decided that the most prolific shall survive, and this is probably with fish the great factor of protection. Here individuality is lost, and Providence is with the big battalions.

* Of course it is not suggested that all fish survive through fecundity alone. The European Goby (*Latrunculus pellucidus*) and the Sea-Stickleback (*Gastrosteus spinachia*) have apparently been proved to die within a year of their birth. In these cases other protection seems to be afforded. According to Dr. Günther, the fish spawns in June and July. In April the males lose the small teeth, which are replaced by very long and strong teeth, the jaws themselves being stronger. The teeth of the females remain unchanged. In July and August all the adults die off ('Introd. Study Fishes,' p. 487). In this case the male may defend the progeny. *G. spinachia* is, on the same authority, a "nest builder, choosing for its operations especially the shallows of brackish water which are covered with *Zostera*" (*ibid.* p. 507).

If there is truth in this view, it should be emphasized by the fact that animals of great fecundity, as a rule, possess little protective disguise in colouration or markings, and this, in a great measure, appears to be the case, despite the somewhat contrary evidence which tends to be deducible from the colours of many flat-fishes. Even in this case we must remember that other senses besides those of sight may be used to discover a semi-concealed prey. The extreme hardihood of certain animals after injury is also an agency in "survival." Prof. McIntosh relates that "a full-grown female Picked-Dogfish was captured in the stake-nets for Salmon some years ago with its stomach distended with food. In dissecting the apparently dead animal in the laboratory the heart pulsated actively, though it and the pericardium were covered with old and recent lymph, caused by the irritation of a large Cod-hook, the point of which projected into the pericardium, and against which the heart seemed to impinge during contraction. An Eel will live for a year or two with a hook projecting through the gut into the abdomen, and the glutinous Hag (*Myxine*) is also hardy under similar circumstances."* In so often seeking for the explanation of animal survival by mimetic or assimilative disguises, we are probably endeavouring to open too many locks with one key.

Colour alone may prove a false analogy to protection. Mr. Beddard has well observed :—"The bluish and white colour of many Gulls is generally allowed to be of protective value ; in any case, they are not unlike their usual surroundings. For three years several of the common species of Gulls have a brownish speckled plumage, which is totally unlike that of the old bird ; if one colour is advantageous, the other must be the reverse ; and three years is either a considerable period, or not long enough."† Another illustration is from a writer who, recording his views as to protective resemblances in South America, describes the well-known butterfly, *Ageronia feronica*, which rests with its wings expanded horizontally. When seen on the "grey lichens or bark of the tree-trunk," it is "then so like in colour and markings to the surface on which it rests that it is practically invisible

* 'Journal of Mental Science,' April, 1898.

† 'Animal Coloration,' 2nd edit. p. 29.

at the distance of even a few yards.”* This observer, however, at the same time refers to the statement of Bigg Wither, that this very insect is called the Whip-butterfly, owing to the sharp whip-cracking sound made by its wings when battling with its fellows in the air, and that this sound makes it the easy prey of a forest-bird, locally known as the “Suruqua,” who thus detects and secures it. Here the apparent protection, by “protective resemblance,” is invalidated by a peculiar and unusual sound-producing quality, which is as equally dangerous as its colour is reported protective. A similar remark may be made as to the musical *Cicadidæ*. How often have the usual green and brown colours of these insects been adduced as an example of protective resemblance, and not without reason if we regard only the difficulty of distinguishing them on the branches or leaves on which they rest. But when we desire to capture them, their shrill noise proclaims their retreat, and their assimilative colouration avails them little. This has frequently been the experience of the writer when in South Africa.† Mr. Burr writes:—“I have often stalked down our large *Locusta viridissima*, L., and have usually found it on a bed of nettles or thistles, in the middle of a corn-field, or in stubble, invariably much farther away than I at first expected. The sound appears to come from almost beneath one’s feet, but, on walking straight towards it, seems to recede into the distance, until it suddenly strikes the ear, very harshly and shrilly at close quarters. As soon as the would-be capturer approaches the sound ceases, and the insect remains invisible. The assimilation of the green colour of the insect and the green surroundings, which it always chooses as a band-stand, is so close, that it is almost impossible to detect the creature until it recommences to chirp, when the rapid movement of the elytra betrays its whereabouts.”‡ Frank Buckland wrote similarly of the Green Tree-Frogs of Germany:—“I have frequently heard one singing in a

* C. W. Tait, ‘Entomologist,’ vol. xxvii. p. 52. (The author’s name by a misprint appears as W. C. Mit.)

† That birds do destroy Cicadas is a fact well known. Mr. Blandford found the *Accipiter Nisus sphenurus*, in Abyssinia, “living on *Cicadæ*” (‘Obs. Geol. and Zool. of Abyssinia,’ p. 295). Cf. also Swinton (‘Insect Variety,’ p. 21); Belt (‘Naturalist in Nicaragua,’ p. 230); Hudson (Trans. N. Zeal. Instit. vol. xxiii. p. 20); Riley (‘Science,’ v. p. 521).

‡ ‘Zoologist,’ 4th ser. vol. i. p. 516.

small bush, and, though I have searched carefully, have not been able to find him; the only way is to remain quite quiet till he again begins his song.*

The aquatic larvæ known as the Small "Bloodworm" (*Tubifex rivulorum*) is another instance of an animal whose colouration is a lure to its destruction, and whose fecundity can alone enable it to survive. The angler knows how readily a dish of Gudgeon can be procured with this bait; whilst other well-known ground fishes, such as the Loach (*Cobitis barbatula*), and the Miller's-thumb (*Cottus gobio*) also greedily attack it. These small worms live in great numbers in the mud at the bottom of streams, and, as Mr. Beddard has observed, as "the head-end is fixed in the mud, while the tail waves about freely in the water, these worms form exceedingly conspicuous red patches, which must attract ground-feeding fish." †

It is often urged that few observers have seen butterflies attacked by birds, and that therefore their protective and warning colours are little needed against these as foes. Similar remarks have been made with reference to other animals. Thus Mr. Andrew Lang writes:—"On the Dee, Salmon sometimes rise to March Browns, and take the artificial March Brown tied rather large on these occasions. I have never seen a Salmon take a natural fly, any more than I have seen a phantasm of the dead"; yet he adds he "can believe on good evidence that Salmon do take natural flies." ‡ Undoubted trustworthy accounts do exist also as to avian attacks on Lepidoptera, and the writer has witnessed not a few, though the occurrence is somewhat uncommon. Eimer once came across a large concourse of white and blue butterflies on a high plateau of the Swabian Alp: "On my approach a number of birds (Stonechats) flew from the spot, and when I came up I found a number of maimed butterflies lying fluttering on the ground; pieces had been bitten from the wings of most of them—indeed the wings were often torn to pieces

* 'Life of Frank Buckland,' by G. C. Bompas, 2nd ed. pp. 56-7.

† 'Animal Coloration,' 2nd edit. p. 6. — According to Prof. Miall, the colour of the larva of *Chironomus* is due to a blood-red pigment, which is identical with the hæmoglobin of vertebrate animals, and "only such *Chironomus* larvæ as live at the bottom and burrow in the mud possess the red hæmoglobin" ('Nat. Hist. Aquatic Insects,' p. 130).

‡ 'Illustrated London News,' February 10th, 1894.

before the birds succeeded in getting the bodies of the butterflies, although these were sitting quietly on the ground.”* Mr. Riley Fortune states that he has often seen Starlings chasing butterflies.† The Stonechat greedily devours butterflies, as I have seen in the aviaries of Dr. Butler. Zehntner on different occasions found seven Painted Lady butterflies in the mouths of Alpine Swifts (*Cypselus melba*), as recorded in the ‘Catalogue des Oiseaux de la Suisse.’‡ Such an observation did not miss the lynx eyes of Jefferies: “I once saw a Flycatcher rush after a buff-coloured moth, which fluttered aimlessly out of a shady recess; he snapped it, held it a second or two while hovering in the air, and then let it go. Instantly a Swallow swooped down, caught the moth, and bore it thirty or forty feet high, then dropped it, when, as the moth came slowly down, another Swallow seized it and carried it some yards and then left hold, and the poor creature after all went free. I have seen other instances of Swallows catching good-sized moths to let them go again.”§ These moths were probably inedible species, and were thus protected, at least at this stage of their existence. Mr. Furneaux, referring to the common and well-known white butterflies of the British *Pieridæ*, observes: “It is remarkable that we are so plagued with ‘whites’ seeing that they have so many enemies. Many of the insect-feeding birds commit fearful havoc among their larvæ, and often chase the perfect insect on the wing.”|| Another writer states: “At no stage in their lives are lepidopterous insects free from the attacks of enemies. In the egg state they fall a prey to beetles and small birds, and as larvæ they are extremely liable to receive a deadly thrust with the ovipositor (or sting) of an ichneumon. . . . The enemies of the imago, whether butterflies or moths, are numerous. Birds, Bats, dragonflies, &c., pursue and harass them whenever they happen to meet with them.”¶ Fungi are also parasitic on butterflies.** But the discrepancy in experience as found among

* ‘Organic Evolution,’ Eng. Transl., p. 118.

† ‘Ornithology in relation to Agriculture and Horticulture’ (1893), p. 139.

‡ Cf. Gurney, ‘Trans. Norf. and Norw. Nat. Soc.,’ vol. vi. p. 259.

§ ‘Wild Life in a Southern Country,’ p. 147.

|| ‘Butterflies and Moths’ (British), p. 144.

¶ F. O. Pickard-Cambridge, ‘Roy. Nat. Hist.,’ vol. vi. p. 80.

** J. C. Rickard, ‘Entomologist,’ vol. xxix. p. 170.

field naturalists on these points tends to prove how partial or moderate must be the danger in the present day, and how considerably more intense it must have been in some former time to have prompted the evolution of the wonderfully simulating guises, which we can only conceive as evolved for protective purposes.

A repetition of observations will frequently qualify the premises on which many conclusions are based. Many recorded facts are of course utterly erroneous. Thus in 1666 Schefferus records in the 'Philosophical Transactions' that Swallows sink into lakes in autumn, and hibernate in a manner precisely similar to Frogs. In 1741 Fermier-Général Witkowski made legal testimony to the effect that two Swallows had been taken from a pond at Didlacken in his presence in a torpid state; that they eventually regained animation, and after fluttering about, died some three hours after their capture. In 1748 the great Swedish chemist Wallerius wrote that he had on several occasions seen Swallows clustering on a reed until they all disappeared beneath the surface.* Thus a traveller in a tropical forest might from paucity of observation form a wrong impression as to the relation of the liane and the stem or tree to which it is attached. He would frequently find "the hard basal parts of a liane stem twisted and coiled apparently around nothing. This is due to the fact that the original support had been killed, and then, slowly rotting into dust, has been denuded away by the wind and rain." Our traveller might then record the murderous action of lianes as of a somewhat universal character. But further observations would show the action quite reversed. As Kerner describes the process: "If the erect young stem is stronger and more vigorous than the twiner which encircles it, which has been used as a prop, it does not allow itself to be strangled; the twiner is destroyed when they both increase in thickness. The coils of the climber are gradually stretched tighter and tighter, and many are the contrivances which exist for preventing the tension from immediately acting injuriously on the movement of the sap in the interior of the twining liane stem. As this thickening continues, the pull on the coils becomes so great that the death of the liane results."†

* Cf. Dixon, 'The Migration of Birds,' 2nd edit. p. 54.

† Kerner and Oliver, 'Nat. Hist. Plants,' vol. i. p. 682.

Similarly an explanation may be long deferred till one branch of science is sufficiently advanced to illuminate another. Discoveries in botany and entomology have often reacted on, and supplemented each other. Prof. Drummond has quoted an instance which will serve our purpose here:—"More than two thousand years ago Herodotus observed a remarkable custom in Egypt. At a certain season of the year the Egyptians went into the desert, cut off branches from the wild palms, and, bringing them back to their gardens, waved them over the flowers of the date palm. Why they performed this ceremony they did not know; but they knew that if they neglected it the date crop would be poor or wholly lost. Herodotus offers the quaint explanation that along with these branches came certain flies possessed of a 'vivific virtue,' which somehow lent an exuberant fertility to the dates. But the true rationale of the incantation is now explained. Palm trees, like human beings, are male and female. The garden plants, the date bearers, were females; the desert plants were males; and the waving of the branches over the females meant the transference of the fertilizing pollen dust from the one to the other."*

The time has arrived when the whole theory of "protective resemblance" and (or) "mimicry" † requires to be expressed and understood in two senses, *viz.* Demonstrated, and Suggested or Probable. I propose also to give instances of what may be considered as Disputed or Mistaken Mimicry, and likewise Purposeless Mimicry. In considering these questions one is reminded of the three kinds of Phantasms as understood by the Stoics. Those that were probable, those that were improbable, and those that were neither one nor the other. Or perhaps still better, the three categories of Renan. "The first, which is unfortunately very limited, is the category of certainties; the

* 'The Ascent of Man,' pp. 310-11.

† The term "mimicry" is often considered as first applied in nature by its great enunciator, H. W. Bates. Some years ago I pointed out ('Rhopalocera Malayana,' p. 33, *note*) that Henfrey in 1852 had already used the term in connection with botany. Mr. Scudder subsequently ('Butterflies E. U. States and Canada,' vol. i. p. 710) showed that Kirby and Spence had anticipated Henfrey in 1815. Boisduval also, in 1836, drew attention to the phenomena (*cf.* Coe, 'Nature *versus* Natural Selection,' p. 161).

second, that of probabilities; and the third, that of dreams,"* By the term "Demonstrable" is implied all those instances where protection, absolute or partial, has been or can be demonstrated by experiment or actual observation. "Suggested or Probable" should, however, be applied to those examples where, because we see similarity of structure, markings, or colour, we assume—and probably often correctly—that protection is involved, though no direct knowledge of the same is obtainable. As an illustration, we know that certain Diptera, *Eristalis* spp., resemble Bees, and we conclude that this simulation has arisen by evolutionary means for protective purposes. It must nevertheless be remembered that the Bee itself is not absolutely protected by its sting, and does not possess a corresponding immunity from the attacks of all its enemies. Mr. Woodford, on Peel Island, Moreton Bay, observed Bees of the genus *Bombus* caught and devoured by Spiders.† Prof. Lloyd Morgan's experiments, however, demonstrate protection at least from birds:—"To another group of chicks I just gave Hive Bees, which were seized, but soon let alone, and then the Droneflies (*Eristalis*), which so closely mimic the Hive Bee. They were left untouched. Their resemblance to the Bees was protective."‡ Frank Buckland relates:—"A gentleman in Oxfordshire had a hive of Bees in the cavity of a wall. A common Toad which had taken up its residence in a hole close by was observed to walk forth and place himself at the mouth of the hive, and so catch the Bees in their coming from and returning to the hive with much dexterity and activity. After witnessing the Toad at work for some time, and feeling convinced that, if his depredations were suffered, he would eventually destroy the whole hive, the owner of the Bees killed the robber, and on inspecting his stomach it was found full to repletion of dead Bees."§

* 'Philosophical Dialogues and Fragments,' Eng. Transl., p. 5.

† 'A Naturalist among the Head-hunters,' p. 70, note.

‡ 'Habit and Instinct,' p. 52.

§ 'Curiosities Nat. Hist.,' pop. edit., vol. i. pp. 42-3.—According to Mr. Pocock, and as a result of an experiment, a Spider treats both Bee and *Eristalis* with the same caution when found in its web ('Roy. Nat. Hist.,' vol. vi. p. 62). That the Bee has no special immunity is attested by Mr. Pickard-Cambridge, who states that another hymenopterous insect, *Phylanthus triangulum*, in its larval condition feeds upon the Honey Bee. "Since

No specialist who works long at any large group of animal forms, especially at insects, can escape meeting with these problems. This is particularly discovered when, in monographing a family, species are found resembling insects belonging to another order. Thus, in recently working out some Hemiptera for the 'Biologia Centrali-Americana,' I found in the family *Lygaeidæ* a species with all the superficial form and colour of an Earwig (*Forficula*) belonging to the order Orthoptera; while among the *Lygaeidæ* and *Capsidæ* were many species which mimicked Ants (Hymenoptera). To add to the problem, *Lygaeidæ* and *Capsidæ* were found mimicking one another. Dr. Thorell made a similar observation in monographing Burmese Spiders. *Ligdus chelifera* "is a small flat Spider belonging to the family *Salticoidæ*, and resembles very much a Cheloneth (Pseudoscorpion); *Prolochus longiceps* has some resemblance to an Orbitelarian Spider of the genus *Meta* (*M. segmentata*, f. inst.)."* Now, in the first case, and, alluding to the writer's own experience, it appears we have "Suggested or Probable Mimicry," because we possess no knowledge whether these Hemiptera are found with the Earwigs and Ants they mimic, nor whether they are avoided or neglected by enemies because of this mimicry. We can only report that these insects are mimics one of another as seen in our cabinets, and that as nothing is, or can be, predicated as purposeless in nature, neither can these assimilative forms be meaningless; and, further, arguing from demonstrated knowledge in other cases of mimicry being protective, the presumptive evidence is that the theory of protection affords the clue to the origin of the mimetic guise of these insects. But this is only circumstantial evidence of the weakest description, and, though we may believe as a matter of biological faith, based on analogous cases in nature, that this is the explanation, it is probable, or more than probable, that the progress of science is retarded by confounding scientific suggestion with

at least five Bees are provided for each larva, the havoc caused in hives where these insects abound must be considerable" (*ibid.* p. 36). The Horse Bot Fly (*Gastrophilus equi*) also resembles the Honey Bee in size, colour, and form, but protective mimicry here seems an altogether unwarranted assumption, as the larval fly is parasitic in the alimentary canal of the Horse.

* 'Descrip. Catalogue Spiders of Burma,' Introd. p. xiii.

scientific demonstration.* It is simply teleology come back to the house newly swept and garnished. To the teleologist everything in nature proclaimed design, and a precisely similar view—only differing in terminology—is held by an extreme wing of our own Darwinian army; the only distinction is, that the design in one case was attributed to a supernatural providence, in the other, to an all-sufficing power represented by the term Natural Selection. That the teleologist was in no way inferior, but in many instances—so far as power of observation was concerned—surpassed the knowledge of many of our contemporary entomological evolutionists, is a fact that can be easily realized by perusing the exhaustive Letter XXI. in Kirby and Spence's 'Introduction to Entomology,' on "The means by which insects defend themselves." In this letter may be found a wealth of illustration on what we understand as "protective resemblance," &c., not available in any special work written on that theory. How near to modern thought the writer of that letter was, is proved by its last paragraph:—"Another idea that upon this occasion must force itself into our mind is, that nothing is made in vain. When we find that so many seemingly trivial variations in the colour, clothing, form, structure, motions, habits, and economy of insects are of very great importance to them, we may safely conclude that the peculiarities in all these respects, of which we do not yet know the use, are equally necessary; and we may almost say, reversing the words of our Saviour, that not a *hair* is given to them without our Heavenly Father." Even when teleological views and the conception of a special creation dominated the minds of naturalists, the knowledge of the existence of intermediate forms—a postulate of modern evolution—was more or less enunciated. Thus, in the first part of the 'Zoological Transactions,' Mr. Ogilby, in describing the *Cynictis Steedmanii*, a mammal just then discovered in South Africa, remarks: "That the work of creation was originally complete and perfect in all its

* According to Prof. Miall, when writing on "Flies with Aquatic Larvæ," "The attitude, the mode of breathing, and the mode of feeding observed in the larva of *Dixa* are curiously like those of a certain Gnat larva, *Anopheles*. So close is the resemblance, that an experienced entomologist has, in a published paper, mistaken one for the other. There are few better examples of adaptive resemblance" ('Nat. Hist. Aquatic Insects,' p. 163). But the reasons why this should be considered as *adaptive* resemblance are not stated,

parts ; that no hiatus existed among natural bodies, or, in other words, that no individual stood completely apart from surrounding groups, but that all were connected by a uniform gradation of intermediate forms and characters, is a law of natural history which every day's experience tends more strongly to confirm."* We sometimes find teleological views in what are presumably put forward as evolutionary suggestions. Thus Mr. Harting, in discussing the migrations of Ceylonese butterflies, is inclined to concur with Col. Swinhoe, in considering the explanation "as a sudden exodus from the birthplace, leading to a compensating reduction of the species, after a season exceptionally favourable to its increase." † This "compensating reduction," or rather the method of the same, as thus expressed, seems more logically to denote design or chance, neither of which will explain the phenomena, but may reasonably be adduced to account for the theory. Perhaps one of the most orthodox and thorough-going teleologists was the late Frank Buckland, to whom the poisonous fangs of deadly Snakes were "the apparatus which the omniscient Creator has given to the class of Snakes to enable them to procure their food"; though, he might have added, these divinely-constructed creatures are on that very account gladly destroyed by the orthodox and heretical alike. The real difference between the teleologist and the evolutionist appears to be this. Both search for the phenomenal facts in animal life, but, when found, the teleologist goes no further than enunciating the magical word "Design." The evolutionist, on the contrary, seeks to find how the structure or property has been, and from whence, derived. With the first it is "Fall down and worship"; with the second, "Prove all things." Agassiz considered that the only classification of the animal kingdom was to be found in the plan of creation; "the free conception of the Almighty Intellect matured in His thought before it was manifested in tangible external forms." ‡ And again: "I would as soon cease to believe in the existence of one God because men worship Him in so many different ways, or because they even worship gods of

* Cf. Steedman, 'Wanderings and Adventures in the Interior of Southern Africa,' vol. ii. p. 97.

† 'Zoologist,' 3rd ser. vol. xix. pp. 340-1.

‡ 'An Essay on Classification,' p. 10.

their own making, as to distrust the evidence of my own senses respecting the existence of a pre-established and duly-considered system in nature, the arrangement of which preceded the creation of all things that exist.”*

What we seem to require is a healthy Agnosticism in theoretical science; neither affirmation nor negation, *per se*, but proof. Thus, grant to all a free use of the imagination in scientific theory, but in no case allow it to be confounded with fact, or crystallized into dogma. “What is called ‘mimicry’ is apparently, in many cases, nothing more than the influence of similar surroundings, acting in a similar manner upon different insects inhabiting the same district.”† Or, as Mr. F. T. Mott most enigmatically puts the objection, “The very curious appearances of mimicry, which are often supposed to be protective, but of which a large proportion seem to have no such function, may probably be attributed to sympathetic communication of the vibratory motions which must be passing through the ether in all directions in the neighbourhood of organic life.”‡ Animal depredators may, however, be not altogether defeated by “mimicry,” which of course predicates the sense of sight only. As Mr. Cornish has well observed, predaceous animals watch for movement to guide them to their prey. “Most of the larger birds, notably Wood Pigeons, remain perfectly motionless for many seconds after alighting in a new place, in order to identify any moving object. On the other hand, the power of scent is a great corrective to animal misconceptions about objects.”§ How little is the cause of Darwinism advanced by many exhibitions made at scientific societies! The advocate exhibits—say, insects—which, belonging to different orders, closely resemble each other in colour, markings, or structure, and which he reasonably adduces as an example of “mimicry,” but misuses a suggestion as a demonstration. The Darwinian sceptic at once denies the strength of the whole argument, because it cannot be demonstrated as a fact, and has not been put forward as a suggestion only. It is quite possible

* ‘An Essay on Classification,’ p. 228.

† W. F. Kirby, ‘A Handbook to the Order Lepidoptera,’ vol. iv. p. xxiv.

‡ “Organic Colour,” ‘Science,’ June 16th, 1893.

§ ‘Animals of To-day,’ p. 165.

that truth may exist between the two antagonists, for it seems certain we have not yet *all the explanations* of these mimetic disguises, and discussion may well precede a universal dogma of its causation. Because a phenomenon is frequent in nature, it is not necessarily universal. For instance, the metamorphosis in the early lives of Frogs is an observation of so general a nature as to indicate a constant law; but a land Frog in the Solomon Islands (*Rana opisthodon*) lays very large eggs in the crevices of rocks, and from these emerge fully-developed Frogs.* We join issue with Prof. Tyler when he states, "Natural science does not deal in demonstrations, it rests upon the doctrine of probabilities; just as we have to order our whole lives according to this doctrine."† This is a cardinal doctrine in natural and apologetic theology, but is the very antithesis of science, natural or otherwise. The man who orders his whole life on probabilities will probably arrive at the conclusion that hope is a very good breakfast, but a most indifferent dinner. A "science" based on probabilities may turn out to be a new system founded on contradictions.

Prof. Herdman, in speaking of the colours of Nudibranchs and their probably protective character, forcibly observes that we cannot gauge the problem by observing the animals in a museum-jar, or as illustrated in a book, or on the wall. "In order to interpret correctly the effect of their form and colours, we must see them alive and at home, and we must experiment upon their edibility or otherwise in the tanks of our biological stations."‡ Such a course would doubtless give many positive and many negative results, confirming in many cases the theory—if it is still to be called but a theory—of mimicry, and preventing many hasty and erroneous conclusions in other cases, where mimicry is only a suggestion, and much discredit is brought to the argument. The "law of evidence" might with advantage be studied

* Guppy, 'The Solomon Islands,' p. 316.—*Hylodes martinicensis* affords another instance (cf. Mon. Berl. Ac. 1876, p. 714).

† 'The Whence and the Whither of Man,' p. 164.—It is only fair to add that this is a book written by an American Professor of Biology, consisting of a series of Morse Lectures delivered at a "Union Theological Seminary," on the agreement that the subject of the lectures was to have to do with "The relation of the Bible to any of the Sciences."

‡ Opening Address, Sect. Zoology, Brit. Assoc. Ipswich, 1895.

by many enthusiastic students in bionomics. Solitary instances, or that of a single species without reference to its congeneric allies, afford but a doubtful testimony to mimetic resemblances. This was clearly seen and enunciated by Darwin himself:—"If Green Woodpeckers alone had existed, and we did not know that there were many black and pied kinds, I dare say that we should have thought that the green colour was a beautiful adaptation to conceal this tree-frequenting bird from its enemies; and consequently that it was a character of importance, and had been acquired through natural selection; as it is, the colour is probably in chief part due to sexual selection."* In fact, much evolutionary controversy is simply intellectual fencing, and what Schopenhauer has defined as "controversial Dialectic, *Dialectica eristica*." Mimicry, again, is often much obscured by plates in illustrated books which are intended to support the theory. As an example, in the excellent 'Royal Natural History'† appears a coloured plate, entitled "Mimicry in Insects." Here a number of various insects of different orders and diverse habits are brought together in the midst of inappropriate—or inartistic—foliage, with the result that there is no apparent or sufficient mimicry to deceive the most careless enemy, or the most inexperienced entomologist. In fact, as a support to the theory, one can only conclude that either nature, or the artist, is at fault. Again, a comparative immunity from attack is often ultimately proved to be alone the case. A recent writer has observed:—"It is well known, and I have myself observed, that all our 'Cabbage' Butterflies are immune from attacks of birds,‡ presumably because of some unpleasant taste or smell. Wasps, however, have twice been observed by me in the act of devouring these butterflies. Earwigs, too, which undoubtedly possess an unpleasant smell when irritated, fall victims to Wasps, in spite of their malodorous attributes."§

To conclude a discursus, which in itself appears somewhat controversial, it may be better to give some instances of

* 'Origin of Species,' 6th edit. p. 158.

† Vol. vi.

‡ This is a direct contradiction to the testimony of Mr. Furneaux (*cf. ante*, p. 328).

§ O. H. Latter, 'Natural Science,' vol. vi. p. 151.

what are considered as “demonstrated,”* and others classed as “suggested or probable,” illustrations of the theory of mimicry ; and it will be noticed that those in the second category are much more numerous than those included in the first ; inference necessarily having so often to be relied upon in the absence of observed facts.

(To be continued.)

* Of course by this term is meant what has been or can be demonstrated, and hence a careful observation made by a competent traveller must be accepted as decisive, for we can neither all visit the scene of the occurrence nor, if we could, is it certain we might meet with the instance. A remark by Lecky is apposite :—“ If anyone in a company of ordinarily educated persons were to deny the motion of the earth, or the circulation of the blood, his statement would be received with derision, though it is probable that some of his audience would be unable to demonstrate the first truth, and that very few of them could give sufficient reasons for the second ” (‘ Rationalism in Europe,’ vol. i. p. 9).

ORNITHOLOGICAL NOTES FROM NORTH-
WESTERN IRELAND.

BY ROBERT WARREN.

It may interest some of the readers of 'The Zoologist' to learn that the White Wagtails (*Motacilla alba*) have again visited the island of Bartragh (Killala Bay) this season on their northern migration. Mr. A. C. Kirkwood, on April 27th, met a solitary bird in the stable-yard at Bartragh, and secured the specimen for a friend's collection. A few days after he met another bird at the same place, which remained only for a few days, and then disappeared. This bird was succeeded by a pair that were seen on May 4th picking up insects on a manure-heap in the farmyard, but they stayed only for a couple of days, disappearing, like the other bird, after they fed and rested. From the fact of these Wagtails having been observed during the spring migration on the island of Bartragh in 1851, 1893, 1897, 1898, and in April and May of the present year, it is more than probable that they pass over Bartragh every spring on their way to Iceland, but are not seen by observers unless northerly winds are blowing at the time of their passage, which cause some birds, from fatigue, to drop down on Bartragh, and feed and rest before continuing their northern journey.

The Bar-tailed Godwits (*Limosa lapponica*) are still remaining about the sands of the bay and estuary. On June 13th I observed several flocks which altogether might number one hundred and fifty birds, and in the midst of a small group, near Moyne Abbey, was a bird exhibiting the red plumage of summer, a very unusual sight in this locality, for out of the many hundreds of birds seen here in summer I have observed only two or three birds in a similar stage of plumage. The birds frequenting this western coast are apparently all immature, too young to assume the red breeding plumage. When at Bartragh on the 5th inst. I saw fully one hundred Godwits on the shores of Bannros Island, and all appeared in the light grey plumage.

When I was returning from Bartragh on the 5th inst. I observed a dark-coloured Duck diving in the channel near Goose Island, and, not being able to identify it satisfactorily with my glass, I let the boat drift up with the tide until within range, when I fired, the bird diving at the shot; but on coming up it rose, when, with my second barrel, I secured a beautiful specimen of an adult male Black Scoter, in perfect plumage. It was the first I met in summer, and, although numbers frequent the open bay in winter, none ever came into the channels of the estuary, so I felt very fortunate in obtaining such a fine specimen so very unexpectedly.

For some days past* both Curlews and Redshanks have begun to return from their breeding grounds to the estuary, and on the 28th June I was surprised to see three or four Greenshanks on the shore here, the earliest date on which I have ever known them to return from their breeding haunts.

The Sandwich Terns, as usual, were the earliest of our visitors. I saw one on March 26th, but the main body of the flight did not appear in the estuary until the first week of April. Although the Lesser Terns arrived on May 4th, the Common Terns were some days later in arriving. When visiting the Terns' breeding haunts near Killala on June 13th, I found, as usual, the Common Terns confining themselves to the gravelly "Inch," about thirty pairs having nests on it, and perhaps eight or ten pairs of the Lesser Tern; while the Arctic Terns were scattered all over the Ross sands for over half a mile along with the majority of the Lesser, laying their eggs on the bare sand and gravel. The numbers of the Common Terns have diminished, while there has been a great increase in those of the Arctic Tern.

* This communication is dated July 8th.

NOTES FROM THE HADDISCOE MARSHES
(NORFOLK).

BY LAST C. FARMAN.

OWING to the fine and open winter of 1898 few rare birds paid us a visit. A friend obtained a very beautiful specimen of the Common Bittern, the only one I heard of during the winter, and which was killed by the side of the river Waveney. Wildfowl were exceedingly scarce, and Snipe visited us in very limited numbers, while the Woodcock record was not up to the usual standard.

Redshanks arrived early in March, about twenty-five couples having nested on the Herringfleet and Fritton Marshes, with about the same number of Lapwings.

During the first week in May a Spoonbill took a few days' rest on our marshes before proceeding on its journey, and altogether about seven specimens of this species have been seen in the vicinity of Breydon mud-flats.

The brothers Richard and Cherry Kearton came down from Surrey for the express purpose of photographing a Redshank's and a Dabchick's nest, each containing four eggs, and laid by the side of the Waveney. I have also seen two Snipes' nests, each containing four eggs.

Moorhens have been nesting in numbers, and numerous Terns of the Common Arctic and Black species have, during the month of May, been daily hawking the marsh ditches. I have found several nests of the Yellow Wagtail, Meadow Pipit, Sky-Lark, and Willow Warbler; and in the garden adjoining my house the following birds have successfully reared broods—*viz.* Goldfinch (two pairs), Common Whitethroat (two pairs), Wren (three pairs), Chaffinch (two pairs), Bullfinch, Robin (two pairs), Red-backed Shrike, Hedge Sparrow (three pairs), Blue Tit, Great Tit, Song Thrushes (two pairs), and Tree Creeper.

In a wood near my home I found a Sparrowhawk's nest containing six eggs, which have now been successfully hatched. And I know of three pairs of Redback Shrikes and two pairs of Redstarts in the village; but I note that Whinchats and Stonechats are very scarce with us this season. Nightingales have bred in quantity. Cuckoos, Swallows, and Martins are plentiful. I have only heard the Wryneck's note once this season, this species having locally decreased very much of late years.

In the early spring I shot a specimen of the Green Woodpecker, and the Great Spotted and Little Spotted species were also in the locality.

During the month of March several Pike were taken from a narrow marsh dyke, ranging in weight from 7 lb. to 25 lb. The latter fish was caught by net with another Pike of 16 lb. weight.

NOTES AND QUERIES.

MAMMALIA.

MARSUPIALIA.

How does the new-born Kangaroo get into the Mother's Pouch?—From an exceedingly interesting book recently published, 'Wild Animals in Captivity,' by A. D. Bartlett, the late superintendent at the London Zoological Gardens, I extract the following:—"The excitement and curiosity evinced by most persons when they witness the young Kangaroo protruding from the mother's pouch naturally leads to the question, 'How it got there?' a question not yet satisfactorily answered. Long have we been trying to unravel the mystery, and some of the ablest naturalists have bestowed considerable attention upon it, and spent much valuable time with a view to solve it." In the Rev. R. Owen's 'Life of Professor Owen,' however, I find a curiously contradictory statement. It is that of a note in Mrs. Owen's diary at so early a date as Nov. 14th, 1844, which appears to definitely settle the above question. She says:—"Also interesting letter from Lord Derby. A Kangaroo at Knowsley has been watched till the matter so long in doubt is cleared up. She has been seen taking the new-born tiny Kangaroo in her fore-paws and putting it in the pouch." It seems almost inconceivable that Bartlett, so intimate as he was with Prof. Owen, should have remained unaware of this fact.—W. BARRETT ROUÉ (Clifton, Bristol).

In reference to the above communication of Dr. Roué, the interesting question of "How does the new-born Kangaroo get into the mother's pouch?" mentioned in 'Wild Animals in Captivity,' remains unsolved, I believe, just as my father stated. I remember many long conversations on that point with my father, who had the greatest opportunity of knowing all about the breeding of these animals, and we came to the conclusion that the worm-like young passed through a duct or canal in the mammary glands from the womb to the pouch, which would only be perceptible at the time of birth. Had Prof. Owen believed that the mother would pick up a miserable naked worm-like creature with her paws and place it in the pouch, I fancy that he would have made that statement long ago. Waterhouse, in his 'Mammalia,' vol. i. Pouched Animals, published in 1846, does not even mention how the young gets into the pouch; he had access to Prof. Owen

and all his papers. Cassell's Nat. Hist., quoting some other authority, says, "The mother places it in her pouch," without giving any idea of how that is performed. It is easy to make a statement, but it is not so easily confirmed. One can understand a Cat or a Dog picking up its young in its mouth and carrying it away, but it is too human-like for a Kangaroo to pick up that wretched worm and put it in her pouch. What would happen if it was born in the jungle in the dark?—EDWARD BARTLETT.

[Lumholtz writes:—"The large Kangaroo bears a young 'no larger than the little finger of a human baby, and not unlike it in form.'* This helpless, naked, blind, and deaf being the mother puts in an almost inexplicable manner into the pouch with her mouth" ('Among Cannibals,' p. 379). Aflalo states that the actual fact of the Kangaroo's birth was observed at the "London Zoo. . . . It was there proved that the little 'joey' is brought into the world in the usual way, and forthwith conveyed to the comfortable receptacle, and affixed to a teat by the dam, which held the lifeless-looking little thing tenderly in her cloven lips" ('A Sketch of the Nat. Hist. of Australia,' p. 29). There is evidently much confusion on this interesting question.—ED.]

A V E S.

Is the Whinchat a Mimic?—Referring to Mr. Godfrey's note (*ante*, p. 267) anent this question, my brother and I had indubitable evidence of the imitative powers of *Pratincola rubetra* (*cf.* Zool. 1877, p. 384). Again, I heard one when crossing a meadow in May or June, 1897, near this village, which allowed me to approach within a very few yards whilst singing on the top of a wall; and, although perhaps not gifted with such a range of mimetic powers as the bird heard in 1877, yet it so closely imitated the song of the Blackcap, in addition to the reproduction of call-notes of various birds, as to fairly astonish me. It may be said in passing that whilst executing its imitative performance its attitude indicated intense passion, and altogether different to its movements and habits when it resumed its ordinary song, at which time it was more active and much wilder, and would not suffer a near approach.—E. P. BUTTERFIELD (Wilsden, near Bradford).

Arrivals of Spotted Flycatcher and Nightjar.—The question whether the Spotted Flycatcher (*Muscicapa grisola*) is the last to arrive of our summer migrants must, as far as this district is concerned, be answered in the negative, the Nightjar (*Caprimulgus europæus*) arriving on an average more than a week later. I should like to ascertain from your readers whether

* This quotation appears to be from Gould's 'Introduction to the Mammals of Australia,' p. 10.

their experience is the same in other parts of Britain. Nightjars here seem to have a partiality for feeding upon *Hepialidæ*, arriving about the time when *H. velleda* appears, and not leaving the heaths for any considerable distance until the end of June or beginning of July, when it is to be seen in the fields near the village feeding upon *H. humuli*.—E. P. BUTTERFIELD (Wilsden, near Bradford).

The Delinquencies of Starlings.—Mr. Fox (*ante*, p. 269) asks whether others have observed feuds to exist between Swifts and Starlings. Such quarrels are not at all of uncommon occurrence, and in one haunt at least *Sturnus vulgaris*, is frequently ejected on the arrival of *Cypselus apus* notwithstanding that possession is nine points of the law, being apparently overpowered by mere numbers as I should think, for it is hardly conceivable that Swifts could single-handed be a match for Starlings.—E. P. BUTTERFIELD (Wilsden, near Bradford).

Starlings nesting in Fir Trees.—During May last I found small colonies of *Sturnus vulgaris* nesting in the fir trees in Burnt Wood, Emborough, near Wells; every lateral branch at an elevation above eight or nine feet was piled two or three inches deep with dead grass, hay, shavings, &c., and on this were deposited the eggs. I climbed up and examined a clutch of four eggs. The gamekeeper informed me that they nested there annually, which perhaps accounted for such a collection of rubbish.—STANLEY LEWIS (Wells, Somerset).

Rooks in the West-End of London.—Some time since (*Zool.* 1897, p. 87) I wrote that I feared *Corvus frugilegus* had ceased to breed in the West-End of London; but I now have the pleasure to record that this year there have been three nests in a plane tree close to Park Lane, not in the park, but opposite to it. It seems somewhat strange that they should choose such a site when the park was so near.—J. YOUNG (64, Hereford Road, Bayswater).

Peculiar Conduct of the Woodcock (*Scolopax rusticula*).—It has been stated that the female of this species carries her young between her legs. I saw a female rise on a moor in this locality on the evening of June 8th, having her legs hanging down, and the hind part of her body being also in a drooping position. Three other birds—all smaller—soon rose from the same point, and flew in quite the opposite direction, their bodies being in the ordinary flying position. All the birds flew about sixty yards, and the female carried on a continual chirping, evidently feigning great pain. I followed up to where she alighted, when she rose and went away in the direction of the others, flying in the same position as at first. I have no doubt but that all this is a peculiar habit for protecting the young

of this species. I am not prepared to say whether the three were all young, or an old bird and two full-grown young, as the male, being smaller than the female, might have constituted one of the number. The three all remained quiet, and rose singly when the female ceased chirping and joined them, having apparently accomplished her supposed purpose of removing danger by her ruse.—WM. WILSON (Alford, Aberdeen).

Corrections to Notes from North-West Australia. — I shall feel obliged if you will kindly allow me to correct one or two mistakes that I made in my notes (*ante*, p. 139):—The Collared Parrakeet I mentioned as occurring here proves to be the Yellow-banded (*Platycercus zonarius*); also somewhat unaccountably I have (p. 142) written Roller (*Eurystomus pacificus*), whereas it should be Bee-Eater (*Merops ornatus*). The Sand-piper I mentioned, Mr. A. G. Campbell has since identified as the Grey-rumped (*Heteractitis brevipes*). He also informs me the Emu-Wren I secured (p. 140) is undoubtedly a new species, and now named *Stipiturus ruficeps*.—THOMAS CARTER (Point Cloates, N.W. Australia).

AVICULTURAL NOTES.

Aiding a Young Cuckoo.—A young Cuckoo (*Cuculus canorus*) was found here on the 20th June, and was so numbed with the cold and wet that it was quite unable to fly, or even move about. It had evidently flown from the nest a day or two before when the weather was very dry and exceedingly warm. It was taken indoors and put into a cage. Next morning it revived, and was fairly docile to handle. It seemed intermediate in the colour of the feathers between blue and rufous, the white mark being conspicuous on the head. It perched on the uppermost bars of the cage, and seemed to endure confinement with remarkable tranquillity, showing none of the pugnacity incidental to its kind when in a nest, and partaking of the refreshments placed beside it. I released the bird when it had thoroughly recovered near the spot where it was found, and observed that its powers of flight were decidedly superior to other specimens of the same bird which I had seen at a similar age. I did not notice any particular birds approach as it flew out of sight among the dense cover of broom, but a pair of Twites were very demonstrative in the vicinity, and might perhaps have been the foster-birds. Although the tail was short and not fully developed, this bird was well-grown. The behaviour of the young Cuckoo was remarkable for a wild bird just newly confined, showing none of those points of temerity or agitation which act so detrimentally upon more wild animals in early captivity. We may possibly assume that the young Cuckoo can obtain support from various sources when deprived of the foster-birds, and will live apart from them by taking up with other birds,

or in confinement relying upon man himself. — WM. WILSON (Alford, Aberdeen).

BIBLIOGRAPHY.

A Proposed Correction.—Ought we not *all* to *verify* our references? On page 303 the Editor observes that Bonvalot, in his work ('Across Thibet,' vol. ii. p. 64), narrates that Thibetan Horses "feed on raw flesh, as we have seen with our own eyes." There is *no such statement* in Bonvalot's work, 1889, vol. ii. p. 64. (The work is now before me.) He gives us some statements certainly that remind one of the stories of the famous Baron, as when he tells us, vol. ii. p. 73, "In places there were over six feet of snow, and *nowhere* have the horses *less than up to their necks!*"—E. L. J. RIDSDALE (Rottingdean, Sussex).

[We print this note as it was sent for publication. We quite agree with the writer that we should *all verify* our references. Always thankful to be corrected, we again verified our quotation and reference which Mr. Ridsdale disputes, and, to our astonishment, found them *perfectly correct*. We followed a clue to our critic's communication as to the date of publication and quotation from "vol. ii. p. 73," and then discovered that Mr. Ridsdale had confounded two distinct books, and mixed up two different localities. He has disputed our reference to Bonvalot's 'Across Thibet,' published in 1891, by checking it with the same author's totally different work, 'Through the Heart of Asia,' published in 1889!—ED.]

NOTICES OF NEW BOOKS.

Darwinism and Lamarckism, Old and New. By FREDERICK WOLLASTON HUTTON, F.R.S., &c. Duckworth & Co.

DARWINISM no longer flows an undivided stream into the evolutionary ocean; its banks are submerged and offshoots abound, all ultimately reaching the same goal, but by different channels. These reproduced lectures must be read by all who try to keep in touch with the ever-increasing literature of this engrossing subject. Mr. Hutton states that, "in 1887, when the first of these lectures was given, Darwinism was a compact body of doctrine, obscured only by the writings of certain philosophers who imagined that natural selection was a cause of variation." . . . "In 1899 things are different. The confusion alluded to has much increased. Conceptions totally irrelevant to Darwinism have been fastened on it, and all kinds of misconceptions have grown up. Indeed, things have fared so badly since Darwin's death, that I have seen it stated that his flock has scattered, and that the great theory he so successfully reared is in danger of falling to pieces."

Mr. Hutton does not belong to the school of Wallace, which enunciates the all-sufficiency of natural selection, but is a "Neo-Darwinian," accepting Darwin's teaching, and supplementing "the theory of natural selection with *methods of isolation*, which had been either overlooked or had not been brought into sufficient prominence by Mr. Darwin," thus more or less embracing the views of Moritz, Wagner, and Romanes. He joins forces with the pure Darwinians in his position as an opponent of the teaching of the "Neo-Lamarckians."

The reader will notice without surprise the recrudescence of much pure teleology, which is now far from uncommon. Thus we are told, "there are a number of elementary substances in the world which appear to be of no use except to man: for example,

gold, silver, lead, zinc, &c. These must have been intended for his use, for they were useless in the economy of nature until a sufficient amount of intelligence had been reached. Not only were these made for man, but they appear to have been made as rewards for the exercise of his intellect." Again, Mr. Hutton, in discussing "non-utilitarian" characters in animals, has proposed a motive in the evolution of man, whereby the "contemplation of the beauty seen in nature has stimulated his sluggish soul, and has developed his æsthetic and religious faculties." Hence it is a logical sequence to our author that the goal of psychical evolution—for physical evolution in man may be considered as finished—"does not seem to lie in this world." We have attempted to give an outline of the main thesis of these lectures, and, however much we may withhold our assent to many of the propositions, the volume is worth the study of all zoologists who interest themselves in the problems and paradoxes of animal life.

Insects, their Structure and Life : a Primer of Entomology. By
GEO. H. CARPENTER, B.Sc.Lond. J. M. Dent & Co.

AMONG the very many works of this description which now appear with a certain regularity, the above will hold its place as a compilation conducted with discrimination and written with care. All such works are necessarily more or less compilations; no entomologist of the present day has a complete grasp of the whole subject, and must open an account with the writings of other workers. The high-water mark was reached by Westwood in his 'Modern Classification of Insects,' which, presumably by an oversight, is not included in Mr. Carpenter's reference to 'General Works on Insects.' But since the date of that publication the field of study has been enormously enlarged, not only by the vast accumulation of new facts, but also by what may be now clearly recognized as the evolutionary method. To bridge the chasm that now divides us from Westwood, and to bring his book in line with the knowledge of the day, should be the motive and action of a book we are all awaiting.

For those who wish to possess a handy volume of reference on entomology, which if not altogether encyclopædic shall be at

least trustworthy, and in touch with the knowledge of the day, we can heartily recommend this inexpensive publication; and its writer clearly has the potentiality of producing a yet larger and more exhaustive work on the same subject.

The House Sparrow (The Avian Rat) in relation to Agriculture and Gardening, with Practical Suggestions for lessening its Numbers. By W. B. TEGETMEIER, F.Z.S., &c. Vinton & Co.

Passer domesticus is now fully convicted as a pestilent marauder to the crops of our fields and gardens. The verdict is almost unanimous by a competent jury that includes many ornithological authorities once inclined to the non-proven theory. For an absolute acquittal one might appeal in vain to any experienced farmer or horticulturist. It is a purely human parasite. "No Sparrow's nest is ever to be found a quarter of a mile from a human habitation." Its enemies are actual sufferers by its depredations; it is defended by sentiment combined with an utter ignorance of its life-history. This small volume is an excellent review and summary of the reasons that are procurable, and can be multiplied, for an authorized diminution of its numbers by justly incensed agriculturists and gardeners. An appendix by Miss E. A. Ormerod supplies the particulars of the monthly toll it levies on our fields and gardens. In America it is reported by the United States Department of Agriculture "as one of the greatest pests which could have been introduced" into that country.

A List of British Birds belonging to the Humber District (having a special reference to their Migrations). Revised to April, 1899. By JOHN CORDEAUX, F.R.G.S., &c. R. H. Porter.

WE are surprised to find, from a perusal of this "pamphlet"—to follow the designation of the author—that no fewer than 322 species are recorded as inhabiting this district, of which an excellent definition is given in the preface. "This is altogether a very clearly marked and well-defined faunal area, and particularly rich in its avi-fauna, from the fact that off the mouth of the

Humber the two main lines of the autumn immigratory flights converge and overlap." This publication is, however, much more than a "List"; as regards the time of specific appearances it is a veritable manual. The information is concise, and, we need scarcely say, thoroughly authenticated. We will quote the note appended to the Great Bustard (*Otis tarda*): "The last Lincolnshire Bustard was shot in 1818, in Thoresby Field, near Louth, by Mr. Elmhirst, and sent as a present to Sir Joseph Banks. . . . The last two eggs of the Bustard, as the late Sir Charles Anderson, of Lea, told me, were taken in 1835 or 1836, on his father's property at Haywold, near Driffield, on the Yorkshire wolds. On November 11th, in 1864, a dead female Bustard, still warm, was picked up at sea, in Bridlington Bay." A note is attached to every species, and each note will probably afford a subsequent quotation.

Faune de France, contenant la description de toutes les espèces indigènes disposées en tableaux analytiques et illustrée de figures représentant les types caractéristiques des genres et des sous-genres. Par A. ACLOQUE. Préface de ED. PERRIER, professeur au Muséum. Paris: J. B. Ballière et Fils.

IN our last volume (1898, p. 514) we noticed the third part of this very useful publication. The fourth, devoted to the "Mammifères," has just reached us, in which 209 figures are distributed in a space of 84 pages.

The synoptical method is again pursued, and we know of no other work of a similar size where structural characters can be so easily appreciated and used for differential purposes. The illustrations are somewhat coarse, but their help will be appreciated by the young zoologist, and the information afforded is not exclusively for one side only of the English Channel.

Cries and Call-Notes of Wild Birds. By C. A. WITCHELL.
L. Upcott Gill.

WE all hear and, as a rule, enjoy the cries of wild birds; but how few recognize them; how seldom are they analyzed; how

much more infrequently are they understood! Mr. Witchell endeavours to act the part of interpreter, to give us the reason for these avian cries and call-notes. Now and then a Capt. Burton appears, who can quickly master any human dialect and make it his own, but how little we still know of the *languages* used by the other living creatures who are our contemporaries! Probably sound is not alone their method of communication, but that the gesture-language common to primitive man and mutes may be very largely used by non-human creatures. This little book is worth the study of all lovers of natural life; it is an insight into the loves, hates, and fears of the birds around us. Whether their cries can be rendered by musical symbols is at least open to doubt, but we are very thankful for the attempt. We are glad to be interested in our friendly nuisance the Sparrow. "The male Sparrow, when perched comfortably in sunshine, often rehearses his vocabulary, in a way which indicates an attempt at song. If reared under birds of another species in a cage, the Sparrow has their notes and not Sparrow-notes, though he retains the Sparrow tone of voice, and he may then become quite a pleasant singer."

All about Birds. By W. PERCIVAL-WESTELL. "Feathers"
Publishing Co. Limited.

THE title of this little book is not quite a happy one, though its contents are a series of clippings from various sources which may be said to be "all about birds." Unfortunately, many of these bear no reference to their authority, and hence possess little value. They likewise appear to be somewhat undigested and ill-arranged, the same heading appearing in different parts of the book with contrary information. Thus: "The rarest existing Bird" appears on pp. 67 and 158; on the first we are told it is the "Horned Screamer"; on the second it is described as "a certain kind of Pheasant from Annam." The information as to "the Great Auk" on pp. 108 and 155 does not agree in details. The remarks as to the Sparrow on p. 52 seem a "little previous," and a perusal of Mr. Tegetmeier's book (*ante*, p. 375) might possibly produce some qualification of assertion.

EDITORIAL GLEANINGS.

THE 'South Devon Gazette and Kingsbridge Times' of July 7th published a supplement devoted to the memory of Col. George Montagu, from which we reproduce the following extracts :—

“ So much interest has been evinced by the finding of Montagu's breast-plate under the flooring over the vaults near the chancel door of our Parish Church (Kingsbridge), that an account of his life and work, and the subsequent uncertainty of his place of sepulture, may not be amiss, for some even solemnly asserted he was buried in the grounds at Knowle. For the reproduction of the following memoir by William Cunnington, F.G.S., written many years ago, we are under obligation to the Hon. Sec. of the Wiltshire Natural History Society :—

“ George Montagu was born in the year 1755, at Lackham House, the ancient seat of his family in North Wiltshire. He was the son of James Montagu, Esq., of Lackham, and Elinor, sole surviving daughter of William Hedges, Esq., of Alderton; and was descended from the Honourable James Montagu, third son of Henry, first Earl of Manchester, who, in the reign of Charles the First, by marriage with Mary, daughter and heir of Sir Robert Baynard, of Lackham, obtained the estate. At the age of sixteen George Montagu entered the army as a lieutenant in the 15th Regiment of Foot, and when he had completed his eighteenth year he married Anne, the eldest daughter of William Courtenay, Esq., and Lady Jane his wife, who was one of the sisters of the Earl of Bute, Prime Minister to George the Third. After a few months spent in visiting friends of the bride in Scotland and in Ireland, Lieutenant Montagu's regiment was ordered to embark for America, and the youthful pair had to experience the pain of a long separation.

“ ‘It was at this early period,’ says his daughter, Mrs. Crawford, ‘that my father first began to turn his attention, whenever opportunity offered, to those pursuits of natural science for which he had so strong a predilection, and for which he was afterwards so much distinguished. He first commenced by shooting any of the more curious American birds, a few of which he preserved with his own hands, though with no further intention at the time than that of presenting them to my mother. The interest which my father had felt from his boyhood in the works of nature, animate

and inanimate, was much increased by the wild grandeur of the scenes which he traversed, and by the novelty of many of the feathered and four-footed tribes that inhabit them. He ultimately determined, however, to limit his researches and his specimens to British Birds and British Zoology generally, thinking that every collection ought to be as complete as possible of its kind, and being desirous that his own should be the result of his practical studies in the wide field of nature. It was thus that he formed that very extensive and beautiful collection of birds for which he was celebrated, and which after his death was disposed of to the Trustees of the British Museum for, I believe, £3000.' At the same time he was gradually collecting materials for two most valuable works, the 'Ornithological Dictionary,' 2 vols. 8vo, published in 1802, and the 'Testacea Britannica,' 4to, in 1803.

"After Colonel Montagu had resided for some time with his family at Alderton House, in the parish of Hullavington, he was induced, by the additional income which he derived from the death of his brother James (who died unmarried), to resign his commission in the Wiltshire Militia, that he might be enabled to devote himself entirely to his favourite pursuits. He then took up his abode at Knowle, near Kingsbridge, in the county of Devon, which, being at no great distance from the sea, gave him ample opportunities for following out his researches in the natural history of the marine molluscs. Here he continued to reside (with occasional visits to the family seat at Lackham) up to the time of his death.

"After many other trials, in June, 1815, the Colonel had the misfortune to tread upon a rusty nail, which pierced his foot and produced a wound; lock-jaw was the result, and this terminated his life at Knowle on the 20th of the same month, in the sixty-first year of his age. He bore his sufferings (which, though of short duration, were extremely severe) not only with the equanimity of a philosopher, but with the fortitude and resignation of a real Christian. His old and attached friend, the Rev. K. Vaughan, of Modbury [Aveton Gifford.—E. E.], who was at his bedside during his last illness, having asked him where he would wish to be buried, his characteristic reply was, 'Where the tree falls there let it lie.' He had always a great aversion to anything like pomp and parade in the ordinary routine of life, and especially in the performance of the last solemn rites. His remains were therefore interred in an unostentatious manner, agreeably to his own request, in the churchyard of the parish in which he breathed his last."

The following are his principal works:—'The Sportsman's Dictionary; or, a Treatise on Gunpowder and Fire Arms, &c.' London, 1792; reprinted in 1803, 8vo. 'An Ornithological Dictionary; or, Alphabetical Synopsis of British Birds,' 1 vol. 8vo, 1802. 'Testacea Britannica; or, Natural

History of British Shells, Marine, Land, and Freshwater, including the most minute, systematically arranged and embellished with figures,' 4to, London, 1803. Supplement to the preceding, 1809, with plates and descriptions of new species. In the 'Transactions' of the Linnean Society he published the following papers:—"Description of three rare species of British Birds," vol. iv. 1796. "Description of several Marine Animals found on the coast of Devonshire," vol. vii. 1802. "On some species of British Quadrupeds, Birds, and Fishes," vol. vii. 1803. "On the larger and lesser species of Horseshoe Bats, proving them to be distinct, with a description of *Vespertilio barbastellus* taken in the south of Devonshire," vol. ix. 1805. "On the Natural History of the *Falco cyaneus* and *pygargus*," vol. ix. 1807. "Of several new or rare Animals, principally Marine, discovered on the south coast of Devonshire," vol. xi. 1809. "Of some new and rare British Marine Shells and Animals," ib. He also furnished six papers to the Wernerian Natural History Society, which were published between March, 1809, and March, 1815.

THE following very interesting communication has recently appeared in the 'Westminster Gazette':—

"The appetite of the zoological world has been very much whetted of late by the news of the discovery in South Patagonia of a portion of mammalian skin which, it is conjectured, may once have formed part of a genuine *Myiodon*, or Ground Sloth. This interesting animal has long been supposed to be extinct, and its reappearance in the wilds of South America would create a sensation as pronounced almost as if a Great Bustard had again swooped down upon Cavenham Heath, or a Large Copper been brought to the net in the neighbourhood of Whittlesea Mere. To use a departmental expression, some further tidings of the *Myiodon*—whether in flesh or fossil—are just now very much 'wanted,' and besides Mr. H. S. H. Cavendish, the well-known traveller, who has gone forth with confidence to shoot one for the authorities at South Kensington, Mr. George Davis and Mr. Scott, of Aberystwyth, are making tracks for the monster in the Patagonian forests at the instance of the Hon. Walter Rothschild, M.P., the owner of the famous museum at Tring.

"The details of this important, and possibly sensational, discovery come from two different sources, and are somewhat conflicting. Dr. F. P. Moreno, who recently arrived in England, brought with him a portion of the skin (described as being as dry as leather, hairy, and thickly encrusted with some bony substance), which was found hanging in a tree, it being part of a much larger piece which some Argentine officers had dug up in a cavern several years previously. In close proximity were discovered some

half-gnawed stumps of trees, an important clue to the identity of an animal which, unlike others of its species, did not climb the branches, but simply razed them to the ground by means of its prodigious strength. Professor Moreno believes that this fragment of skin belongs to the real *Mylodon*, and that it owes its present state of preservation to certain contributory circumstances which on other occasions have destroyed the potency of the effacing hand of time and weather! The skin has been exhibited before the Royal and Zoological Societies, where it had to pass under the review of some of the leading zoological and geological experts of the day.

“On the other hand, Dr. Ameghino claims to have procured some of the skin from natives, who assured him that they shot the animal, and that owing to the bony lumps it had to be literally hacked from off the carcass. He regards it as a living representative of the *Gravigrades* of Argentina, and has given it the name of *Neo-Mylodon listai*. Be that, however, as it may, the animal in question is—or should be—about the size of a Bear, and in many quarters the possibility that it may yet be found alive is hopefully regarded. If it is alive, it is scarcely possible that it will elude for long the vigilance of so keen and practised a big-game hunter as young Mr. Cavendish, whose name has been given to a new species of Antelope which he recently discovered on his travels in Africa. Up to the present the *Mylodon* has only been found in a fossilized state, its remains having been brought to light in a pleistocene fluviatile deposit not far from the city of Buenos Ayres nearly sixty years ago. There is a complete skeleton, but nothing more substantial, in the Natural History Museum at South Kensington, and there is an almost entire one in the Hunterian Museum of the Royal College of Surgeons. As a consequence, the efforts of those gentlemen who are endeavouring to establish its reality in the flesh are being watched with the closest interest.

“As to the ordinary Sloth, it has been thought by many that owing to the imperfect nature of its formation its existence must be a positive burden to itself; but this is far from being the case, as those know who have seen the agility which it displays in its native state in the forests of America, despite the unequal length of its arms and legs. True, it is absolutely helpless on *terra firma*—in fact, it can neither walk nor stand—but even that is excusable in the case of an animal that not only moves but also rests, and even sleeps, in a state of suspension!

“Since the above was written news has reached England from Patagonia that several huge bones, entire skulls, powerful claws, and a complete hide of the animal have been discovered deep down in a cave by Dr. R. Hauthal, of the La Plata Museum, who had also joined the ranks of the pursuers.”—F. P. S.

ON July 19th a specimen of the egg of the Great Auk (*Alca impennis*) was sold by Mr. J. C. Stevens, the well-known natural history auctioneer, of King Street, Covent Garden. The history of this specimen is well known. It was formerly in the collection of Comte Raoul de Beracé, having been bequeathed to him in 1834 by the owner of a fishing vessel at St. Malo. It afterwards passed into the possession of Baron d'Hamonville, who was the possessor of four eggs of the Great Auk, which were figured and described in the Mémoires of the Société Zoologique de France for 1888 and 1891. Of the four eggs belonging to the Baron, three have been sold by Mr. Stevens. The exact sum realized by the specimen sold on July 19th was 300 guineas. The egg was slightly cracked, and the dark markings were chiefly at the larger end, where the egg was slightly stained. The bidding commenced at £100. There was a brisk competition between two bidders, the egg being knocked down to Mr. Middlebrook, of the 'Edinburgh Castle,' Hampstead Road, the purchaser of Baron d'Hamonville's previous specimen, that was sold in June, 1895, at Stevens's, to Messrs. Jays, Regent Street, for sixty-five guineas, and afterwards resold at Stevens's, in July, 1897, to Mr. Middlebrook for 160 guineas.

THE Fortieth Annual Report of the Chicago Academy of Sciences for the year 1897, and dated Jan. 11th, 1898, has just reached us (July, 1899). We notice in the Curator's Report of the Museum that, "through the continued generosity of Mr. George H. Laflin, the Academy has acquired the valuable collection of birds lately owned by Mr. F. M. Woodruff. This collection is particularly rich in the birds of the Mississippi Valley, and also includes nearly every species recorded from the Chicago area."

THE Duke of Bedford has been elected by the Council President of the Zoological Society of London, to fill the vacancy caused by the death of Sir William Flower.

WE recently (*ante*, p. 96) recorded the death of Mr. A. H. Everett, the travelling naturalist and collector. We now with equal regret record the decease of Mr. John Whitehead from pestilential fever while on a scientific mission in the island of Hainan. Mr. Whitehead's zoological enterprise in the Philippines is well known to zoologists, and, as our contemporary, 'Natural Science,' truly observes, "as a collector, Mr. Whitehead was highly esteemed, and his death, at the early age of forty-three, will be especially felt in the Natural History Museum at South Kensington, the zoological collections in which have been enriched through his industry and skill."

IN the 'Transactions and Annual Report of the Manchester Microscopical Society' for 1898 is a paper by Mr. A. T. Gillanders on "Scale Insects," from which we extract as follows:—"In many parts of the country the trunks and larger branches of beech trees will be found coated with a white covering, presenting the appearance of a shower of snow having frozen. This pest has been graphically termed the 'Felt Scale' by Miss Ormerod, and the coccid itself is named *Cryptococcus fagi*. Where the pest is but sparsely distributed on the stem little damage accrues; but it is sometimes found about a quarter to half an inch in thickness, and when such is the case the bark separates from the stem, and the tree ultimately dies in consequence. A most interesting and successful remedial measure has been brought under the writer's notice at Blagdon, in Northumberland. With an $\frac{1}{8}$ -in. auger bore three holes at about equal distance right into the centre of the trunk, about three feet from the ground, and sloping slightly towards the root of the tree. Into these holes place as much flower of sulphur as can be conveniently got in, and then cork them firmly up with a plug of soft wood. This should be done in the autumn, and will be found successful. It was first adopted about thirty years ago, and the trees which were then operated on are now in comparatively good condition. Prior to the experiment they were covered with the scale, were very sickly-looking, and shed their leaves prematurely."

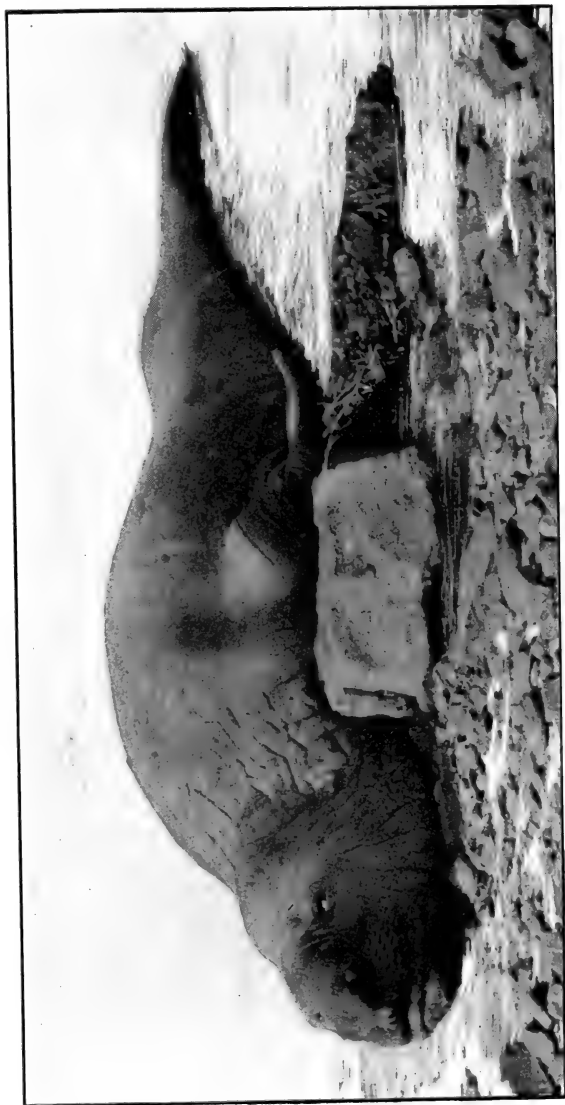
MR. MATTHIAS DUNN has contributed to the August number of the 'Contemporary Review' a very interesting article on "The Seven Senses of Fishes." These senses are considered and described as sight, touch, taste, hearing, smell, electric dermal sense, and magnetic dermal sense. The "electric dermal sense" affords fishes premonitory warnings of coming storms, and they then—Herrings have been observed—leave the shores "sometimes ten or twelve hours before the coming storm." The "magnetic dermal sense" is a guiding principle. Mackerel, Herring, and Pilchards "swim without error to their desired spawning-beds, sheltered homes, and pleasant feeding grounds. Now, these fishes cannot, like man, have objects to guide them to their desired haven, in the shape of high lands, lights, and sea-marks; nor can they be aided by telescopic sight in going these long distances, for in the obscure sea, as before shown, this is impossible; hence we conclude that some magnetic principle must assist in guiding them."

THE 'Wombat,' just received (May, 1899), gives "Ornithological Results during 1898," which reports that during the season just closed "steady progress has been made in Australian ornithology and oology."

We read that "the Garganey or Blue-winged Teal (*Querquedula ciria*) of Europe has been added to the list of Australian avifauna, as a pair have been identified that were shot at Lake Connewarre, near Geelong (Victoria).

THE important and well-known ornithological collection of Mr. H. E. Dresser has been acquired by the Manchester Museum (Owens College), through the munificence of a wealthy resident, who elects to be anonymous. This collection is essentially a student's collection, Mr. Dresser having collected a series of all but the very rarest species to show changes of plumage, variation arising from geographical distribution, &c.; and there are no real duplicates, as these have been most carefully weeded out, and all the skins are first-class ones. The Palæarctic collection is the most complete, for of the 743 species (according to the last calculation) found in the Western Palæarctic Area, about 725 are fully represented; and besides these there are about 260 strictly *Eastern* Palæarctic and allied species. All those figured and described in the 'Birds of Europe' are marked, and most of the labels bear notes by the leading ornithologists who have worked at the collection from time to time. Besides the Palæarctic collection, there is a collection of Bee-Eaters, comprising about thirty species, used by Mr. Dresser in writing his 'Monograph of the Bee-Eaters,' and one of Rollers (about twenty-six species), used in writing the monograph of those birds. Altogether the collection comprises about 1040 species and fully 10,000 specimens, and contains a fair number of types.

It is with the greatest regret that we have to announce the death of our very old and esteemed contributor, Mr. John Cordeaux, of Great Cotes House, Lincoln. We hope to publish a full obituary notice in our next issue.



THE "SEA-ELEPHANT" (*MACRORHINUS ELEPHANTINUS*).

THE ZOOLOGIST

No. 699.—September, 1899.

THE "SEA-ELEPHANT" (*MACRORHINUS ELEPHANTINUS*).

(PLATE III.)

SOME few months ago Mr. Robert Service, of Dumfries, kindly forwarded to us a photograph of a specimen of this animal which had been killed on the Falkland Islands. This photograph, however, was too faint for reproduction, and, at our request, he asked his correspondent, Mr. Wm. Grierson, of Stanley, F. I., to send us, if possible, a better impression. This has now been received, and is reproduced in the accompanying Plate. With the photograph, Mr. Service received the following letter from the capturer of this interesting beast:—

“STANLEY, F. I., *June 21st*, 1899.

“DEAR SIR,—Mr. Grierson gave me your letter of April 20th, enquiring about the ‘Sea-Elephant.’ I beg for your information to say that the animal is now very scarce, this being, I believe, the only grown one killed on these islands for the past twenty-five years. One was seen on the north coast about a year ago, but I have not heard of it since I killed the one, of which you saw the photograph, about this time last year, while I was killing a few Sea-Lions on a small island about fourteen miles to the southward of Stanley. I killed two Seals about 7 ft. long, and not until I saw the grown Elephant could I find out what they were. I then saw that they had been young Elephants.

“It was on February 6th last that the large one in question was found hauled up to high-water mark on the south shore of Stanley Harbour, and about one hundred yards to the east of the Settlements.

He made no attempt to leave the beach until he had been disturbed several times by my tapping him on the trunk. At first he only opened his mouth to the full extent; latterly he raised himself on his fore flippers and swung his after-part round, thus turning his head towards the water; after this, by placing his fore flippers a little forward and drawing his body forward, somewhat like a snail, he was making for the water. A rope was then passed over his head, and fastened to a rock to prevent his getting away. On being lanced behind the fore flipper the blood ran freely, but the animal pressed his flipper several times on the wound and stopped the bleeding, until the flipper was forced from his side; at a low estimate there was three hundred gallons of blood. The length from the tip of the trunk to the end of the hinder flippers was 17 ft. 18 in.; the skin, when spread, measured 18 ft. by 12 ft. He was in low condition as regards blubber, there only being forty gallons. The hide resembles that of the Land-Elephant in colour, and is covered with deep scars from the head to one-half of his length. The skin and skeleton are still here. I think to give the Smithsonian Institute the first refusal, as Mr. Grierson is sending photographs. I will send one of the skeletons, minus the head, which has not been taken.—(Signed) JAS. SMITH."

This appears to refer to some lantern-slides of a specimen which were exhibited, on behalf of Mr. Rupert Vallentin, at a meeting of the Linnean Society on June 1st last. According to the official report of that meeting,—“The distribution of this huge Seal on various antarctic and subtropical islands having been traced, Mr. Vallentin’s notes on a specimen killed in Stanley Harbour were read. It measured 18 ft. 11 in. from the end of the trunk to a straight line between the two hinder extremities; the trunk, produced by the inflation of a loose tubular sac of skin above the nostrils, is present only in the male, and measures, when fully extended, 12 in. from the gape. No fresh facts were made known concerning the nature of the food of this animal: described by some writers as herbivorous, like the Manatee; by others, as feeding on Mollusca and Crustacea, like the Walrus. In this case the stomach was empty, with the exception of a large number of Nematode worms, specimens of which were exhibited.”

In the late Prof. Moseley’s “Notes by a Naturalist on the ‘Challenger’” will be found considerable information regarding this animal. It has almost entirely deserted the island of Tristan da Cunha. Four specimens were found on landing at Kerguelen’s Land, where the species is probably common. On Heard Island there were strewn thousands of skeletons of the “Sea-Elephant.” “The bones lay in curved lines, looking like tide lines, on either

side of the plain above the beaches, marking the rookeries of old times and tracks of slaughter of the sealers." Specimens which were preserved on board the 'Challenger' were found to have "only a greenish slime in their stomachs"; and Moseley states that "neither the *Otariadæ* nor the 'Sea-Elephants' feed during the breeding season, but live upon their fat, becoming gradually thinner and thinner." They seem very plentiful on Heard Island, where on one beach thousands can be seen in the breeding season. The Californian "Sea-Elephant" (*Macrorhinus angustirostris*) is well described in Allen's 'North American Pinnipeds,' and is there stated to "differ very little in size, colour, or other external features" from the southern species. Capt. Scammon has described the animal and its habits most fully; and is by Allen freely quoted.

Under the name of *Macrorhinus leoninus*,* Trimen reports it as having been met with on the Cape Coast (*cf.* Noble's 'Official Handbook of the Cape and South Africa,' pp. 60-1). The Rev. A. E. Eaton, during his visit to Kerguelen Island, frequently saw young Sea-Elephants in Swains Bay. "Some examples are uniformly reddish brown, others are pale, blotched and spotted with darker grey. They usually lie just above the beach, separately, in hollows among the *Acæna* and *Azorella* where they are sheltered from the wind." (*Proc. Roy. Soc.* xxiii. 1875, p. 502.) According to the information obtained by Robert Hamilton, "They take particular delight in covering themselves with great quantities of sand, moistened by the sea-water, which they throw over them with their paws till they are entirely enveloped in it. It is under these circumstances especially, that with Forster, we might mistake them for so many enormous rocks." ('*Amphibious Carnivora*,' &c., p. 219.)—(ED.).

* The late Sir W. H. Flower advocated the use of this name. He wrote:—"There is much confusion as to the synonymy of the species. It is the *Phoca leonina* of the 'Systema Naturæ,' ed. xii., founded upon the 'sea lion and lioness' of Juan Fernandez, described and figured in Anson's Voyage, 1748; the *P. elephantina* of Molina, 1782, and the *P. proboscidea* of Perron, 1815, and of many late authors. *Leonina* therefore is the earliest specific appellation" ('*Philosoph. Trans.*' clxviii. 1879, p. 96).

AN OBSERVATIONAL DIARY OF THE HABITS
OF NIGHTJARS (*CAPRIMULGUS EUROPÆUS*),
MOSTLY OF A SITTING PAIR. NOTES TAKEN
AT TIME AND ON SPOT.

BY EDMUND SELOUS.

June 22nd, 1898.—Crawled up behind a small elder bush some three paces from where a Nightjar had laid her eggs. When nearly there the bird flew down, not on to nest, but close to it. Shortly afterwards the other bird flew down beside it, and immediately I heard a very low and subdued "churr," expressive of quiet contentment, I think, and very different from the ordinary loud note of the bird. After I had got up under cover of the bush the following occurred:—One of the birds came on to the eggs, and began to "churr" softly. The other bird then flew down and sat close beside it, also churring (I think, but cannot be certain if both churred together). The bird last arrived then flew away, leaving the other on the eggs. This one, after ten minutes or so, also flew away, uttering the "quaw-ee" note. In a little while one of the birds returned, and settled near the eggs. Its mate very shortly joined it; and I now heard another note, a low croon, quite distinct from the "churr" uttered by one or both of them. One bird then flew away, and the other came and sat on the eggs, and began to "churr" softly at first, then loudly, the ordinary churring note. In some ten or fifteen minutes' time it flew off. In a little while one of the birds returned, and was followed almost at once by the other. Both flew down near the eggs, and soon one settled itself on to them, the other flying away. I had now got my watch out, and this bird sat for fifty-five minutes silently (no "churr," no sound at all), at the end of which time its partner flew near by clapping its wings, and then sat on a bush close behind me (as I judged, for I could not turn), and "quaw-eed."* Upon this, as in answer to a summons, the

* As it flew off no doubt, for this note "quaw-ee quaw-ee" is, according to my observation, only made in the air.

sitting bird left the eggs, uttering the same note, and both flew away together. They were away for nearly twenty minutes, when one of them returned (this time flying right down on to the eggs in silence), and continued to sit silently for an hour or the best part of an hour (it being now too dark to see the time), during all which time I was digging out the sand behind the bush so as to have a better place to sit and watch in. I then went out and brought some branches to make more cover, but in placing these I startled the bird away. Having made a good shelter I left. I imagine that the bird which sat twice for a short time only and churred on the eggs whilst alone was the male, whilst the silent and long-sitting bird was the female.

June 23rd.—Found bird sitting at 3.15 p.m. The Nightjar seems almost as good an example of protective colouring as any insect. It harmonizes to absolute perfection with the sandy ground, dry sticks, and pieces of fir-tree bark, amongst which it so often lays its eggs. My shelter was at some three paces of the bird as it sat, and I could distinctly see the outline of the latter part of its body, and one wing with the tail. Yet, scrutinizing it with the utmost attention for ten minutes or a quarter of an hour at a time, it was only at twenty minutes past four that I finally became convinced it was the bird and not a piece of fir-bark at which I was looking; and this though I knew the eggs to be there, yet could not see them. Stayed till five, during all which time the bird sat in silence.

Returned at 6.10 p.m., and found bird (presumably the same one)* still sitting in the same position.

6.25.—A bird in clump of fir-trees near churred slightly.

8.15.—First flying note of the Nightjar heard as well as the "churr."

8.40.—Sitting bird relieved by her mate. He settled down facing her, and then, as it were, snoozled up to her, churring softly. Whilst doing so he waggled his tail from side to side, as did the other one also in exactly the same way. I believe therefore that both birds churred together, though I could not be quite certain that I heard the two separate notes. The bird I had been watching then flew away with a "quaw-ee," the other one

* One bird—no doubt the hen—sits on the eggs all day, and does by far the greater part of the night-sitting also.

having insinuated itself into her place on the eggs, but with the head turned the other way (to where the tail of the other bird had been). In a minute or two only the first bird returned, when both immediately flew away together (at 8.40) quaw-eeing. I could then see the eggs plainly. They had not till then been uncovered, one bird having, as it were, squeezed itself on and the other off them. (My tame Doves used to act in the same way, the one snoozling itself up to the other, and thus taking its place.)

8.55.—One bird certainly (I think two) flew near, clapping their wings loudly and repeatedly. I took them to be the pair.

8.55.—Two birds (probably the pair) flying about near, clapping their wings and quaw-eeing.

9 (nearly).—Bird flew down direct on to eggs and sat on them (in the accustomed position) for a second or two only, then again flew off quaw-eeing.

9.5.—A bird settled down somewhere not very far from the eggs, and kept churring. Another bird flew by quaw-eeing.

9.25.—A bird flew silently down near the eggs, then rose, hovered a few seconds over the tops of the nettles, thistles, &c., and again went down near them. It then again rose, and hovered over the eggs with its wings aloft over its back (characteristic), and once more flew down a little way off. Finally, at 9.27 or 9.28, it rose and came down on to the eggs with a clattering noise, made no doubt with the wings. It took some time to settle itself comfortably on to the eggs (which it did in the accustomed position), and then sat silently, not churring.

9.35.—A bird (the mate, I make no doubt) flew quite near (settled once, I think), clapping its wings and "quaw-eeing." From the sound I thought it clapped its wings whilst settled on the ground, as well as whilst flying, but cannot be sure either of this or that it did settle. During this time, and till 9.45, when I went away, the sitting bird was quite silent.

June 24th.—At 8.10 p.m. found bird sitting, but in a different position, the head being turned the other way. It was a wet night, and came on to rain a little worse as I arrived. At 8.25 an Owl flew by (flying fast and high) in exactly the same direction, and about the same time (for I had not looked at my watch) as the night before.

8.28.—Churring commences.

8.33.—A Nightjar flew by, uttering a single note like “queek queek,” not the more usual “quaw-ee.”

8.42.—Sitting bird relieved. The arriving bird hovered for some time above its mate, waving its wings rapidly, but uttering no sound. Whilst it was acting thus the sitting bird churred quietly and contentedly, wagging its tail from side to side as before. The whole body waggles as well as the tail, but the tail is the most noticeable. In a second or two the hovering bird settled on the ground beside the other, which then flew off quaw-eeing. Its partner continued to sit where it was—not on the eggs, but close by them—for two or three seconds, when it also flew off.

8.49.—Two birds (probably the pair) flew by pursuing each other, one of them clapping its wings loudly and repeatedly.

The birds being now gone, I went round the bush, and picked some of the nettles and grasses from about the eggs so as to have a better view of them from my shelter; then went back.

8.55.—Two birds flew near quaw-eeing and clapping their wings, and one settled not very far off—in a small fir tree, I think—and churred. After a little it rose, clapping its wings. At this time some other Nightjar, after churring, uttered a note like “chu-oo chu-oo chu-oo,” quite different from the usual “quaw-ee” as the bird takes flight. Whether this note is uttered whilst the bird is still sitting, or only as it flies off, I do not yet know.*

No bird returned to the eggs for over an hour, and I grew more and more uneasy. At last, at 10 o'clock, one returned, and hovered for some time above them. Instead of settling on them, however, it made a dart off to one side, and came down on the ground a little way off. Shortly afterwards it flew away. At 10.30 the eggs were still uncovered, though one of the birds had again hovered in the neighbourhood, though not very near them. I now went away. The eggs had therefore been uncovered from 8.42 to 10.30 as a minimum.

June 25th (10.15 a.m.).—Found bird sitting in the accustomed position (head towards me, that is, and tail overlapping dried stalk). Could see it even better than before, owing to having

* Only as it flies off, I believe.

removed what thin and scattered herbage had become interposed. It sat quite motionless, the large eye shut, but occasionally opening to a very limited extent so as to show a long black slit.

10.30.—The low sleepy "churr" of a Nightjar from neighbouring fir-clump. Left a little after 10.30.

At about 11 a.m. crept up behind a bush, near which sat another Nightjar with young birds (I had disturbed this family three or four days before, when the old bird spun along the ground as if hurt), From here I could see the bird sitting just as the other one did on her eggs with a young one on each side of her. This I did not remark till one of the young birds moved and then shuffled itself more under its mother's breast, causing her to sit with the head held higher. I then saw both this and the other young one for the first time. Just then (11.25) the old bird either saw me or suspected my presence, and went off the nest, spinning over the ground in various directions. She then flew to a small bush near by, and sat there, uttering a note like "chook chook chook." Shortly after she flew off and out of sight.

11.30.—Bird returned to a bush close to the one she had left, and again uttered the note "chook chook"; then sat silent.

11.55.—Bird left the bush and flew around evidently disquieted. At 12 I came out, but before leaving walked to where the young birds had been, and where I had seen them after the mother had flown away. To my surprise they were gone, and, though I looked carefully all about, I could not find them anywhere. The "chook chook chook" therefore of the mother may have been the danger signal.

12.30.—Came back to the first bird, and found it (assuming it was the same) still sitting, but in a changed position, the head being now turned the other way. This time I was entirely deceived by the bird's resemblance to an inanimate object (though the bird I had just left had not deceived me). Not catching the outline of the tip of the wings and tail across the dry stalk (to which I had become accustomed) my eye rested full upon it, and I thought I was looking at a piece of fir-bark, one of those amongst which it sat. I, in fact, looked for the eggs upon the bird, for I knew the exact spot where they should be. But as I should have seen them at once, owing to their light

colour, I felt sure that they must be covered, and, gazing still more attentively, all at once, by an optical delusion as it seemed, rather than by the passing away of one, the piece of fir-bark became the bird. The broad flat head, from which the short beak hardly projects noticeably, presents no special outline for the eye to seize on, but is all in one line with the body. It looks just like the blunt rounded end of a stump or piece of fir-bark, whilst the dark brown lines and mottlings of the feathers not only blend with and fade into the surroundings, but have in themselves, at a little distance, a great resemblance to the flaked surface of the bark, the lighter feathers exactly mimicking those patches where some of the layers have been more newly flaked off. This would only be of special advantage to the bird when, as in the present instance, it had laid its eggs amidst pieces of fir-bark, and, did it invariably do so, a special protective resemblance might perhaps be admitted. This, however, is not the case. It lays them also under beeches or elsewhere where no fir-bark is to be found. Unless therefore it could be shown that a large majority of Nightjars lay their eggs in the neighbourhood of fir-trees, the theory of a special resemblance due to the action of natural selection must be given up, as I believe it ought to be in other apparent instances. No doubt when the objects adjacent are different the sitting bird may often appear to have a special resemblance to one or other of them; but as, owing to its habits, such objects would be mostly of the same general description, the bird's colouring may have been made generally protective in relation to its incubatory habits. The Nightjar lays on the ground, and one of the birds sits on the eggs without leaving them the entire day. Day, however, is night to the Nightjar, which not only sits on its eggs, but sleeps, or a least dozes, on them as well. It is therefore much exposed during this period, and would be liable to be taken unawares without some protection, and such protection it has by virtue of its plumage and its habit of sitting very close. Drowsiness may in this case have meant security both to bird and eggs, for the most sleepy birds would, by keeping still, least endanger their young at all stages.

The two birds that I am watching have laid their eggs in the midst of pieces of fir-bark of various sizes lying on a sandy soil.

from which spring nettles, thistles, &c., with alder bushes scattered about singly or in clumps.

Left at 1.30, the bird not having moved perceptibly.* During most of the time the eyes were closed.

June 25th.—Found bird sitting at 8.15 p.m. Position a little varied from the usual one. The eye shut, the bird seeming to be asleep or dozing.

8.21.—A bird churred sleepily, but soon ceased.

8.30.—The first prolonged churring. I shall refer† to the occasional modification of the “churr” when it becomes less instrumental, and more voice, as it were, enters into it (for the ordinary “churr” sounds more instrumental than vocal). I shall also allude to the “chu-oo chu-oo chu-oo” uttered just after the “churr.” But besides these the “churr” (as heard by me at this moment) sometimes ends in a sort of jubilee of gurgly notes impossible to describe.

8.35.—First bird seen flying slowly and clapping its wings in a very leisurely manner. Upon the sound of a gun fired near the noisy “churr” sinks into a low bubbling note.

8.37.—The Owl flies high in the air in same direction as night before.

8.49.—Sitting bird relieved. Her mate came, I think, from neighbouring plantation, uttering the “quaw-ee” note, which she acknowledged with a soft churring. The newly-come bird then seated itself beside the other in exactly the same attitude (like a Swift on the ground) at a distance of about six inches, and both birds churred together,‡ wagging (it is the best word) their whole bodies, as well as their tails, from side to side, especially the one on the eggs. In a second or so this latter rose from the eggs, and flew away to the plantation from which the other had come. This one did not move on to the eggs, but continued to

* Except blinking the eyes.

† In concluding “General Observations.”

‡ “This churring note . . . is said to be confined to the male bird, and only uttered when it is perched” (*cf.* Seebohm, ‘History of British Birds’). “The well-known vibrating ‘churr’ is believed to be uttered by the male only” (*cf.* Howard Saunders, ‘Illustrated Manual of British Birds’). “As the season advances the song of the cock,” &c. (*cf.* Prof. Newton in ‘Ency. Brit.’ (last edition), and also in ‘Dictionary of Birds’).

sit where it was, and in a few seconds (before I had finished making the note) flew off after the other.

A little before nine a bird passed near quaw-eeing. Another flew by a little after, also quaw-eeing, and clapping its wings in a rather peculiar manner. No doubt they were the pair. At a few minutes past nine one of the birds came back, hovered a little over the eggs, then darted to one side, and settled on the ground a little way from them. Soon it walked up to them (or rather waddled,* the legs being quite invisible); and now I witnessed a curious action. I must say that just previously, when both birds were away, I had left my shelter in order to pick another nettle or two, and thus give myself a still clearer view, and I had then noticed that the two eggs were rather wide apart. As the bird now got on to them (which it did by pushing itself along the ground), it must, I think, have moved them still farther from each other. At any rate, it became necessary, in the bird's opinion, to alter their position, and in order to do this it went into a very peculiar attitude. It, as it were, stood up on its breast, with its tail raised almost perpendicularly in the air, so that it looked somewhat like a peg-top placed peg upwards on the broad end, the legs being at no time visible. Thus poised, the bird pressed with the under part of its broad beak, or, as one may say, with its chin, first one egg and then the other against and under its breast,† and, so holding it, moved backwards and forwards over the ground, presenting a strange and unbird-like appearance. The ground, however, was not even, and, despite the bird's efforts to get the eggs together, one of them (as I saw) rolled down a little declivity. At the bottom some good-sized pieces of fir-bark lay partly buried in the sand, and under one of these the egg became wedged. The bird was unable to get it out so as to bring it up the hill again to where the other egg lay, for the bark, by presenting an edge, prevented it from getting its chin against the further side of the wedged egg so as

* This word, though I could think of no better one at the time, does not properly express the bird's motion. As will appear later on, the Nightjar is quite at home on the ground.

† In such a position the bristles fringing the gape would help to keep the egg secure, whilst the toothed claw would help the bird to get a grip on the ground in its strained attitude; but I do not estimate this as any special adaptation in relation to these odd and probably infrequent proceedings.

to press it against its breast as before, though making the most desperate efforts to do so. Wedging its head between the bark and the ground, the bird now stood still more perpendicularly upright on its breast (or rather, in this case, on its head) than it had done before, and in this position shoved and shouldered away most desperately. After each effort it would lie a little, as if exhausted, then waddle to the other egg, and settle itself upon it; but in a minute or two it would return to the one it had seemingly abandoned, and repeat its efforts to extricate it. I must have watched the bird make at least half a dozen of these attempts; but at last, after nearly half an hour, an idea occurred to it (or rather it altered its tactics then, as the idea may have come sooner). Again going to the properly placed egg, the bird, instead of covering it as before, began to move it to the other one in the way that I have described. "If the mountain will not go to Mohammed, Mohammed must go to the mountain." That was clearly the process of reasoning, and, seeing how set the bird's mind had been on one course of action, how it had toiled and struggled and returned to its efforts again and again, its sudden adoption of another plan shows, I think, both intelligence and versatility. It, in fact, acted just as an intelligent man would have acted. It tried to do the best thing till convinced it was impossible, and then did the second best. Still, we cannot any more, than in the case of the man, assume that the alternative course of action was not in the bird's mind from the beginning. Having got the two eggs together again, the bird appeared to me (for it was now too dark to observe accurately) to be trying to push the piece of bark away backwards with its wings, feet, and tail. It certainly propelled itself backwards against the edge, after the manner—observed by Jenner, and now, I believe, authenticated by photography—the young Cuckoo ejects its foster brothers and sisters from the nest. Finally, at 9.40, it flew away. I then went out to look, and saw that the bird had been successful in its efforts to a certain extent. The two eggs lay together, and though not quite on the same level, and though the piece of bark was still in the way of one of them, it might still, though not with ease, have sat on them both. However, had I left them as they were, I have no doubt that the birds would have worked away till matters were quite

satisfactory. But having watched what had been taking place for a full half-hour at only three paces distance, and as, on the bird's return, it would have been too dark to see anything more, I thought I would assist them, and so smoothed down the declivity, and laid the eggs side by side on a flat surface. I must add that while the bird was thus struggling to extricate its egg it uttered from time to time a low querulous note.

At about ten one of the birds settled on a bush just in front of me, and sat there silently for some ten minutes, then flew and settled on the ground near eggs for a minute or two, and whilst there uttered a low guttural note. Finally, at 10.13, it came and settled itself quietly on to the eggs as I had placed them. This and my subsequent observations make me think that it was not the bird that had got into difficulties, but the other and more skilful one—the hen, no doubt—the cock bird being less perfect in the art of incubating.

June 26th.—Reached bush at 8.22 p.m., and found the bird sitting in the same position as night before. It seemed to be asleep, the eye being fast shut. The eggs appeared to have been moved slightly to one side, judging by where the bird sat.

8.34.—Sitting bird relieved. Process exactly the same as on night before. The relieving bird came from neighbouring plantation quaw-eeing, and when near was answered by a gentle "churr" from the brooding bird. This latter's head was turned the other way, so that she could not have seen her mate as he flew up. Moreover, she opened her eyes for the first time at his "quaw-ee." The new-come bird settled himself beside the brooding one as on previous night (same distance apart), and both of them churred, gently wagging their bodies from side to side. Then in a few seconds the relieved bird flew away (I think silently), and was followed a few seconds afterwards by the other one, which had not moved on to the eggs, or from where it had alighted. Upon going round the bush and looking at the eggs, I could not feel certain that they had been moved from where I placed them the previous night. The distance, I find, from where I sit to the eggs is just three paces.

8.53.—Bird flew near, and would have perched on the same little bush (just in front of me) as last night, but it saw me, I think, and, very little startled, settled on ground close by.

Soon it flew up again, and came right down on to the eggs, settling itself in a different position to that at 8.22, the head being turned the other way. The eye, as far as I could see in the waning light, was again shut.

9.3.—The other bird flew up quaw-eeing as before, and, when near, the sitting one churred softly. He settled beside her silently whilst she continued to “churr,” lifting up her tail and wagging it from side to side. I had not noticed the tail lifted so high before; it was raised considerably from the ground. In a few seconds the sitting bird flew off, and the other at once moved on to the eggs, but did not get on them properly, and began to pull them about with its beak (always the under part or chin), though not going into the curious attitude of the night before. The bird did not seem able to manage the eggs, and, after sitting hardly a minute on one only, flew off again, leaving them a couple of inches apart instead of side by side, as they had been left by the other.

9.22.—Bird settled on ground in neighbourhood of eggs, churred a little, and then flew away.

9.33.—Bird settled on ground near eggs, and in a second or two flew on to them, and got them together again, I think by stretching out a wing to one of them, and pulling it up to itself, but too dark now to see properly. At any rate, there was no clumsiness or uncouth attitude this time. This bird seemed master of the art of sitting; believe it to be the hen, and that it was the other (the cock bird) that got into difficulties with the eggs last night, and again this, though not to the same extent. If this be so, then the cock Nightjar is only a “prentice han” at incubation. Had to leave now.

Note.—This same night (at 9.15) had several fine opportunities of watching pairs of birds chasing and playing about with each other high in the air (a beautiful sight), both of them clapping the wings above the back as an essential part of the performance. The clapping of the wings is as characteristic of this bird, as is the churring itself, and as much an expression of feeling between the male and female during the breeding season.*

* At least in relation with the bird's nuptial activities. Compare aerial antics of Peewits in the spring. This most salient peculiarity of the Nightjar appears to have been most inadequately noticed. I have not met with an interesting remark in regard to it.

(I shall subsequently allude to this point under "General Observations.")

June 27th.—(Bad weather all day; rainy and cloudy evening.)

Arrived at 8.15. Heard birds churring already. Bird sitting. Head turned towards stalk, eyes closed, and seemingly asleep. When sitting the tips of the wings cross each other over the tail, which projects an inch or so beyond them.

8.50.—At the loud bang of a gun not far off ("making night hideous") the bird just opened its eyes (the one next to me at least) to the smallest possible extent, hardly noticeable at all, and then shut them again. They had been closed until then, but for one little blink.

8.40.—The eyes still fast closed. A bird flew by quite near quaw-eeing, but the sitting bird took no notice. Again the bird (or another one) flew by, still closer, calling as before—no notice. But a little farther on he was answered by a soft "churr" from the ground, his mate, as I concluded, sitting on the eggs. He did not settle, but circled round several times, quaw-eeing and clapping his wings, the other bird answering with "churrs," and also a soft croodling note, very expressive of satisfaction. Note that my sitting bird paid no attention to the greeting of a bird, not her mate, which greeting was not addressed to her, though uttered quite close—in fact, just over her head.

8.55.—A bird flew near by quaw-eeing, and the sitting one answered with a very subdued and low "churr" (the lowest I have yet heard). The bird flew on without settling. The sitting bird had not opened its eyes properly till then. I seemed to recognize the note made by the flying bird, but wondered at the "churr" being so low and so quickly ended.

Query.—Was it a mistake on the sitting bird's part? It sounded like, "Was that——? No. I thought I recognized his voice."

Five or six birds now flew near about, seeming to chase and sport with each other. Some flew quite close, but to their cries the sitting bird made no response.

9.10.—Partner still not come. Sitting bird now became wakeful, moving her head round first one way and then another; then flew off so suddenly that I thought she must have caught

sight of me through the screen. In all probability, however, this was not the case.

Walked about a little, and returned to screen at 9.30.

About 9.40 a bird came and sat on the same alder-stump as night before (some four feet high, and only a few feet from where I sat, with very little cover between—last night hardly any). It sat there about ten minutes, uttering during a good part of the time a low guttural note, perhaps something like “ho-oo ho-oo ho-oo,” but impossible to write it. No doubt whatever as to this; heard it as plainly at that distance as if the bird had churred. At 9.50 bird flew from its stump round my bush and on to its eggs, which suddenly disappeared, but it was too dark to see the bird on them.

June 28th.—Arrived at 11.20 a.m., and found bird sitting, the head this time turned straight towards me, which had not been the case before. Evidently dozing. One eye, however, was a little more open than the other, showing just a black slit. A Blow-fly was walking over its head and beak, and the bird took no notice. Flies afterwards settled on it from time to time, and walked about over it. When they went over its eyes the bird blinked the one or the other of them, or just twitched without opening it. A large green fly flew right at one of her eyes, when, without opening it, she gave her head a jerk.

Three times, whilst sitting here, I observed the feathers just under the bird's throat to be quivering, whilst the beak was very slightly (as slightly as possible) open. I satisfied myself that this motion of the feathers was produced by the bird itself, and not by the wind, for it was only occasional, whereas the wind was continuous. They were often still during a sudden gust of wind, and, moreover, why should the wind have moved just those feathers and no others? I could hear no sound, though I believe there was one. The bird perhaps was dreaming and churring in its dreams.

Left at 1.10 p.m.

7.25 p.m.—(No rain during day and sunny, but now cloudy and almost raining.) Bird sitting in nearly same position as in the morning. Eyes shut.

8.25.—Sitting bird relieved. Its partner flew up quaw-eeing, and when near was answered with a slight “churr.” It settled

down a few inches off, and then both birds churred, wagging their tails from side to side in the usual manner. In a second or two the sitting bird flew off, silently at first, but when she had gone a little way gave a "quaw-ee." The other one sat where he was for a second or so (not going on to the eggs), and then flew after her.

9.28.—Bird began to "churr" on eggs,* and did so at short intervals in little bursts for a few minutes, as if it heard the voice of its mate, which I believe it did, though I could not.

9.50.—Other bird settled on elder-stump near, and kept uttering a peculiar single note like "quo quo," which was answered (but only occasionally) by a "churr" from the sitting bird.

9.53.—The bird on the stump flew near to the one sitting, which rose and joined it, and then both flew off quaw-eeing.

9.55.—Bird flew on to stump, and kept uttering low single note. In less than a minute it flew to eggs and sat on them. Was still sitting at 10.35, when I came away.

June 29th.—(Fine day, sunny.)

12.7 p.m.—Found bird sitting in same position as yesterday, head towards me, affording a very good front view. The bird kept constantly quivering the feathers of the throat. Just those particular feathers which make a sort of lappet dividing the throat and breast, were in a continual state of trembling, or vibration. The beak was very slightly open. I could catch no sound, except just once, for a single moment, the faintest possible "churr." There was a considerable wind, and the nettles all around the bird were swayed backwards and forwards (though the low plants were not to nearly the same extent). Yet no other feather of the bird's body was stirred, and I particularly noticed that one which projected a little from the side of the throat rather lower down was quite steady. Moreover, with the nettles still swaying in the wind, the tremulous motion I speak of would stop for a instant or two, and then recommence. During this time that eye of the bird which I could see was either shut or very slightly opened. Splendid view of the bird brooding to-day. The feathers of the breast are pressed outwards over the eggs, so that the bird seems sitting on a square pedestal of its own

* I have omitted to note bird's return.

feathers. Could see one of the eggs projecting from under the feathers. Left at 12.44.

8.48 p.m.—Bird sitting. Position changed since morning. Wings and tail crossing dried stalk, as at first. Eyes closed. Other bird settled nine or ten paces from eggs on ground. Churred a little, and sat still. Sitting bird did not answer, seeming to be asleep. About nine the partner flew up and sat beside the sitting bird, who then just churred a little. The other did not “churr,” and almost immediately flew away quaw-eeing. The other still sat on, and seemed to go to sleep again.

9.15.—The partner again settled on ground near and churred a little, the sitting bird taking no notice. The latter now moved, and two little white fluffy things (as at that distance and in the waning light they seemed to me to be) scrambled from beneath her. They were the chicks.

(To be continued.)

THE HAUNT OF THE RING-OUZEL
(*TURDUS TORQUATUS*).

BY C. TROLLOPE.

SOME birds seem to belong to all scenery alike; others love only the waste common land, the stream, or the sea-shore; while a third division, *οἱ εκλεκτοί*, are only to be found in one or two favoured counties in the whole of England. Of these last are the Ring-Ouzels. Dartmoor, the hills of Derbyshire, the Yorkshire Moors, are perhaps the best known of their summer haunts, but there is a little-known nook of Western Herefordshire to which they come with unfailing regularity. There they have entrenched themselves among the wild hills known in the Ordnance map as the Black Mountains; and there, in the May of this year, I journeyed with a friend whose love of birds at least equals, if I will not allow that it surpasses, my own, to see them at home.

The way to the dingle which the Ring-Ouzels love, took us first through a country—the country around the foot of these hills—which was curiously like some out-of-the-way corner of Brittany. The small rough fields, where gorse takes up much space from the poor grass; the small fields of hand-sown wheat; the tall hedges, sweet with bird-cherry, with pink crab trees, with yet sweeter may blossom; the brown babbling trout-stream running down the valley; the white rough homesteads; the small farms of so few acres, farmed by the holders with slow toil and antiquated methods, and not by hired labourers who must needs bring their work up to the perfection which he who pays for labour naturally requires:—all this had some unique foreign charm, and recalled another country, dwelt in, as this, by dark-haired Celts, who cling with a like dogged faith to their own inherited thoughts, methods of work, superstitions not a few.

The way to the hills leads through such a country as this, but when the mountains are reached civilization disappears, and spring too, although it is the latter end of May. In the sheltered

dampness, indeed, under slabs of rock, the *Cystopteris fragilis* and the gleaming white flowers of the familiar wood sorrel are seen, and always inseparable; and on the lower edges of the hill, where the little streams soak out, we found the butterwort in abundance, its parchment-like leaves with their curled edges shining out star-like in the still wintry grass. But on the mountain-top, where other and stranger plants grow among the dark bog-pools, there was as yet no sign of summer life. Only the diminutive *Luzula spicata* did what it could to make colour, with its golden anthers gleaming from brown flowers amidst the waste of heather, which had as yet put out no spring shoots. We only saw one butterfly, a *Pieris napi*, and that seemed half asleep, perhaps wholly disappointed in a world too wet for its fresh wings. The only links with the spring, the almost summer indeed, of the valley were the numbers of Common Heath moths which were fluttering among the heather, undismayed by the showery day.

We had to cross two wild heather-clad hills before we reached the Ring-Ouzels' haunt, but when we reached it we owned that they were birds of taste. At the head of their dingle two hills join, and there a waterfall runs down, its course marked among the rocks by brightest green of soft, cushiony moss, by tufts of *Nephrodium dilatatum*. The scene was desolate wildness, bounded on the west by the steep rocks and the waterfall, on the north and south by the two bare mountain sides, while on the east stretched the at first narrow valley, with its brawling stream. The mountains were patterned over by great stones, by larger slabs of fallen rock, by patches of heather, black, tragic, in colour as if burnt, and showing yet no tinge of spring green, by patches of bilberry covered by pinky green leaves and a few pink flowers, but which in the distance and in the mass seem only a dull sullen yellow. Only one tree broke the straight sky-line of the solemn mountains, a rowan tree growing high up amid the rocks, and as yet destitute of leaves.

It was a land of waters. I tried, as I sat and waited for the coy Ring-Ouzels, to think of "the silence which is among the hills," but the thought did not do. The air was full of the noise of the water-pipes: water leaping down the head of the dingle, water murmuring on down the valley, water springing out of the mountain sides and sliding over the grass in narrow streams

which had not had time to make a channel for themselves, water spreading out into spongy places or disappearing suddenly under ground, whence we still heard it trickling mysterious, like water in a dream, and reappearing many feet lower down the mountain slope.

At first we seem to see no bird, except a little lonely Wren who sings persistently, its voice rising shrill above the water-pipes. And, crossing the mountain, Meadow Pipits had been our constant companions; but here, in the dingle, there seemed to be no bird in the universe save that solitary Wren.

Yes. After that patient waiting which all bird lovers know so well, a Rock Dove, blue, smaller by many inches than our familiar Wood Pigeon and of less swift flight, flew out from the rocks by the waterfall and crossed the ravine. They build here in community, and once a wanderer, who often rambles lonely through these untrodden ways, caught one in his hand on its rude nest on a ledge or rock—such was its ignorance, its sweet trustfulness. And as he let it go into the sunlight he saw the sheen of iridescent green on its lustrous breast, and remembered that centuries ago the Dove's feathers of "pale-green gold" had been noticed, and perhaps loved, under far-away skies.

Then the Wheatears appeared from we knew not where, flitting restlessly from rock to rock, and uttering a soft and sweet call-note. Their song, sung so often to the listening waste alone, we did not hear; but we found a nest. For as we went up a little sheep track a bird slipped out from under a great slab of rock and flew up the dingle, showing no further anxiety for its treasures. And there, far under the stone as arm could reach, in darkness and in damp, was the warm nest and four eggs of faded blue.

Soon the Ring-Ouzels began to show themselves, but the eye so loses itself on these wide still wastes, amid the spacious simplicity of great sky and great mountain, that it is difficult at first to follow these little specks of flitting life or to mark them with our field glasses. And, if the truth must be told, in the hours spent among them we added little or nothing to the information with which our books provided us. The birds would not come anear or suffer us to come near them. They kept indeed a suspicious eye upon us, flitting in the direction in which we walked, perching on heather or slab of rock to watch our move-

ments, but always far away. Their loud *bravura* song we never heard; nor did they utter that harsh alarm cry for which we listened. But we had had, at least, the joy of penetrating to the heart of their mountain fastnesses, their sanctuary among the hills; and henceforth we knew the Ring-Ouzels as we should never have known them had we not seen them on their native heath.

A RAMBLE NEAR SYDNEY.

BY DAVID G. STEAD.

PERHAPS few cities are so admirably situated as Sydney, placed as it is upon the shores of that much-talked-of, much admired, but never adequately described harbour, Port Jackson.

To the ordinary resident in Sydney nothing is more welcome than the advent of a holiday, for then full advantage is taken of the wondrous plenitude of resorts lying in the many arms and indentations of the harbour; these, from their number alone, making the ever arising question, "Where shall we go?" quite a knotty problem, which at times is not easily decided.

The naturalist—especially the marine zoologist—who, of course, looks at things in quite a different light, is still at times considerably puzzled, on account of the multiplicity of places of interest to be reached comfortably by coach, rail, or boat within the scope of one day's wanderings.

What is undoubtedly the most popular resort of Port Jackson is Manly, "the Brighton of the South," which on one side faces the harbour, and on the other the Pacific Ocean. The harbour side forms a veritable "happy hunting ground" for the zoologist, as around the rocks and amongst the dense seaweed with which they are clothed a great variety of animal forms—chiefly Crustacea and many-hued fishes—is to be found.

My reason for giving this short preamble, is, that I wish to introduce to our readers a realm that is overflowing with interest to the zoologist, and one that has been the scene of many of my wanderings, including the one now described. But as very few will be familiar with the locality, and as most naturally wish to know a little about any place under consideration, I feel some justification in thus introducing it.

I may add, that, as the following observations have been quoted almost verbatim from my note-book, they are necessarily of a somewhat general nature, though chiefly—as in this case they should be—zoological.

April 23rd, 1899.—To-day I wended my way to Manly, and from thence journeyed by coach to Rocklily, some miles along the coast. It was a most enjoyable and perfect day. As we drove along through the balmy bracing atmosphere, with the occasional buzz of insects coming to our ears, ever and anon could be heard the extremely melodious cry of the Collared Crow-Shrike (*Cracticus torquatus*), one of the so-called "Butcher Birds," rising above the more feeble twitterings and chirpings of the smaller birds. *En route* also I was much impressed and interested by the gradual change in the physical aspect of the land as we began to come out upon the "Narrabeen Shales" (which here crop out from under the "Hawkesbury Sandstone"). Amongst the objects of interest which were passed I must not omit to mention several beautiful cabbage-tree palms, which reared their stately crowns high in air.

After a pleasant drive in the genial sunshine we arrived at Rocklily, where I alighted, and whence I began to walk on my return journey to Manly *via* the coast. Whilst making my way from there to the coast (a distance of about half a mile) I was greatly amused by the actions of a small insectivorous bird, which, by feigning to be wounded, did its best to attract me away from where I knew its nest must be situated; however, as I had experienced that before, I took no notice of it. On Rocklily beach I found indisputable evidence that the sand-dunes were resting upon shales, as at intervals portions of these shales cropped out, and here and there were little streamlets of salt water oozing out of the sand (all at the one level), the sole visible occupants of which were a few small Amphipoda. On the drier parts of this and the succeeding beaches the tiny burrows of minute grey Isopoda, as well as the animals themselves, were much in evidence. Here also were to be seen the burrows of the beautiful swift-footed Crab (*Ocypoda cordimana*), which penetrate obliquely into the sand for some distance.

After traversing these beaches, and while rounding a headland, I disturbed several Ravens, *Corvus australis* (the "Wahgun" of the Bourke district aborigines), which were walking about at the water's edge; also a Cormorant (*Phalacrocorax novæ-hollandiæ*), which was perched sentinel-like upon the adjacent rocks. (Incidentally, I might mention that there is a price set

upon the heads of Cormorants, on account of their depositions amongst the piscine tribes, and the supposed injury caused thereby to our fisheries; but personally, I am of opinion that it is rather misplaced, as they also dispose of a large quantity of floating offal, thereby rendering us a great service.) At this point my attention was attracted by a large mass of rock which had fallen from the top of the cliff, and which displayed in a very interesting manner the junction of the Narrabeen Shales and Hawkesbury Sandstone. It consisted mainly of sandstone, but on the under surface there was a layer of shale about three inches in thickness. This layer possessed all the appearance of mud, of which the surface had been formed into small undulations by the action of water, then sun-dried, thereby cracking in all directions. It was evidently thus upon the day that the sand was swept over it, filling up the cracks, and thus preserving their contours admirably.

Whilst traversing the huge beach which here intervened, it was very pleasing to observe the evolutions of a number of Porpoises (*Phocæna*) which were here disporting themselves. The sun was shining full upon them (from behind me), so that I was enabled to see them distinctly as they often sprang completely out of the water. I was here also interested by the performance of a "Little Black-and-White Cormorant" (*Phalacrocorax melanoleucus*), which at one time would be flying lightly over the water, at another making a terrific vertical plunge for some fish which happened to be near the surface. A little farther along this beach I came across a flock of Sea-Gulls (*Larus novæ-hollandiæ*). At my approach they all, with the exception of one, flew away, which remaining bird, I perceived, was wounded. After a little manipulation I managed to "round it off" away from the water, and succeeded in making it cross the road (which here skirts the beach) into the bush, whereupon I secured it. It turned out to be a most beautiful specimen. Before finishing this beach (which was the largest travelled over during the day), I turned my attention to numbers of the *Physalia*, or "Portuguese Man-o'-war," which were being washed up. Nothing can excel in point of beauty the exquisite iridescent tints of these little creatures as they sail or float in on the tide by means of the *pneumatophore* or "float" with which they are provided, and nothing could appear

more peaceful or less likely to do harm; but woe betide the unlucky and unsuspecting wader or bather who becomes entangled in their tentacles, for, by means of the stinging capsules with which they are studded, they are capable of inflicting the most acute pain and inflammation. These tentacles, which may be drawn close up to the pneumatophore, are capable of being let out to a length of thirty feet or more.

After collecting a few of these *Physaliæ*, I once more resumed my journey, and at last finished this seemingly almost interminable beach, and rested myself for awhile at the foot of the landward slope of the headland ("Long Reef"), which here juts out into the sea. I say "rested"; rather should I say I would have, but for the attacks of a relentless little band of mosquitoes which gave me their undivided attention, and seemed bent upon making as close an acquaintance with me as possible.

I now crossed this neck of land to the next beach (also a great length), and in the distance on the waters of the bay espied what I at first took to be the heads of a great number of the fronds of the large brown seaweed protruding above water (although it struck me as being rather strange that, supposing it to be seaweed, there was no broken water around, it being in the middle of the bay); but, upon drawing closer, I found, to my delight, that it was a large flock—consisting of from eighty to ninety*—of Black Swans (*Cygnus atratus*), which were resting and pluming their feathers upon the then placid waters of the bay. After watching their movements for some time I marched onward, and, upon reaching the southern extremity of the beach, looked back, and found that they had all betaken themselves to the neighbouring "Deewhy" lagoon, which is separated from the ocean—as are most of the lagoons along the coast—by the sand-dunes only. Here it was that I could not help contrasting the headland (Deewhy Head), near which I was standing, with the one (Long Reef) on the other side of the bay. The former is composed solely of the "Hawkesbury Sandstone," and, as a consequence, is high, rugged, and precipitous; while, on the other hand, the latter consists entirely of "Narrabeen Shales," is

* This was a very large flock, the average consisting of from thirty to forty individuals.

comparatively low, has a gentle slope inland, and has a rapidly disintegrating sea-face composed in great part of fairly soft clays. The hardest part of my walk now began, as I had left the easy slopes of the shales behind. Here amongst the rocks, as would be expected, animal life in the way of birds, reptiles, and insects became more abundant, and I began to keep a sharp look-out, especially for the smaller Reptilia; nor was I disappointed, for, after turning over a few loose flat stones on the southern slope, I found one under which was concealed an almost typical collection of the "small fry" usually found in these localities. This assortment consisted of—1, a large flat side-walking Spider; 2, several specimens of the large black Wood-bug (which, after the manner of its kind, emits at times a most disagreeable odour); 3, some small prettily marked Cockroaches; 4, two species of Ant; 5, a collection of Termites, or "White Ants"; 6, a small Centipede;—all these in the way of Arthropoda. Then of Reptilia there were three species, comprising two specimens of a small "Rock-Gecko" (*Gehyra variegata*), one of a fine mottled Lizard (*Egernia whitei*), which grows to a length of twelve or thirteen inches (including tail), and, lastly, the exquisitely beautiful and agile little Lizard (*Lygosoma tæniolatum*). The last mentioned is very beautifully marked, having on its dorsal aspect brown yellow, and white longitudinal stripes running the whole length of the body; these,—with the exception of one brown stripe on each side which forms a line of demarcation between the dorsal and ventral surfaces,—upon reaching the tail gradually fade into a light yellowish colour. But it is when the sun is shining on it that this little creature is seen at its best, for then the whole of the many-striped body shines again; and the tail possesses a semi-transparent roseate hue. The little "Rock-Gecko" (*Gehyra variegata*) also deserves a word in passing. When one is picked up it begins to squirm its subcylindrical truncate tail about in a most ridiculous manner, doubling it up in a somewhat similar fashion to the Scorpion, and seemingly doing all it can to give the impression that the tail is a stinging organ. In man—at any rate, in most cases—it has the desired effect,* and has thereby earned for itself the title of "Rock-Scorpion," this title being

* I am of opinion that the same effect would be produced upon many of the marsupials or birds that have come into contact with Scorpions.

also held by a neighbouring species (*Gymnodactylus platurus*), in which the tail is even more like that of the Scorpion. This latter species, especially in some parts of the country, is held in great abhorrence on account of its supposed stinging powers, but nothing could be more fallacious, as it is perfectly harmless, and its appearance is its only defence. Both species have also the power of voluntarily throwing off the squirming tail, thus distracting attention while the animal is making its escape. These Geckos are at times covered apparently with bright red or pink tubercles. I say "apparently," because on examination with an ordinary hand-lens these "tubercles" are resolved into minute ticks, which by contrast with the brown body are extremely noticeable.

Of course, it is not usual to find all the foregoing animals upon such a small area (about a foot square), and at least one of the reptiles crept under as I approached.

After proceeding a little farther, I came upon a specimen of Cunningham's Lizard (*Egernia cunninghami*), the most salient feature of which is its extremely rough tail. In disposition it is inclined to be sluggish, but when pursued it can manage to progress at a fair rate of speed.

Whilst crossing this headland I observed a "White-bellied Sea-Eagle" (*Haliaëtus leucogaster*) soaring around at a considerable altitude, and standing out in bold relief against the azure sky.

As the afternoon was wearing on, and I still had a considerable distance to traverse, I decided to halt nowhere else; so, as soon as I had passed this headland, I hastened over the beautiful sandy beach (about half a mile in extent) which stretches away from its base; though not so fast but that I had time to observe a number of the burrows of that interesting little bright-coloured "Soldier-Crab" (*Mycteris longicarpus*). These burrows are surrounded by numberless little round pellets of sand, which the busy little crustaceans bring up to the surface during the course of their excavations.

Departing from this beach, I began to walk across country through the scrub, as I was drawing near to Port Jackson, and wished to strike the road (along which I had passed in the coach during the early part of the day) as soon as possible. On the way through the bush I noticed a great many of

the short burrows (averaging about six inches in depth) made by the Bandicoots (*Perameles obesula* and *P. nasuta*) while in search of their food, this consisting mainly of insect-larvæ, worms, and roots. On either side were also to be seen the miniature white sandy tracks "winding their tortuous ways along," made by those little "Macadams," the Ants.

Here the bushes were almost alive with Common Sparrows and Honey-Eaters (*Meliornis novæ-hollandiæ*), and the united chirruping of their thousands made quite a tumult. While speaking of this locality, I think I may presume sufficiently upon the forbearance of the reader to relate a little incident which occurred hereabout. I find, on referring to my note-book, that it was on Sept. 27th, 1896. I had come down to Manly, and walked from thence to "Curl Curl" Bay. When returning, and on the look-out for birds and reptiles, I came suddenly upon a small brown-coloured* Snake, which darted from me, and started twisting and turning, a short distance away, in a most curious and remarkable manner. Although I walked up and stood right over it, so rapid were its movements, and so nearly did its colour resemble the dead leaves with which it was surrounded, that had it not been for an occasional glimpse of the ventral aspect (which was of a dirty white hue) it would have been utterly impossible for me to distinguish it. Now, all the time the Snake was squirming about, doubtless trying to hide itself under the leaves (and this is to me the most interesting part), it uttered a peculiar little chirping sound, somewhat similar to the call of a young bird. As I did not wish to kill it, I got a small pronged stick, intending to catch it alive; but the moment I touched it with the stick it disappeared like a flash—whither, I know not—leaving me blankly staring at the ground. I was quite dumfounded, as, although watching the animal intently, I did not see it go. I scraped the leaves off the ground for some distance around, but did not discover any holes, and, though I hunted "high and low," could not find any trace of the Snake; I therefore came to the conclusion that it had escaped altogether, the protective coloration being greatly in its favour. I have only heard of one

* I purposely say "brown-coloured," so as not to mislead the reader into thinking that I mean what is commonly known here as the Brown Snake (*Diemenia superciliosa*).

other instance in this city of a Snake making this chirping sound, but perhaps some of our readers may have had a somewhat similar experience; if so, I would be pleased to hear of it.

To resume my narrative. After leaving this locality I continued my journey along a cart-track through the scrub, nothing of special importance being noticed excepting an occasional specimen of a large and beautiful Spider (*Nephila*), which here and there stretches its beautiful yellow silken web right across the track. These webs are exceedingly strong, as well they might be, the prey of the Spider including such large insects as the Cicadas, Phasmids, &c.; also at times a small bird—the “Silver-Eye” (*Zosterops*)—has been found entangled in the meshes.

Leaving this track, and after trudging along rather wearily for about two miles, I reached Manly just as twilight was setting in, and the Bats were coming out in search of their evening meal. In due course I arrived home, thoroughly tired out, but more than ever impressed with a sense of the immensity of Nature, and imbued with a feeling of extreme gratification and thankfulness at being one of the comparative few to whom has been given the desire to know her secrets.

OBITUARY.

JOHN CORDEAUX.

By the death of Mr. John Cordeaux this magazine has lost one of its oldest and most esteemed contributors. From April, 1864, to May of the present year there has appeared in our pages, from his pen alone, a series of zoological notes and observations that collected would be sufficient material for a fair-sized volume, and one that would, apart from its valuable contribution to avian migration, be a handbook to the natural history of Lincolnshire.

Mr. Cordeaux, who died at Great Cotes House, in Lincolnshire, on August 1st, at the age of sixty-nine, was one of the recognized field naturalists of the day, and was especially an ornithologist, and an authority on the birds of the county in which he lived. His 'Birds of the Humber District' was first published in 1873, and a new and revised edition to April, 1899, was noticed in our last issue. Formerly engaged in farming a portion of the Sutton estate, he had relinquished his agricultural pursuits and devoted the later years of his life to sport and natural history. It was to the phenomena of avian migration that he devoted much time, and he mainly helped to achieve the very considerable results that have already obtained to that branch of natural science. As early as 1874 he journeyed to Heligoland, and visited Gätke to compare notes on the subject which so interested both of them, and with which their names are so identified. In 1875 he published in the 'Ibis' a critical and descriptive notice of Gätke's wonderful collection of birds taken on what might well be called Gätke's Island. In 1879 a fresh impetus was given to the study when he joined Mr. Harvie Brown in a successful endeavour to enlist the services of the keepers of lightships and lighthouses along our coasts in making and recording observations as to the movements of our migratory birds. The Committee appointed by the British Association to further this undertaking, of which he was the hard-working

secretary, and the publication nine years afterwards of Mr. Eagle Clarke's "Digest of the Observations," sufficiently appraise the value of this work. The Acts for the protection of sea- and wild-fowl gave him much occupation, and he was one of the expert witnesses before a Select Committee of the House of Commons which was formed to take evidence and advice on the subject, the particulars of which are to be found in a Blue Book published in 1873.

Besides being a frequent and most valued contributor to our pages, as well as to the 'Naturalist,' 'Ibis,' Meteorological Society's 'Journal,' and other publications in sympathy with his favourite studies, he was a member of the British Ornithologists' Union; F.R.G.S.; and President, in 1894, of the Lincolnshire Naturalists' Union. His last publication was apparently in the August number of the 'Naturalist,' and, strangely, was an obituary notice of his late friend and brother naturalist Dr. Bendelack Hewetson, the last paragraph of which contains such prophetic sentences—when read to-day—as "when all present voices have become silent," and a reference to the "valley of shadows."

John Cordeaux was that type of English country gentleman who was not only esquire among the inhabitants of his neighbourhood, but also over the fauna of his county.

NOTES AND QUERIES.

MAMMALIA.

CARNIVORA.

Seals in the Wash.—It may be worth recording that there still exists a colony of Seals in the Wash. On Aug. 18th, when sailing in a small yacht from Hunstanton to Lynn, we had a good view of a party of seven lying on a sand-bank a few miles from Wolferton; and, returning in the evening, we saw the same, or another lot, near the same place. The day was rather misty, but there seemed to be considerable variation both in size and colour among the party. Our boatman assured us that they breed in the locality, and that he had seen much larger parties on the sand-banks. It is much to be hoped that these most interesting animals will not be wantonly destroyed, or in any way molested.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

AVES.

Variety of Song-Thrush in the New Forest.—In July a somewhat peculiar variety of *Turdus musicus* was killed, and at the same time another almost similar specimen was seen—possibly both of one brood—in one of the woods of the forest. It is not mature, being about three parts grown, and its tail is rather short. On dissection it proved to be a male, and the following description indicates its unusual appearance:—Crown, back, and tail almost white; throat, cheeks, and breast pale buff, the usual crescentic black spots occupying the central portion of the tips of each feather being white, conspicuously so when closely examined; wings rather darker, more dirty looking than the back, but the reddish tawny outer edges of the primaries and wing-coverts are very marked, forming a double bar across the wing; legs and feet pale brown; eyes normal. On several previous occasions I have seen white, or nearly white, Thrushes, but they invariably had pink eyes, being albinos, as I supposed; but none were so near maturity as the one I have attempted to describe. A few years ago I recollect a man finding a nest containing four young ones, two of which were white. He took the whole brood with the intention of rearing all, but both white individuals died within a week of their capture, indicating perhaps that they were not so strong as their darker and more normally hued brothers. The latter grew to maturity, and, being both males,

rewarded their protector with abundance of song. — G. B. CORBIN (Ringwood, Hants).

White Wagtails in County Cork.—Seeing in your last issue (*ante*, p. 364) Mr. Robert Warren's note on the occurrence of *Motacilla alba* in North-western Ireland, I think it may be interesting to state that I observed one bird of that species on the river Lee, Co. Cork, on April 20th of this year. The wind on 15th, 16th, and 17th was N. and N.E.; on 18th, 19th, and 20th, S. and S.W.—WM. T. CRAWSHAY (Chesthill, Perthshire).

Chirl Bunting probably often overlooked.—In reference to the note on *Emberiza cirrus* (*ante*, p. 322), I think that the bird is still probably overlooked in many parts of its range. Some time ago, when I reported the occurrence of a bird I believed to be *E. cirrus* in North Cheshire, I was promptly reminded that the species had never before been known in the district. With due care I therefore examined the specimens of *E. cirrus* and *E. citrinella* exhibited in the Natural History Museum, fully expecting to find I had been in error. However, the true *E. cirrus* at any rate resembled the bird I had seen quite as closely as did the common *E. citrinella*, and I returned unconvinced, after repeated examinations. On June 16th, whilst cycling through Dunham Massey, Cheshire, I saw a bird exactly resembling the first I had seen with a dark mark on the throat. I at once dismounted, but the bird settled in some growing crops, and did not reappear. As neither of the birds I saw were shot, it will, I think, be better to suspend judgment, and I am willing to admit after all they may only have been varieties of *E. citrinella*; but I hope these two suspicious occurrences, together with the recent discovery of the species in Wales, will stimulate ornithologists to keep a sharp look out for the true *E. cirrus*.—GRAHAM RENSHAW (Sale Bridge House, Sale, Manchester).

Swifts Fighting.—According to an editorial note (*ante*, p. 269), Bree stated he had been told that Swifts had been found grappled together on the ground by their claws. It may interest readers of 'The Zoologist' to know that some time ago I caught two specimens of the common Indian Swift (*Cypselus affinis*) in this predicament in the Indian Museum buildings. When taken up and separated they proved well enough to rise and fly when placed on the floor. This species, I find, can almost invariably rise from a flat surface; I once found one which could not, but flew away on being thrown into the air. Does the power of rising from the ground vary in different individuals in Swifts? It would almost seem so, for Dr. P. Rendall, writing ('Ibis,' 1892, p. 222) of this same species (*Cypselus affinis*) in Africa, says, "This bird is unable to rise from the ground." The gait of *C. affinis* on the flat is a plantigrade crawl, the feet resting on the ground

to the hock, and being moved alternately. This I ascertained by catching and tying the wings of an adult specimen the other day. I thought the point worthy of investigation, as so few adult birds are plantigrade, though I have found the young of Rollers (*Coracias indica*), Woodpeckers (*Brachypternus aurantius*), and Barbets (*Cyanops asiatica* and *Xantholæma hamatocephala*) to be so in the course of my investigations out here. Seebohm, I believe, stated that the Guillemot and Razorbill walked on the tarsus, but this is not, in my experience, invariably the case with the former, at all events.—F. FINN (Indian Museum, Calcutta).

Curious Variety of the Green Woodpecker.—My brother and I have just seen, in the local birdstuffer's shop, what we consider a most curious and handsome specimen of the Green Woodpecker (*Gecinus viridis*). The bird was a pale greenish yellow colour all over the body. There was a scanty amount of red over the head, and the "moustache" was hardly noticeable. It was a female, and was shot this year near Bath. Knowing that Woodpeckers are not generally subject to great variation, I hope this note may prove interesting. — CHARLES B. HORSBRUGH (4, Richmond Hill, Bath).

Demoiselle Crane on the Norfolk Coast.—A female specimen of *Grus virgo* was shot at Brancaster, on the Norfolk coast, on July 31st, and sent to Mr. Clarke, of Snettisham, for preservation, by whose courtesy I had the pleasure of examining it. It had been feeding on the growing corn, and was shot in a corn-field. Whether it was an escaped bird, or whether it may be allowed to rank as an addition to the Norfolk list, I am content to leave to those of your contributors who have for so many years worked at the avifauna of the county to determine.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Grey Plover in Summer Plumage in Yorks.—We have just received (Aug. 19th) a female Grey Plover (*Squatarola helvetica*) for preservation, which was shot by Mr. J. J. A. Riley on Midgley Moor, Yorks. We think the appearance of this bird in summer plumage in this locality a somewhat rare occurrence.—ROWLAND WARD (166, Piccadilly).

Curlew (*Numenius arquata*) at Sea.—At 9 a.m. on Aug. 5th, at a distance of about twenty miles from the south-west coast of Ireland, I observed three Curlews flying at a height of about a hundred and fifty feet above the sea. The birds held a south-westerly course, and came close to the ship, which was not moving at the time; they then altered the direction of their flight, and disappeared to the south-east. The morning was very bright and fine. I do not recollect to have seen these birds so far out at sea before.—K. HURLSTONE JONES (H.M.S. 'Repulse,' Channel Squadron).

Distribution of a private Collection. — The museum of the late J. R. Wallace, of Distington, was sold by auction on August 1st and following days. Mr. Wallace lived for many years in the Isle of Man, and several of his British birds were procured on that island. Lot 1145 included an immature Black-tailed Godwit, procured on the Isle of Man, and presented to Mr. Wallace by Dr. Hulme. Lot 1160 included a Grey Phalarope, in autumn dress, from Man. Lot 1188 included a Richardson's Skua from Langness Point. Lots 1210 and 1227 included female Smews from the Isle of Man. Lots 1229 and 1230 consisted of two pairs of Shovellers from the Isle of Man. Lot 1241 was a Whooper from the Isle of Man. Lot 1211 consisted of a Brent and a Bernacle Goose from the same. I also bought a Cornish Chough from the island. The rarest Cumbrian specimen was a well authenticated example (immature) of the Spoonbill. Another bird which I secured was a hybrid between the Hooded and Carrion Crows, killed at St. Bees. The three last named go to the Carlisle Museum. There was also a local Hoopoe, but it was much faded, and we have already two local specimens in the Carlisle Museum; so I did not bid for it. A fair specimen of the Ivory-billed Woodpecker and some other good birds were bought for the Tring Museum.—H. A. MACPHERSON (Allonby Vicarage, Maryport).

AVICULTURAL NOTES.

Cape Scops Owl (*Scops capensis*) in Captivity. — I had the rare pleasure of observing one of these queer little Owls in captivity. It lived in a small cage for about a month. Its food consisted mainly of Rats, which were trapped, killed, and given him. It was astonishing what sized Rats the little Owl could devour. He would seize them with one foot, and tear off the flesh, leaving nothing but the head. Small mice were swallowed whole. He also ate small birds and raw beef occasionally. When approached he would erect his ears, blink and roll his eyes, half-spread the wings, and rock from side to side with a sort of circular motion, thus presenting a very comical appearance. If I stuck my finger into his cage, he would peck at it violently. He had still another method of showing his displeasure, or expressing his rage, by snapping his jaws together with a loud clacking noise. This little Owl only measured $6\frac{1}{2}$ in. in length. Iris light golden yellow; feet and bill greyish black.—ALWIN C. HAAGNER (Modderfontein, Transvaal).

[I kept a specimen of the Spotted Eagle-Owl (*Bubo maculosus*) for some years in captivity. I used at first to feed this bird largely on *live Rats*, which it attacked most courageously, and would sit on the body of its victim all day, though it always kept the Rat's head outside its feet both before and after death. After some months in captivity it lost its courage, and would not

approach these rodents. Mice it would swallow at once, and at any time of the day. This specimen was captured one evening in the heart of Pretoria, where it had flown against the telegraph-wires, and had fallen to the ground. When disturbed it uttered the clacking noise well described above by Mr. Haagner. I shot many specimens by daylight. They are artful, cowardly birds, running, or rather slinking, among the herbage before taking flight, and have to be followed down. In the pursuit of this bird, I felt like running down a thief who always tried to hide.—ED.]

REPTILIA.

The Cape Monitor: Correction.—With reference to the remarks of the Editor of this magazine at the foot of my note on this animal (*ante*, p. 226), and to those of Mr. Charles Tanner (*ante*, p. 272), I find I was guilty of an error. The fact is, I wrote *albigularis* by mistake, and only after perusing the first mentioned remarks did I become aware of my error. Carefully examining the reptiles, I found that they belonged to the species *V. niloticus*. This is a certainty, as, in addition to the other points of distinction, the nostril is situated midway between the tip of the snout and eye, rather nearer the eye. With reference to my other remarks concerning the creature's habits in captivity, I can only repeat what I have said, having carefully verified my statements. — ALWIN C. HAAGNER (Modderfontein, Transvaal).

PISCES.

Pelamid in Cornwall.—On Aug. 17th I captured, in Helford River, a Pelamid, or Belted Bonito, *Pelamys sarda* (Day). This specimen (a male) measures 19½ in. long, and weighed 3½ lb. It has only five broad vertical bars on the back, not thirteen, as figured by Day. The narrow oblique stripes, however, correspond with Day's figure, and are ten in number. The stomach was empty, except for a few pieces of vertebral column of some small fish, apparently Pilchard. My specimen is being preserved by the Marine Biological Society at Plymouth. Day says of this fish that "it is abundantly spread throughout the Mediterranean to the Black Sea, and also through the Atlantic Ocean"; so it seems curious that it should not occur more frequently on our coasts.—H. LEYBORNE POPHAM (R. Western Yacht Club, Plymouth).

INSECTA.

Great Wood-boring Wasp (*Sirex gigas*) in Ireland.—It may interest Mr. Pentland (*cf. ante*, p. 184) and others to know that a gamekeeper obtained two Great Wood-boring Wasps (*Sirex gigas*) last summer in Co. Down, and that I was given another specimen from the same county.

I once saw a Spider catch a *Sirex gigas* by the antenna, and hold it till it succumbed.—CHARLES B. HORSBRUGH (4, Richmond Hill, Bath).

[In the 'Irish Naturalist' for this year (p. 26), Mr. W. F. Johnson writes:—" *Sirex gigas* has made its appearance in widely separated localities. I received three specimens, all females; the first was captured at Acton House, the next came from Loughgall, and the third from Downpatrick. Evidently this undesirable addition to our insect fauna is making every effort to establish itself in Ireland."—ED.]

Vanessa atalanta Twenty Miles from Land.—A specimen of this butterfly flew on board the ship when we were some twenty miles from the Irish coast, on Aug. 5th. It was in perfect condition, and very lively. I observed it still about, and still very lively, thirty-six hours later, whilst coming up the English Channel. As we had not been in port for six days, it almost certainly came from the coast. A small moth—some species of *Pyralis*—came on board at the same time.—K. HURLSTONE JONES (H.M.S. 'Repulse,' Channel Squadron).

NOTICES OF NEW BOOKS.

The Fauna of Shropshire. By H. EDWARD FORREST. Shrewsbury: L. Wilding. London: Terry & Company.

THIS is a very welcome addition to our county faunistic handbooks. "The whole area of Shropshire is only about 1340 square miles, yet within this compass we have plateaus and plains, hills and vales, boggy flats and heathery moors, cornlands and pastures, wooded slopes and barren crags, meres and ponds, streams big and little, and—most important of all—the river Severn." Sea- and shore-birds are attracted by the meres, and the still reaches of the Severn, which river again is followed in its course by many birds—as Sandpipers—and fishes. Among the mammals enumerated, "the Wolf, the Roebuck, and the Wild Boar have been long extinct, and the Pine Marten disappeared this century; while the Polecat is on the verge of extinction"; the Wild Ox is also included, though this animal is now of antiquarian interest. Of birds 250 species are enumerated, of which 87 are classed as residents, 34 as summer migrants, 17 birds of passage, 40 winter migrants, and 72 as waifs or accidental visitors. Six reptiles (one of which, the Smooth Snake (*Colonella lævis*) is included, at present, on very slight authority); seven Amphibians, twenty-nine Fishes,—of which the Sea Trout (*Salmo trutta*) is now added by courtesy,—and three Lampreys (Lowest Vertebrates) complete the subject-matter of the volume.

One of the most interesting features of this book is to be found in the lives and portraits of Shropshire naturalists, which include such well-known names as Eyton, Rocke, and Houghton. Charles Darwin was also a Salopian, but *his* work was confined to no county and limited to no country. Another excellent idea is the printing of the names of resident birds in capitals, and of visitors and casual wanderers in ordinary type. To show the contrast, however, different coloured printing would greatly facili-

tate the aim. Other assistance is rendered by the letter B attached to a name, denoting "bred in Shropshire," while with migrants the average dates of arrival and departure are also given below the names. Many photographic plates of groups of excellently "set-up" mammals and birds give a distinctive charm to one of those volumes which are generally procured with avidity by students and lovers of our British fauna.

The Birds of Breconshire. By E. CAMBRIDGE PHILLIPS, F.L.S., &c.
Brecon: Edwin Davies.

IN the pages of this magazine there has appeared, from time to time, a series of papers by Mr. Phillips on the Birds of Breconshire. These were reprinted in 1882 for private circulation, and the same re-written and considerably enlarged it is now our pleasure to peruse and notice. "Breconshire is not a large county, and is so well known that it needs but a slight description. It embraces among its general features, in a marked degree, mountain and moor, valley and hill; it has one large lake, Llangorse, with numerous mountain tarns, and is drained by the Usk and partly by the Wye and their tributaries. Yet with all these advantages of nature the ornithology of the county is not so varied as might be supposed."

The Kite (*Milvus regalis*) up to the year 1889 had increased considerably, but in that spring many were killed, three or four close to the town. Even now, however (1899), a few pairs still breed, and are protected as far as possible in the county. The Marsh Harrier (*Circus aeruginosus*), which was formerly common on the hills between the 'Storey Arms' and Merthyr, is now, unfortunately, supposed to be extinct. The Raven is generally considered to live to an old age, but it is well to obtain actual facts, and Mr. Phillips is able to refer to a bird which must have been fifty years old when it was killed by a dog. Severe cold causes strange messmates, and here we read of a Sparrowhawk roosting close by some Bantams in a thick holly-tree in the dead of winter; in similar weather a Jay was found feeding with the poultry in an aviary, where it must have pushed itself between the wires to get to the food. The varieties of food that birds

and all animals sometimes indulge in is here represented by an interesting fact. A Heron was killed in a field close by a stream, and its crop was found to be filled with Field Mice. This volume is full of "natural history" facts and observations, and is one of the few enumerations of a fauna which, apart from its scientific value, can be read with absolute pleasure. It refers to 198 species of birds.

Cambridge Natural History. Vol. VI. Insects: Part II. By DAVID SHARP, M.A., M.B., &c. Macmillan & Co. Limited.

THIS is the second instalment and completion of an important contribution to a knowledge of entomology, by Dr. Sharp. The present volume includes the continuation of the Hymenoptera, Coleoptera, Strepsiptera, Lepidoptera, Diptera, Aphaniptera, Thysanoptera, Hemiptera, and Anoplura. The most distinctive contribution is that relating to the Coleoptera, an order to which the author has mostly devoted his time, and on which he is recognized as a considerable authority. The Coleoptera have long been classified in a somewhat archaic, if convenient, manner, and we are glad to see here a break from old tradition and a new arrangement proposed, commencing with the Lamellicornia, though these are separated from the Clavicornia by the Adephaga, a proposition which will probably be a more disturbing factor with many Coleopterists. These pages, however, are not the place for so purely a technical discussion, though the careful consideration of all proposed systems is generally pregnant to a further knowledge of the creatures on which such propositions are founded.

With the other orders much useful information abounds, though of course these lack the essential *imprimatur* which the special knowledge of the author gives to his treatment of the Coleoptera. The authorities quoted are naturally more selective than comprehensive, and although many references will be gladly appreciated by workers at these groups, the absence of other references is sometimes very accentuated.

We read that the number of described species of butterflies is probably about 13,000. Forty years ago the number known was not more than one-third or one-fourth of what it is at

present, and hence Dr. Sharp does not consider it too much to anticipate that 30,000 or even 40,000 forms may yet be acquired. We quite agree with him, however, in the opinion that "the species of Rhopalocera seem to be peculiarly liable to dimorphic, to seasonal, and to local variation; so that it is possible that ultimately the number of true species—that is, forms that do not breed together actually or by means of intermediates, morphological or chronological—may have to be considerably reduced."

In the almost congested entomological literature of the present day, this work will long maintain a distinctly acknowledged individuality.

Lancashire Sea Fisheries. By CHARLES L. JACKSON.

Manchester: Abel Heywood & Son.

THIS is a polemic, but a valuable one. It is almost precisely on the lines and argument of Prof. McIntosh's 'Resources of the Sea,' which was noticed recently in these pages (*ante*, p. 188), being a protest against the State's interference with man's livelihood by means of the fishing industry. Of course this is a very wide question. Is our supply of marine fishes seriously jeopardized by the action of the free use of the trawl and net? Many hold that it is, as, for instance, Prof. Herdman, who is treated in this reprinted lecture very frankly by Mr. Jackson, who, on the contrary, holds that the enormous fecundity of most marine animals is an all-sufficient protection against the destructive influence of man. We have described this publication as a polemic, but a valuable one. Its very strenuous advocacy makes it the first; its many excellent recorded facts and observations redeem it, and constitute it a welcome addition to the literature of the subject. Perhaps, however, the author was more concerned with the controversial element; still the natural history reader will probably forget the sorrows of the fishermen, and revel in the anecdotal details of the life-histories of his prey.

A Handy Book of Fishery Management. By J. W. WILLIS
BUND, F.L.S. Lawrence & Bullen, Limited.

THE main teaching of this book, and which will attract our readers, is how to observe the life-histories of fishes. We have excellent field-ornithologists who have acquired their knowledge direct from nature, but how few have directed the same attention to freshwater fishes. In a moderately deep stream it is not so easy to decide always whether a fish is a Trout or a Grayling. But here a knowledge of habits will decide the question. A Trout can keep still, a Grayling cannot. "The rough tests are size for Salmon, immobility for Trout, mobility for Grayling." If any one wants to know if there are Tench in a pool, "let him go and sit beside it some warm evening in June, just before it is dark, and then, if he hears a splashing among the water-plants, and sees the leaves disturbed, he can rest quite certain that there are Tench in the pool, and that they are spawning." And many other hints to the observer in a little-worked study is afforded, which should render a stream as full of interest as a wood, and prove that a knowledge of the habits of our fishes is not confined alone to a capacity for hooking them. We all know how an overhanging or adjacent tree or bush affords an insect banquet to a crowd of fishes in the stream. Mr. Bund gives a very practical example. "A stream comes down from the Welsh hills, which are open, bare, and uncultivated. A large larch plantation has been made. Above the plantation the Trout average seven to the pound; below they average five, and the difference in my opinion is entirely due to the quantity of food the plantation turns out into the river."

No one who wishes to successfully manage a fishery can afford to be without a precise knowledge of the habits and life-histories of fishes. This knowledge is seldom cultivated by angling preservationists. The writer of this notice, who in earlier days mixed much with anglers and pursued the craft, always found that he belonged to a brotherhood that knew how to catch, but was no match in real natural history of the subject with the village poacher, a worthy whose detested success is based on practical observation. Mr. Bund's book, besides detailing the secrets of Fishery Management, gives much information on a subject which is strikingly absent from 'The Zoologist' "Notes and Queries."

Bird Life in an Arctic Spring. The Diaries of DAN MEINERTZHAGEN and R. P. HORNBY. R. H. Porter.

THIS small but beautifully illustrated book is the *verbatim* diary of a three months' sojourn in the Arctic regions in 1897. It does not add much to the knowledge of scientific ornithology, but it will be read with pleasure by all lovers of birds. It is no small advantage to now and again meet with a naturalist who really loves his subject, and is not merely a describer of species, a critical nomenclator, or a resurrectionist in archaic technicalities. Dan Meinertzhagen was none of these things; his birds were evidently to him living realities, and subjects for a very considerable artistic capacity, as plates in this volume bear witness. One of the most original observations we have met in these pages does not refer to birds at all. "It is a curious fact that pine and fir trees, when they rot while standing, warp from right to left, and birch from left to right. This is almost invariably the case."

An Appendix on the "Mottisfont Birds" relates to one of the largest collections of living Eagles and raptorial birds in this country, formed by Meinertzhagen, and located at Mottisfont Abbey, on the Test, near Romsey, the residence of his father. This young ornithologist died last year, at the early age of twenty-three.

EDITORIAL GLEANINGS.

It appears that a new fish may be added to our faunistic catalogues, if carefully sought. Mr. G. A. Boulenger, in this (September) number of the 'Annals and Magazine of Natural History,' gives the following particulars. "Last year in the Bay of Concarneau, and this year in the Gulf of St. Malo, my attention was attracted to a large Goby, growing to 10 inches, and most excellent eating, which appears to have been overlooked by all authors who have written on the fishes of the English Channel and the Bay of Biscay. This Goby I have ascertained to be *Gobius capito*, C. & V., a species believed to be restricted to the Mediterranean."

As it is highly probable that this species will be added to our British fauna, Mr. Boulenger has given the following diagnosis to assist our British ichthyologists:—"Habit particularly stout and heavy; depth of body 5 times in total length; length of head $3\frac{2}{3}$ times. Head a little broader than deep; snout $1\frac{1}{2}$ diameter of eye, which is $5\frac{1}{2}$ times in length of head, and a little exceeds interorbital width; strongly enlarged outer teeth in the jaws; maxillary extending to below posterior third of eye; head scaly only on the occipital and upper opercular regions. The distance between the eye and the dorsal equals the distance between the end of the snout and the preopercle. Dorsal VI, 15, the two portions very narrowly separated; the longest soft rays $\frac{1}{2}$ length of head, a little longer than the rays of the first fin, the base of which measures $\frac{1}{2}$ its distance from end of snout. Anal with 12 rays. Pectoral $\frac{3}{4}$ length of head, with silk-like upper rays. Ventral not reaching vent, with well-developed anterior flap forming an obtusely pointed process on each side. Caudal rounded. Caudal peduncle as long as deep. 61 scales in a longitudinal series, 22 between dorsal and anal. Greenish to blackish olive, more or less spotted and marbled with black; dorsal and caudal fins spotted with black; ventral whitish; yellowish white beneath. Total length 19 centimetres.

"Of the two British species with which this *Gobius* may have been confounded, *G. paganellus* and *G. niger* differ in the larger scales, there not being more than 17 between the dorsal and the anterior rays of the anal and 55 in a lateral series, and in the absence of the antero-lateral lobe of the ventral disk."

We trust that we may soon receive an account of the capture of *Gobius capito* along our southern coasts.

“OUR Obligations to Wild Animals” is the subject of a communication, by Sir Herbert Maxwell, to the August number of ‘Blackwood’s Magazine.’ This article prompts much consideration, and is well worthy of the most careful perusal. Sir Herbert early starts with the postulate, “that animals, whatever we may feel to be our obligations towards them, have no rights, except such as human legislation has conferred upon them.” All our anxiety for animal welfare is on this argument utilitarian. “It has been recognised that without song-birds this world would be a far less desirable place of abode; without insectivorous birds, a far less profitable place for farmers and gardeners; without birds of brilliant plumage or graceful form and flight, a much less interesting place to spend a holiday. Therefore the legislature has undertaken to protect Nightingales, as long as they do not forget their melody, and do not exchange a diet of caterpillars for one of wheat and strawberries; and Swallows, as long as they skim about in their own enchanting way, and confine their voracity to insect life.” . . . “The doctrine of Aristotle that ‘animals have no rights,’ has been reaffirmed lately under authority of the Church of Rome, and applied in a manner which makes every humane heart burn with indignation. The Pope, if he is correctly interpreted, has lent his official sanction to the abominable maxim that it is contrary to the principles of true religion to legislate for the well-being of animals, and an infringement of the rights of Christians.” The writer, however, though no anti-vivisectionist, is a good sportsman, a class we thoroughly believe is “hardly ever indifferent to the welfare and comfort of the animals which serve him”; and, again, the contention seems thoroughly sound, that, “to deal rightly and considerately with animals, wild and domestic, the emotions must have their due influence; the heart must be tender, but it must not rule the head.”

“ON the Affinities of the Enterochromes” is the subject of a communication, by Marion J. Newbigin, in the ‘Zoologischer Anzeiger’ (No. 593). The authoress had previously suggested the name of Enterochrome for green pigments in Invertebrates, and had pointed out the difficulties in the way of the supposition that these pigments are identical with plant chlorophyll. Recently Dr. McNunn has also been re-investigating these pigments, and has come to the conclusion that they are derivatives of chlorophyll, and are produced by the action of the digestive ferments on the chlorophyll of the food. This prompted Miss Newbigin to renewed experiments, the results of which, taken in conjunction with the recent observations and conclusions of Dr. McNunn in the case of enterochlorophyll, and with the fact that that pigment occurs in the fæces of *Patella*, seem “to justify the conclusion that enterochlorophyll at least

is an acid derivative of chlorophyll, produced by the action of the digestive juices on the chlorophyll of the food." This may seem dry reading, but it is highly important to grasp some of these technical facts before launching one's boat on the pleasant waters of theoretical speculation on the problem of animal colouration.

INVITATIONS have been sent to the leading ornithologists of this country to attend a meeting at Serajevo in Bosnia at the end of September. This reunion of bird-lovers will take place under the auspices of the Austro-Hungarian Government, and is promoted by Dr. Herman, of Budapest, and Dr. Lorenz, the Custos of the ornithological collections in the Vienna Museum. "The Hungarian Central Bureau," of which Dr. Herman is president, occupies itself greatly with the study of the migration of birds, and every year it publishes a detailed account of the observations from a small army of ornithologists, who record the migration in the various districts of the Austrian Empire. The excursions arranged in connection with the congress are likely to be full of interest. The Second International Ornithological Congress, which was held in Budapest in 1891, was perhaps the most successful gathering of naturalists that has yet taken place.

At a meeting in Calcutta, of the Asiatic Society of Bengal, in June last, Mr. F. Finn exhibited a living soft-shelled Tortoise (*Emyda* sp.?), and read the following remarks by Mr. W. K. Dods:—

"I got the Turtle, exhibited, on the evening of April 1st, when out after Eld's Deer, on one of the grassy plains near the mouth of the Sittang River. Though dry and burnt up at the time of my visit, this ground is a swamp during at least seven months of the year, after which, when the water, even in the Buffalo-wallows, begins to disappear, the Turtles and Water-snakes bury themselves in the mud, and lie off, till the first monsoon rains soften the soil and release them for another season. This particular individual was under about two inches of soil, so dry and heated by the sun as to be most disagreeable to walk on even with the protection to one's feet afforded by a heavy pair of shooting-boots. Originally the ground had been covered by a thick growth of grass, but that had all been burnt off before by a jungle fire, exposing the cracked soil to the full rays of the sun, and the small round breathing hole to the sharp eyes of my Burman guide. It was quite lively when dug out, and has never to my knowledge eaten anything since. It seems equally indifferent whether its residence is in a bag, a basket, an empty cartridge-box, or a pail of water. I saw the shells of several others lying about, but whether they had met their end by jungle fires or other causes I could not find out."

IN a recent issue of 'Ornis,' Count Ettore Arrigoni degli Oddi has published a Catalogue of his Collection of Italian Birds, which comprises many rare species. We are informed that the Count wishes his collection to be known to English ornithologists who may visit Italy from time to time.

IN the 'Proc. Linn. Soc. of New South Wales' (November, 1898), Mr. D. G. Stead has contributed some observations on the Crustacean genus *Neptunus*, founded upon specimens of *N. pelagicus*, "the principal edible Crab of the Sydney fish markets."

In this species the writer states "that up to a fairly large size, viewed *dorsally*, it is impossible to discriminate between males, females and sterile females. After this stage is passed, the chelipeds of the male become comparatively much larger, attaining considerable proportions. The sterile females do not become any larger, and, in comparative size of chelæ and a few other general characters, resemble the female, excepting that the female's body may reach as great a size as that of the largest male."

De Haan ('Fauna Japonica') figures several species which possess three types of pleon. He styles them—"Males, females, and 'spurious females.'"

Mr. Stead has only referred to the genus *Neptunus*, but he feels sure that others amongst Australian genera will be found to possess these sterile females. At present there are two species which he has good reason to believe agree in this manner with *Neptunus*, viz., *Ozius truncatus* and *Platyonychus bipustulatus*. "The former lives among loose stones in rocky situations, whilst the latter, though really pelagic, spends most of its time half-buried in the sand in shallow water."

THE ZOOLOGIST

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NOTES ON THE ORNITHOLOGY OF OXFORDSHIRE,
1896–1898.

BY O. V. APLIN, F.L.S.

WHERE no other locality is mentioned, the notes refer to the parish of Bloxham.

1896.

January 1st.—The Rev. J. Goodwin, of Milcomb, told me that he had recently seen a Hawfinch in his garden.

25th.—Large numbers of Bramblings have frequented a stubble-field dotted with manure-heaps for a week or more; I saw a small flock to-day, but they were gone two days later. The Rev. J. Goodwin told me he saw some between here and Milton last week.

26th.—Blackbird singing; early. Nuthatch has the rapid rattling or trilling cry. Rooks at their nesting trees most of the day.

27th.—Chaffinch sang the first part of its song, and a portion of the second part.

February 3rd.—News from Mr. Fowler of a Peregrine Falcon shot at Sarsden last month while in pursuit of a Ring-Dove.

5th.—Only one Chaffinch singing; these birds are strangely scarce, although common a few days ago. Possibly the winter birds have just left. One of my nephews has stuffed a Kittiwake (immature), shot at Bodicote a fortnight ago.

6th.—News from Mr. W. W. Fowler that he saw a Hawfinch in Christ Church meadow on the 4th. He remarks, "Not a Chaffinch to be seen or heard."

15th.—Yellow Bunting singing.

17th.—Rooks very noisy at their trees.

26th.—News from Mr. W. C. Darbey that he had received a black Skylark from the neighbourhood of Stanton Harcourt.

March 6th.—Rooks began building.

7th.—A young Song-Thrush, fully fledged, brought to me.

10th.—A Grey Wagtail in the village brook. The body of a Peregrine Falcon (a Fox having bitten off the head), which had died of shot wounds, was picked up near Horton Spinney, Waterperry (H. G. T. *in litt.*).

16th.—Strong wind; one Rook's nest here blown out.

18th.—Rooks have built four more nests. There are now eight.

19th.—Saw two Chiffchaffs in the warm spot by the brook, where I always look for, and generally find, the first; one was in song.

24th.—Saw three Bramblings settle in a tree in the "Ridgeway." This is a late date for them to remain here.

25th.—The Rev. J. Goodwin told me of a pair of Hawfinches seen at South Newington, and a pair of Spotted Woodpeckers in an orchard at Hook Norton, recently.

26th.—News from Mr. Fowler that he heard six Chiffchaffs at Kingham on the 22nd; that the Rev. S. D. Lockwood saw the Wheatear there on the 20th; and that Mr. Foster-Melliard saw it the same day on Shipton downs. News from the last named that young Blackbirds flew on the 16th, and that he heard the Wryneck on the 22nd at North Aston.

April.—I had news this month from Mr. R. W. Calvert of a female Buzzard shot at Ascott-under-Wychwood, while flying away with a wounded Wood-Pigeon on the 30th December, 1881; and of another seen by him there in September, 1893 (*in litt.*).

2nd.—Went to Kingham to examine the Rookery destroyed by Crows (*vide Zool.* 1896, p. 144).

3rd.—A flock of about fifty Meadow Pipits in a grass field on Bloxham Grove.

7th.—Examined a Mealy Redpole (*Linota linaria*) which was

shot from a flock of about fifteen Redpoles at Wickham Mill in March.

10th.—A Swallow seen by Mr. D'Oyly Aplin over the Sorbrook at Bodicote.

13th.—A Swallow seen at Barford.

15th.—I saw a Wren's nest built in the fork of a young tree on the bank of the Swere. As an object the nest was very conspicuous; not so as a nest. It was built of flood-rubbish, and looked exactly like a bunch of this caught and left in the fork, as a bunch often is when a flood goes down. The hole in the nest faced the stream.

With regard to the date at which the Carrion Crow breeds, the following information, acquired while destroying the nests of this (with us too numerous) bird this spring, may be of interest:—April 15th, two birds shot from the nests, one of which sat until a stone was thrown at her; apparently both were incubating. April 17th, four birds sitting on nests. April 18th, bird sat on nest, about 25 ft. up in a young willow, until I came close under it. May 7th, bird sat on nest in tall elm until thrown at. May 8th, nest containing partly fledged noisy young. May 11th, nest with squab young, the pen-feathers just sprouting.

18th.—Willow Wren, Wheatear, and Ray's Wagtail appeared.

19th.—Several Tree Pipits singing; none the day before.

20th.—I think the resident race of Goldfinches must have been nearly exterminated by the frost of the early part of 1895. I could see none about here until a week ago; now I see a fair number. When in the garden to-day I heard loud alarm cries of Starlings, and, looking up, saw eight in a confused mass high in the air. They reformed, and went on in a N.E. direction, and what I believe was a Peregrine was flying away rather heavily; but I could not tell for certain whether it was carrying anything or not. I believe that a good many of the Starlings we see here in April, and even in May, are not going to breed, here at least. Even as late as mid May one sees little parties, up to a dozen or a score in number, flying overhead rather high up. They may be birds which are going to breed in the far north.

21st.—Redstarts appeared. My wife saw half a dozen "Black-birds, one light coloured underneath," fly out of an ivied tree at the edge of Milcomb gorse. This is about the date at which the

Ring-Ouzel has visited us, and it has occurred in this gorse before. I have no doubt these birds were Ring-Ouzels.

22nd.—Swallows appeared about the village. There is always an interval between the appearance of a few early birds and the arrival of the birds about this date in numbers.

23rd.—A Turtle-Dove seen at Woodperry by Mr. H. G. Thomson.

24th.—Cuckoo appeared.

We spent a week at a village in the Chiltern hills about this date, and were delighted to find that the Stone Curlew still inhabited the downs. We located three pairs, and examined a specimen shot at Assendon in September, 1894, and another in an old collection of birds at an inn. A portion of the 'Weekly Dispatch,' 1860, was pasted on the back of the latter case. Grasshopper Warblers were frequently heard on the gorse-covered commons, and Nightingales were not uncommon; at Henley they seemed to be more numerous, and we heard three singing at once there, and not more than fifteen yards apart. Although there is much beech-wood on the hills, we could find no Wood Wrens; in my experience this bird chiefly frequents oak-wood. We saw one day a large hawk which I believe was a Honey Buzzard (darker than a Buzzard, with more pointed wings and a longer tail) flapping slowly overhead. It passed over D'Oyly Wood towards the big woods at Stonor.

The Red-legged Partridge was seen at Stonor and Henley. A great many Peewits still breed on the slopes of the downs and the open stony fields at the foot. We saw hundreds of pairs. On April 30th we watched four young ones in down, perhaps a week old, near some penned sheep. There is a raised ridge of down to be seen at the back of the occiput, making them crested even at that early age. A Sparrowhawk took a bird from the hedge close to us, and, popping over our heads, flew, heavily cumbered, against the wind, low over a big ploughing. Time after time a Peewit rose under him, and he was mobbed all along his course, one bird handing him on to another, until he reached the shelter of the spruce and larch belt, which doubtless held his nest. Some Wheatears apparently breed on the downs; we saw two pairs. Stonechats, which I remembered very common about the juniper bushes on the hills sixteen years earlier, were very

scarce. I think these birds must suffer greatly from hard winters. I examined, at Henley, a Little Owl shot at Turville Heath at the end of 1894. The birdstuffer told us he preserved three local Little Auks during the visitation in January, 1895. I may mention that one obtained on Port Meadow at that date is preserved in the University Museum; the Chipping Norton example has come into my possession. In an old collection of birds at an inn I found a specimen of White's Thrush; unfortunately no particulars respecting the collection are forthcoming. During our stay we noticed the arrival or presence of Grasshopper Warbler, April 25th; House Martin, 26th; Whitethroat, 26th; Lesser Whitethroat, 27th; Common Sandpiper, 29th; Sedge Warbler, 29th; Swift, May 1st; Turtle Dove, 1st. We heard the Wryneck twice; this bird is not common now in Oxon.

In Oxfordshire the Stone Curlew is known as the Curlew or Curloo. Barren open stretches on the undulating downs, as open and exposed as possible, are the haunts the Curloos chose; for there the bird's long legs and watchful eye enable him to guard against a surprise. The spot they select on our hills may be a vast field, partly under plough and partly derelict arable land, fallen back to poor condition, or "tumbled down," as they say, sweeping smoothly down to the foot of the hills in gentle basin-like slopes. Here on the short bare grey-green herbage, strewn with grey-and-white flints, the great down Hares sit out in perfect safety. As I examined the field with the glasses I counted five of them. Many pairs of Peewits were scattered over the field, and now and then one or two would get up and tumble about in the air, and their sweet calls came softly up. Rooks and Starlings were dotted about, the former probably up to no good. Again, the haunt may be a turfy down, with a great white blaze on its side, and on its lower slopes big juniper bushes, some old yew trees, and a belt of spruce and larch. The scrubby herbage is strewn with flints and white chalk-stones raked out of the rabbit-burrows, where a pair of Wheatears flit and run. From its most barren slope, thickly strewn with flints and chalk-stones, and sparsely clothed with short wiry grass and stonecrop, and dotted with dead plant-stems a foot high, I heard the "clamour" of the Curloo; and from it a pair rose and settled again, in view, but where the dead stems stood thickly. On being raised once

more they went over a swell in the down, where, with the glass, I could just see against the sky the head of one bird peeping at me over the ridge. When I followed, one sounded the alarm before I could see more of them, and they flew back to the old spot. A great undulating arable field, on a slope, its surface one mass of flints, held another pair. The cry of the Stone Curlew sounds to me *cur-lwee* or *curl-wee*, sometimes *currr-lwee*. A shrill sound, the second syllable drawn out and very sweet. Sometimes the cry is repeated several times quickly; this seems to be the "clamour." From the slight opportunity I have had of making observations, it seemed to me that the "clamour" was uttered when the bird was on the ground. Once, after a pair settled, one further on than the other, the former called, and the other bird ran up. When taking one of their quick runs (they go very fast) with sudden stops, they exchange an upright position for a stooping one, with the body nearly horizontal. I have seen Bustards run in just the same way. One bird was mobbed after settling, and after taking short runs, by Peewits, which stooped down and buffeted him; but he only ducked his head each time. I once (but not in England) came suddenly on a pair of Stone Curlews not ten yards from me. One struck a curious attitude, facing me (while the other ran up to it), and staring fixedly at me with its large beautiful yellow-irised eye.

May 2nd.—Reed Warbler at Oxford.

9th.—A Nightingale at Milcomb gorse. Swifts numerous here; not seen earlier.

12th.—Among the Rooks shot here were two with part of the lower mandible light-coloured, in one white, the other buffy white; another with a black bill had the whole of the chin-feathers white. Turtle Dove appeared.

14th.—Spotted Flycatcher appeared. These birds arrived at Bodicote on the 13th. The old nest over the drawing-room window there has been taken down, as it was in a very foul condition. The birds used it for four years, and reared two broods each year.

16th.—Spotted Flycatcher singing. The song was continuous, but low in tone; there was no attempt at a fixed strain, and the notes were just jerked out (but there were sweet notes here and there), and the song was distinctly Shrike-like in character.

20th.—News from Mr. Fowler that Mr. Pycraft saw a Cormorant at King's Weir, Oxford, on the 17th, and a Black Tern.

22nd. — Mr. Fowler saw a Blue-headed Wagtail on Port Meadow; "white eye-stripe, and a very dark head even for that species, I should say" (*in litt.*).

24th.—A Song Thrush sang from the ridge of the house-roof. It uttered its rattling alarm-note once in the song, and the quiet alarm-note two or three times. But this might have been accounted for by the fact that it was uneasy.

28th.—A Spotted Flycatcher in the garden is an unusually frequent singer. The song is low, but shrill; weak, yet remarkable when heard at a short distance. It comes tinkling out like the sound of a tiny streamlet, but the notes are thin and shrill.

The Rev. J. Goodwin tells me of a Hawk, which, I think, must be a pale grey Harrier, seen at Broughton lately.

29th to July 8th.—Away in Norway.

June 5th.—The Marsh Warbler arrived at its favourite osier-bed at Kingham for the fifth year, and was heard by Mr. Fowler to-day, the same day as in 1892. It was only heard in song occasionally after the 13th. Nest found on the 27th.

July 10th.—Brancher Spotted Flycatchers.

19th.—Covey of Partridges, thirteen in all, the young nearly as large as the old. Hot dry weather for some weeks.

20th.—Another covey with young quite as big.

August 4th.—Saw a Hobby at Rignell Spinney, near Barford St. Michael.

10th.—Many Swifts; very noisy.

11th.—Not many Swifts to be seen, though some still nesting. Saw a Nightingale in the paddock-walk. How little we know of this bird in the late summer. Also saw a Wren's nest, which I had never noticed before. It was against the trunk of a slightly ivied tree, and built of moss with a thick outside covering of some plant. The latter is now withered and brown, and the nest is very conspicuous (a great drought had prevailed during summer), but I have no doubt the plant was green when the nest was built.

13th.—Still some Swifts.

14th.—About this date I saw a flock of fourteen Missel Thrushes.

26th.—One of my nephews at Bodicote reported that early in the night of the 24th Wild Geese (cackling like tame Geese) passed over low enough down for the swish of their wings to be heard. I believe these early grey Geese are Grey-Lags. The late Lord Lilford wrote:—"I can speak positively as to the occasional passage of flocks of Grey-Lags over the neighbourhood of Lilford in September and October from my intimate knowledge of their cries, which exactly resemble those of our farm-yard and stubble Geese, who are no doubt lineally descended from this species. These cries differ greatly from those of the three other species of 'grey' Geese that occasionally visit us late in the season. . . . Many reports of their passage near home annually reach me, and although I am well aware that the present species is considered to be rare in our part of England, I am nevertheless inclined to think that such reports in August, September, and the first half of October are generally referable to the Grey-Lag." ('Birds of Northamptonshire,' vol. ii. p. 140.)

September 16th.—Many Meadow Pipits in standing mustard.

18th.—Many Pied Wagtails on the fresh ploughings.

28th.—Many Meadow Pipits in slightly flooded meadow. Saw two Turtle Doves; a rather late date.

30th.—Big flock of migratory Peewits.

October 1st.—Close and warm. A Missel Thrush singing fairly well. A rare occurrence in autumn. Blackbirds, abundant for some weeks, are now extraordinarily numerous.

10th.—A Grey Wagtail in the brook below the village.

17th.—Meadow Pipits roosting on a high-lying barley-stubble, with a great deal of sprouted shed corn; they were not there early in the afternoon.

19th.—Grey Wagtail in the brook.

20th.—A few Fieldfares. An immature Golden Plover shot at Ascott-under-Wychwood by Mr. Calvert (*in litt.*).

21st.—Mr. Darbey, of Oxford, informed me he had received a good many locally-killed Gulls recently, and showed me examples of the Herring Gull, Common Gull, and Kittiwake.

29th.—Vast flock of Starlings on barley-stubble; a little flock of Meadow Pipits in roots late in the afternoon. A good many Redwings. It was reported in the 'Banbury Guardian' that

Mr. Valance Elam, of Little Tew Lodge, Enstone, flushed eight Woodcocks in one cover on the 24th.

November 2nd. — Near Heythrop, where these birds are numerous about the stone-wall country, as the sun came out to-day, the Common Bunting was singing gaily.

6th.—A Sand Martin was seen at Milcomb by two friends of mine who know the bird well.

16th.—This afternoon, at 3.40 p.m., I noticed a great noise and excitement proceeding from eight or ten Hedge-Sparrows which were scattered about in a laburnum and some orchard trees. They became silent when I went out to look at them, but soon began again, answering one another with their thin *tseek*. No cat or other vermin was to be found, and the birds were in some cases some distance apart. The excitement lasted about a quarter of an hour. It was near roosting-time. I have once or twice since noticed a similar occurrence.

22nd.—A very mild but dull day. A Blackbird sang for some time just before sunset. The notes were rather poor, but numerous. Perhaps the bird was a young one of the year, early hatched, as many were last spring. In my experience the Blackbird is very rarely heard to sing in autumn.

30th.—A Water Rail shot close to the village. In two swede-fields I found a good many Meadow Pipits: a late date for a flock to be here.

December 6th.—Missel Thrush singing well.

9th.—Wind strong from the south. A flock of about two hundred Ring Doves passed over at a fair height, going due south, and battling with the wind.

11th.—Song Thrushes sing very well now.

18th.—Severe frost for the last few days. Two Jack Snipe shot.

19th.—Vast flock of Chaffinches on clover and stubble; as far as I could see they were all females.

24th.—Another Jack-Snipe shot here.

31st.—A Sclavonian Grebe shot at Chimney-on-Thames. It is now in the Oxford Museum. In the course of correspondence about this bird with Mr. Darbey, he gave me information of the following Oxfordshire examples of this bird, not previously recorded:—One picked up at Pink Hill (or Pinkle) Lock, near

Eynsham, in the winter of 1893 ; in the possession of Mr. Curtis. One killed in the same winter on Port Meadow ; in the possession of Mr. Greenwood, of St. Giles Street. Another in the same winter on Port Meadow ; preserved for an undergraduate of Keble College. One killed in the winter of 1895-96 on the Isis, at Oxford. One killed at Newbridge in January, 1896 ; in the possession of Mr. George Kent, of Newbridge.

Mr. A. H. Cocks reported in 'The Zoologist' that eight adult Sandwich Terns passed the greater part of the 10th April, 1895, at Great Marlow, going in the afternoon about three-quarters of a mile up the river (*vide* 1895, p. 190). These birds were not far from our borders.

(To be continued.)

BIOLOGICAL SUGGESTIONS.

MIMICRY.

BY W. L. DISTANT.

(Continued from p. 363.)

IN the following discussion on "Demonstrated," "Suggested or Probable," and other categories of views and suggestions relating to this more than interesting question, recourse has been somewhat plentifully made to original quotations, giving full references to the authors and publication of the same. This course may be probably commended for several reasons. In the present day much biology is written on the historical method,* in which conclusions and facts are worked together in one harmonious whole, and treated as canonical information, to which reference to the original sources of information is unnecessary. But in Biology, surely we should bear in mind—(1) Justice to the original author—A. Reference to the work in which the quotation appears, and which may be unknown or neglected by the reader, who may thus—(a) find other facts besides those quoted; (b) find that such quotations should be qualified by other information in the same work; (c) be led to consult the same authorities with reference to other investigations he may have in hand. Besides which, the evidence for or against this theory must be cumulative, and we must not be misled by successful advocacy either one way or the other.

* This method is not to be despised, as Lord Acton has well observed:—"Method is only the reduplication of common sense, and is best acquired by observing its use by the ablest men in every variety of intellectual employment. Bentham acknowledged that he learnt less from his own profession than from writers like Linnæus and Cullen; and Brougham advised the student of Law to begin with Dante. Liebig described his 'Organic Chemistry' as an application of ideas found in Mill's 'Logic,' &c. ('A Lecture on the Study of History,' p. 53.)

Illustrations of Demonstrated Mimicry.

Butterflies of other families are found as mimics of the *Danaidæ* and *Heliconiidæ*, which have been shown to be generally uneatable, and avoided by Birds, Dragonflies, Lizards, and other enemies. The fact that the writer found a *Danais chrysippus* being devoured by an orthopterous insect (*Hemisaga prædatoria*)* is only another illustration of the much used motto—the exception proves the rule. The glands near the anus of some *Heliconiidæ* have also been proved to emit a pungent odour. These facts have been recorded by Bates, Belt, Trimen, Wallace, and others. But Mr. Frank Finn, who has made some careful experiments to test the “Theory of Warning Colours and Mimicry,” certainly found that his birds in captivity not only ate, but sometimes seemed to prefer, specimens of *Danais* and *Euplœa*. Nevertheless, when he experimented with birds at liberty, he had not the slightest doubt “as to the unpalatability of *Danais*, and the other ‘warningly-coloured’ forms. Birds would often look at them, and soon left them when picked up.” But when he further experimented with the common garden Lizard of India (*Calotes versicolor*), he came to the conclusion that “the behaviour of these reptiles certainly does not appear to afford support to the belief that the *butterflies* at any rate, usually considered nauseous, are distasteful to them.”†

Miss Newbigin is also a sceptic on this point, based on her physiological study of animal colouration. She remarks:—“Instead therefore of supposing that the *Heliconiidæ* have, in Mr. Wallace’s words, ‘acquired lazy habits’ and a slow flight because they are uneatable, and the *Pieridæ* because they resemble the *Heliconiidæ*, may we not rather suppose that the slow flight and ‘warning’ colours in both cases are due to the same cause, the relatively low organisation which renders pigmentation by waste products possible, which makes brilliant optical colours impossible?”‡ As appertaining to this subject, Mr. Hopkins has demonstrated the presence of uric acid in the wing-pigments of the *Pieridæ*, and observes:—“The described uric acid derivatives, though

* ‘A Naturalist in the Transvaal,’ p. 65.

† Cf. J. A. S. Bengal (Nat. Hist.), vol. lxiv. pp. 344–56; and vol. lxxv. pp. 42–8.

‡ ‘Colour in Nature,’ pp. 161–2.

universal in the *Pieridæ*, are apparently confined to this group among the Rhopalocera. This fact enables the interesting observation to be made, that where a Pierid mimics an insect belonging to another family, the pigments in the two cases are chemically quite distinct. This is well seen in the genera *Leptalis* and *Mechanitis* respectively.* The experiments and conclusions of Dr. McNunn and Miss Newbigin in relation to the green pigments in Invertebrates have already been referred to in these pages (*ante*, p. 430).

The leaf-like Phasmid (*cf. ante*, p. 303) observed by Mr. Belt standing immovable among a host of foraging ants, many of which ran over its legs without discovery that food was within their reach.† (This may also be taken as an illustration of "Active Mimicry," referred to subsequently.)

The larvæ of Geometrid Moths, which so resemble the twigs on which they rest as to deceive their enemies. Rösels's gardener, mistaking one of these caterpillars for a dead twig, started back in great alarm when, upon attempting to break it off, he found it was a living animal.‡ Burmeister was similarly deceived by the larva of *Ph. quercinaria*, Borkh. (*Eunomus erosaria*, Tr.), "mistaking it for a small dry twig upon wishing to break off a small twig of oak."§ Mr. Jenner Weir writes:—"After being thirty years an entomologist, I was deceived myself, and took out my pruning-scissors to cut from a plum-tree a spur which I thought I had overlooked. This turned out to be the larva of a Geometer two inches long. I showed it to several members of my family, and defined a space of four inches in which it was to be seen, but none of them could perceive that it was a caterpillar."||

In plants, *Matricaria chamomilla* is considered a mimic of the true Chamomile, which from its bitterness is not eaten by quadru-

* 'Proc. Roy. Soc.' lvii. pp. 5 and 6 (1894).

† 'The Naturalist in Nicaragua,' p. 19.—Prof. S. D. Judd, who has made a special study of the subject, records an observation to be remembered:—"I am surprised to find that Grasshoppers (*Acrididæ* and *Locustidæ*), in spite of their protective coloration, are eaten by over three hundred species of birds in the United States." ('Amer. Nat.' vol. xxxiii. p. 468.)

‡ Rös. i. v. 27. Quoted by Kirby and Spence. 'Introd. Entomol.' 7th edit. p. 413.

§ 'Manual of Entomology,' Shuckard's transl. p. 505.

|| 'Nature,' vol. iii. p. 166.

ped. *Ajuga chamæpitys* is a mimic of *Euphorbia cyparissias*, with which it often grows, and which is protected by its acrid juice. The most familiar case, however, is that of the Stinging and the Dead Nettles. They very generally grow together, and, though belonging to quite different families, are so similar that they are constantly mistaken for one another.* But even here caution is necessary in many cases before giving a verdict for mimicry as generally understood. Zopf (1892), in studying the colouring-matter of the fungus *Pilobolus*, found that a parasite growing on the fungus took up not only the drops of oil, but also the pigment associated with the oil, the result being that parasite and host were similarly coloured.† Poulton has also shown that the green pigment of some caterpillars is derived from the green leaves upon which they live.

It is to be remembered, however, as Mr. Ridley has remarked, that it is not essential that fruits should be flavoured to our taste in order to induce birds or animals to swallow them. In the Malay Peninsula "the *Macaranga* capsules, covered with a viscid gum most unpleasant to the mouth, the hot Capsicums, the drupes of the palms (*Kentia macarthurii*), the berries of the wild grapes (*Cissus* spp.), which have a most irritating effect on the mouth, and the poisonous fruits of *Sapium*, are all highly popular with birds, and even the fruit of *Strychnos tieute*, Bl., with its intensely bitter pulp, is eaten by Civet Cats. A large number of the wild fruits, too, though very astringent, are sometimes eaten by birds or animals."‡ In the North-West Provinces of India, Mr. Silberrard has known Goats to "frequently eat, without any ill-effect, the leaves and green stems of the 'Akaúa' or 'Madar' (*Asclepias* or *Calotropis gigantea*), the milky juice of which is an acrid poison for human beings, and is frequently used as such in infanticide cases."§

Illustrations of Suggested or Probable Mimicry.

We do not suggest, or in any sense imply, that the few and scanty instances we have given of "Demonstrated Mimicry" are at all commensurate with the much larger number that could be

* Sir John Lubbock, 'The Beauties of Nature,' p. 156.

† Cf. Miss Newbigin, 'Colour in Nature,' p. 41.

‡ 'Natural Science,' vol. viii. p. 190.

§ 'Nature,' vol. lix. p. 177.

adduced. But an illustration was alone intended. In the present category the records are, however, much more numerous, and considerably more familiar, to all who take an interest in the subject. We are now in the realm of suggestion, and among naturalists who incline to theory there is often much faith. As Lecky has observed, referring to another subject, "Their measure of probability ultimately determines the details of their creed."*

Recently a new suggestion has been made as to "Nocturnal Protective Colouration in Mammalia, Birds, Fishes, Insects, &c., as developed by Natural Selection." The author, Mr. A. E. Verrill, truly remarks that much has been written in respect to the imitative and protective colours of these groups, as seen by daylight, and the bearing of these facts on natural selection is well known. Very little attention has been paid to their colours, as seen by twilight, moonlight, and starlight. Yet it is evident that protection is more needed during the night than in the daytime by a very large number of species. This is the case with those that move about in search of their food at night, as is the habit of numerous forms of small mammals, such as rodents (Rats, Mice, Arvicolæ, &c.), insectivores (Moles, Shrews, &c.), many herbivores, various marsupials, and members of other orders. Many carnivorous species, which seek their prey at night, will also find advantages in such protective colours, for thus they will more easily escape the notice of their prey. Hence many nocturnal carnivores are black or nearly so, as the Mink, Fishes, some Bears, &c. The same principles will apply to birds, reptiles, fishes, and to insects, both in their larval and adult states, for many members of all these groups are very active at night, and hide away in holes or beneath dense herbage by day. . . . Many nocturnal insects that live on the ground are black or dark brown, which are colours that are protective only

* Charles Kingsley complained:—"Weak and wayward, staggering and slow, are the steps of our fallen race (rapid and triumphant enough in that broad road of theories which leads to intellectual destruction)." ('Glaucus,' p. 30.) Perhaps Kingsley would have approved of an old and summary method, as described by Gibbon:—"A Locrian who proposed any new law stood forth in the assembly of the people with a cord round his neck, and, if the law was rejected, the innovator was instantly strangled." ('Decline and Fall.') Dr. A. B. Meyer has recently remarked:—"It must be admitted that it is not very difficult to invent pleasing and clever hypotheses, specially convincing to the laity." ('Distribution of the Negritos,' pp. 81-2.)

at night. This is true of most ground-beetles, many Crickets, Cockroaches, Ants, &c. Many of these insects hide away in the daytime, so that no protective colours are then needed. But many insects that are exposed both during the day and at night have acquired green or yellowish colours that are protective at all times, when living among foliage. Green-grasshoppers, Katydid, &c., are examples.*

Sometimes we find varied or almost contradictory suggestions, as has been applied to the resemblance of Tree-Shrews to Squirrels. Lydekker considers this may have been originally due to the extreme agility of the latter animals insuring them from pursuit by other creatures, as being a useless task. Hence it would clearly be an advantage for a slower animal to be mistaken for a Squirrel.† Wallace suggests that the resemblance is probably due to the Squirrels being harmless creatures which cannot alarm the insects around them by their movements, so that the Insectivora which resemble them easily capture their food.‡ Another protective quality possessed by Squirrels has been conjectured by Poulton as existing in its large bushy tail: "An enemy in pursuit would be liable to get only a mouthful of fur."§ Ridley, in commenting on this proposed mimicry, is much more cautious: "If this resemblance is to be reckoned an example of mimicry, it is not easy to decide whether it is the *Tupaia* which mimics the Squirrel, or the Squirrel the *Tupaia*. Possibly the resemblance is accidental, both animals having taken on the most inconspicuous colouring, and the most suitable form for their environment."|| Mr. Oldfield Thomas considers that the resemblance between the *Bassaricyon*, a Raccoon-like type of animal (known at present only by a single skull from Costa Rica and a skin from Ecuador)¶ to the Kinkajou (*Cercoleptes caudivolvulus*), a well-known Raccoon inhabiting Central America and Northern Brazil, is a case of true mimicry, although he is unable to

* Abstract of a paper read before Morphol. Soc. 'Amer. Journ. Sci.' Feb. 1897 ('Ann. and Mag. Nat. Hist. Sixth Series, vol. xix. 354-6).

† 'Royal Nat. Hist.' vol. i. p. 314.

‡ 'Nat. Select. and Trop. Nature,' p. 76.

§ 'Colours of Animals,' p. 209.

|| 'Natural Science,' vol. vi. p. 28.

¶ Mr. Thomas informs me that the Brit. Mus. has very recently received a second specimen.

imagine of what advantage it can be for the Bassaricyon to be mistaken for a Kinkajou.* The Cape Hunting-Dog (*Lycan pictus*) has a superficial resemblance to the Spotted Hyæna of the same country, which has been suggested as a case of mimicry. As Mr. Lydekker has observed:—"It is, however, very difficult to see what advantage a strong animal hunting in packs, like the present species, can gain in being mistaken for a Hyæna, as it is in every respect fully qualified to take care of itself. If, however, we could suppose that the Hunting-Dog was originally a solitary animal, which had subsequently become gregarious, then perhaps the resemblance to the Hyæna might have been an advantage to it."† The same authority believes that in the resemblance of the South African Weasel (*Pœcilogale albinucha*) to the Cape Polecat (*Ictonyx zorilla*) we may have "another instance of true mimicry among mammals."‡ The African Monkey (*Colobus occidentalis*) is covered with a long silky fur arranged in alternate stripes of black and white, so handsome that the skin is much prized by the Masai for making head ornaments. The contrast of black and white is so marked that at first sight, as Dr. Gregory remarks, "it would seem to preclude concealment, but its value is at once evident when the animal is seen at home. This Monkey lives in the high forests of Abyssinia, Kenya, Kilima Njaro, and Settima, where the trees have black trunks and branches, draped with long grey masses of beard-moss or lichen. As the Monkeys hang from the branches they so closely resemble the lichen that I found it impossible to recognize them when but a short distance away."§

The tabby Cat, the original progenitor of which may have been "a distinct natural variety which no longer exists as a wild animal," has been thus described:—When "curled up asleep, the dark bands arranged themselves in concentric circles, or rather in a closely set spiral, strongly suggesting the appearance of a coiled serpent." This is considered as a probable remarkable instance of "protective mimicry."||

Mr. S. E. Peal, writing from Assam, has launched the following

* 'Proc. Zool. Soc.' 1880, pp. 397-99.

† 'Royal Nat. Hist.' vol. i. p. 571.

‡ *Ibid.* vol. ii. p. 70.

§ 'The Great Rift Valley,' p. 272.

|| Louis Robinson, 'Wild Traits in Tame Animals,' pp. 240-1.

suggestion: Certain tan-spots occur over the eyes of semi-domesticated Dogs. They do not exist in wild animals allied to the Dog, or in the modern breeds of fully-domesticated Dogs. The spots are most conspicuous when the eyes are closed, appearing then like opened eyes. They "may have been protective to the animals during sleep, causing them to look as if wide awake." This speculation has been supported by no less an authority than Mr. A. R. Wallace.* Waterton, in describing the South American Sloth, writes: "His fur has so much the hue of the moss which grows on the branches of the trees that it is very difficult to make him out when he is at rest."† The Philippine Koel, or Phow (*Eudynamis mindanensis*), one of the Cuckoos, is an example of a bird in which the young does not follow the general rule of having the plumage of the female, or one distinct from that of both parents. Mr. Whitehead accounts for this by the fact of the Phow laying its eggs in the nest of the Yellow-wattled Myna. "The young Cuckoo, being black, does not differ from the young Myna, and so the deception is carried on until the young bird can take care of itself. If the young followed the general rule, and resembled their mother in being of a brown colour, the Mynas might not feed them."‡ Of the Matamata Tortoise (*Chelys fimbriata*), a South American species, it has been observed:—"When in its native element the warty appendages on the neck float in the water like some vegetable growth, while the rugged and bossed shell strongly resembles a stone; it is thus probable that the whole appearance of the creature is advantageous either in deluding its enemies or in attracting to it the animals on which it feeds, the latter being the most likely hypothesis. Although it appears that the Matamata will occasionally eat vegetable substances, its chief food consists

* 'Nature,' vol. li. p. 533.

† 'Wanderings,' Wood's edit. p. 219.—We may here refer to "the law which underlies Protective Coloration" as propounded by Mr. Abbott H. Thayer, the law of gradation in the colouring of animals, which "is responsible for most of the phenomena of protective coloration except those properly called mimicry. . . . Mimicry makes an animal appear to be some other thing, whereas this newly-discovered law makes him cease to appear at all." Thus "animals are painted by nature darkest on those parts which tend to be most lighted by the sky's light, and *vice versá*." (Cf. 'The Auk,' vol. xiii. 1896; and reprint 'Ann. Rept. Smith. Instit.' for 1897, p. 477).

‡ Cf. 'Royal Nat. Hist.' vol. iv. p. 7.

of fish, frogs, and tadpoles, some of which may probably be attracted within reach by mistaking the appendages on the neck for plants or animals on which they feed.”* “There occurs at the Cape of Good Hope a harmless egg-eating Snake (*Dasypeltis scabra*), which flattens its head, coils as if for a spring, hisses, and darts forward as though about to strike in a way that closely resembles the characteristic mode of the Berg-Adder (*Vipera atropos*), of which it is mimetic. It is really quite harmless, subsisting on eggs, the shells of which are broken in the throat by the enamel-tipped processes of the vertebræ, which project into the gullet, and form the so-called gular teeth; but its resemblance both in form and behaviour to a venomous Snake presumably affords it protection from enemies.”†

When we approach the annals of entomology,‡ we find this explanatory idea permeating the whole subject. To suggest a new instance of mimicry is considered more desirable by many than to describe a new species; while the advocates or followers of both procedures do not always seem to practise mutual admiration. The observations are not all modern. The old Swedish traveller in South Africa, Dr. Sparrmann, who first discovered (1775) the curious hemipteron, *Phyllomorpha paradoxa*, was impressed by its mimetic resemblance to a leaf. “At noon-tide I sought for shelter among the branches of a shrub from the intolerable heat of the sun. Though the air was now extremely still and calm, so as hardly to have shaken an aspen leaf, yet I thought I saw a little withered, pale, crumpled leaf, eaten as it were by caterpillars, flittering from the tree. This appeared to me so very extraordinary that I thought it worth my while suddenly to quit my verdant bower in order to contemplate it; and I could scarcely believe my eyes when I saw a live insect, in shape and colour resembling the fragment of a withered leaf, with the edges turned up and eaten away, as it were by caterpillars, and at the same time all beset with prickles. Nature, by this peculiar form, has certainly extremely well defended and concealed, as it were in a mask, this insect from birds and its other

* ‘Royal Nat. Hist.’ vol. v. p. 91.

† C. Lloyd Morgan, ‘Habit and Instinct,’ p. 12.

‡ Poulton has focussed many observations respecting instances in the Insecta, largely augmented by information received from the well-known coleopterist, C. J. Gahan. (Cf. ‘Journ. Linn. Soc.’ xxvi. pp. 558-612 (1898)).

diminutive foes.”* Canon Fowler, who has been recently writing on the *Membracidae* (Homoptera), referring to the genus *Sphongophorus*, opines that, in some cases at all events, these forms are protective, for, when at rest, many of the insects must resemble pieces of dry twigs.”† One of the most interesting, but, to the writer, inexplicable, instances is given and figured by Dr. Gregory, as observed in Eastern Central Africa. In this case numbers of a species,—or of more than one,—of the homopterous sub-family *Flatinae* (*Ityraea nigrocincta*) adhere to a stem, and closely resemble a flowering Transvaal plant (*Sesamopteris pentaphylla*). The observer adds:—“It may be that the insects were only rendered sluggish by the cold and rain, but it appears not unlikely that the members of this species have very limited powers of flight, and secured protection from birds by this ingenious mimicry of a cluster of flowers.”§ I have frequently seen other insects after heavy rain in the Transvaal follow the same habit without any protective resemblance being obtained.|| A common orthopteron in La Plata (*Rhomalea speciosa*), when at rest, is “only a pretty Grasshopper; but the instant it takes wing it becomes the fac-simile of a very common Wasp of the genus *Pepris*.”¶

Prof. C. Emery has published, in the ‘Bull. del Soc. Ent. Ital.’ 1886, a short but interesting note on the habits of an Ant (*Camponotus lateralis*). Of this species there are two varieties—one black, like its nearest allies, the other red, with the abdomen and part of the thorax black. They live in small colonies, and make expeditions up trees to collect honeydew from the aphides. The black type (*C. foveolatus*, Mayr; *C. ebeninus*, Emery) sometimes go in troops, but generally a few join the troops of other

* ‘Voyage to Cape of Good Hope,’ Engl. transl. 2nd edit. vol. ii. p. 16.

† “Must” is an unfortunate expression, and in most arguments is equivalent to “it is evident,” which the late Prof. Clifford described as meaning “I do not know how to prove.” (‘Lectures and Essays,’ 2nd edit. p. 176.)

‡ ‘Biologia Centrali-Americana,’ Rhynch. Homopt. vol. ii. p. 26.—Whatever we may think of this suggestion, it is at least not more improbable than some banter which lately appeared in an American entomological work by Dr. Comstock, where we read that as regards the *Membracidae*, “Nature must have been in a joking mood when Tree-hoppers were developed.”

§ ‘The Great Rift Valley,’ pp. 273–5, and figured on coloured frontispiece.

|| Cf. ‘Zoologist,’ 1898, p. 256.

¶ W. H. Hudson, ‘The Naturalist in La Plata,’ p. 127.

black Ants, such as *Formica gagates* and *Componotus æthiops*. Prof. Emery suggests that, their numbers being small and their sight not very good, they find it convenient to accompany other Ants which live in larger communities, and they perhaps escape detection from the similarity of colour.”*

Mr. Skuse considers that the Australian Hepialid moth (*Leto stacyi*, Scott) resembles *in situ* an approach to the head of a reptile of the genus *Varanus*. “The moth is one which passes its larval state in the butts of Eucalyptus trees for the period of five or six years, but on emergence the perfect insect is not prone to fly, and would therefore be very liable to be attacked by birds. Hence the probability that my surmise of the striking resemblance to the head of a Lizard being an instance of genuine protective imitation is correct.”† Of the larvæ of the Hawk-Moth (*Chærocampa porcellus*), it has been stated that should it “be discovered among the dead leaves, where it usually lies concealed, the first four segments are suddenly retracted, and, as in the case of *C. celerio*, the animal appears to have a very large head, with two glaring and dangerous-looking eyes. This transformation is no doubt of use for defensive purposes.”‡ A similar observation is made on the larva of *C. elpenor*. “In this position its appearance is very striking, and gives a formidable look to the creature in the eyes of those animals that might have been thinking to prey upon it.”§ Poulton has proposed that these caterpillars “terrify their enemies by the suggestion of a Cobra-like serpent”; || an hypothesis not so improbable as would appear if *C. elpenor* is considered a purely European species, whereas it is distributed over “Europe, Japan, Sind, Himalayas, Shillong, Nagas, Manipur”; ¶ and thus is found in the area inhabited by the Cobra. Dr. Gregory, in East Central Africa, relates having been “startled by a hissing noise like that of a Snake coming from a clump of grass.” On closer inspection he “could just detect a small green head among the stalks, and behind this appeared, whenever the noise was repeated, an expansion like

* Cf. Lubbock, ‘Ants, Bees, and Wasps,’ pp. 402-3.

† ‘Records Australian Museum,’ vol. ii. p. 91.

‡ W. J. Lucas, ‘Book of British Hawk-Moths,’ p. 109.

§ *Ibid.* p. 113.

|| ‘The Colours of Animals,’ p. 259.

¶ Hampson, ‘Fauna Brit. India,’ Moths, vol. i. p. 85.

the hood of a Cobra." He subsequently found that he "had been frightened by a big Grasshopper, which, by puffing out its wings, assumed a resemblance to the shape of the head of a Hooded Snake; while its noise was a good imitation of the dull jerky hiss of some species of Snakes."*

But it must be remembered, as Mr. Kirby has truly remarked, that though these brightly-coloured caterpillars are probably rejected by insectivorous animals as inedible, they are not protected "against the attacks of parasites, but rather the reverse." He once bred some *Tachinidæ* (parasitic Diptera) from the larvæ of the Spurge Hawk-Moth.† Mr. Pickard Cambridge states that "upwards of a thousand parasitic grubs of the genus *Microgaster* have been taken from a single caterpillar."‡ The many enemies of caterpillars have been described by an Indian observer, who writes:—"Upon the whole I think birds are the least important of a caterpillar's enemies. At first, when it is so minute that a bird would not be at the trouble to pick it up, it is exposed to the cruelty and rapacity of hordes of Ants of many tribes, which scour every tree and shrub, sipping the nectar in the flowers, licking the glands at the bases of the leaves, milking the aphides, and looting and ravaging wherever they go. Besides Ants, every tree swarms with Spiders—not web-Spiders, but wolf-Spiders—which run about in quest of their prey. Then come Wasps and Ichneumons, and these, from a caterpillar point of view, are of two sorts—those which will carry him to their own quarters for the food of their children, and those which will quarter their children on him, or, I should say, *in* him. Finally, the few that have survived all these dangers have to run the gauntlet of the birds."§

Poulton refers to the two Hawk-Moths (*Sesia fuciformis* and *S. bombyliiformis*), "which in some degree suggest the appearance of Humble-Bees," as instances of "mimicry of Hymenoptera by Lepidoptera." But when he offered a living specimen to a Lizard (*Lacerta muralis*), the animal was "not imposed upon in the least, but devoured the insect without hesitation or caution. Although Humble-Bees are eaten by Lizards, they are always

* 'The Great Rift Valley,' p. 273.

† "Hanb. Order Lepidoptera," 'Allen's Natr. Libr.' vol. i. p. xxx. note.

‡ 'Royal Nat. Hist.' vol. vi. p. 26.

§ Eha, 'A Naturalist on the Prowl,' pp. 122-3.

seized cautiously, and disabled before being swallowed.”* This certainly seems to be very negative evidence. The well-known British Moth, *Lasiocampa quercifolia*, affects a resting position which “makes it appear exactly like a dead leaf. One is walking along, maybe, when his attention is attracted to a dead brown leaf hanging on a blackthorn bush, suspended by a slender stalk, and swaying to and fro in the air with every passing breeze. You feel satisfied it can be nothing but a rich purplish-brown leaf, and yet your trained eye is hardly satisfied; and as you slowly take in the outline, and put your finger beneath the supposed stalk of the leaf, another slender stalk is gradually pushed up, and a Lappet Moth dangles from your finger.”† Here the expression “trained eye” of the entomologist would suggest a more developed “trained eye” of the moth’s natural enemies, and hence any theory of *protective* mimicry is much discounted. Should such a theory be advanced, the instance would probably be more applicable to conscious or active mimicry, to be discussed later on. The same author gives a subsequent illustration which seems capable of the same comment. Another of our moths (*Orgyia antiqua*) has an apterous female, and in this condition, “seated on her cocoon after emergence, she looks so exactly like a Spider that only *practical entomologists* recognize her; she lays her eggs on the web, and never stirs.”‡ Dr. Sharp has remarked on the eggs of *Phasmidæ* that nearly everyone who mentions them speaks of their extreme resemblance to seeds. “Goldie has suggested that this is for the purpose of deceiving Ichneumons; it is, however, on record that the eggs are actually destroyed by Ichneumons.” Not only do the eggs have a history like that of seeds, and resemble them in appearance, but their capsule, in minute structure, greatly resembles vegetable tissue.§ Again he states:—“The egg of a Phasmid has not only a general resemblance in size, shape, colour, and external texture to a seed, but the anatomical characters of certain seeds are reproduced on

* ‘The Colours of Animals,’ p. 246.

† J. W. Tutt, ‘British Moths,’ pp. 61–2.

‡ *Ibid.* p. 91.—The italics are our own. “Practical entomologists,” in the struggle for existence, and in the sense here meant, naturally includes the insect’s enemies, whose sustenance depends upon their practical knowledge.

§ ‘Cambridge Nat. Hist.’ vol. v. p. 265.

the external surface, there being a hilar area, a hilar scar, and a capitulum corresponding to the micropylar caruncle of such seeds as those of the castor-oil plant (*Ricinus communis*).”* The eggs of *Phyllium crurifolium* are a case in point. Henneguy states “that a prominent lozenge on the egg represents the surface by which the achene of an umbelliferous plant is united to the column, and that the micropyles are placed on this lozenge. As regards the egg-capsule, the same writer observes:—“Almost every botanist, on examining for the first time a section of this capsule, would declare that he is looking at a vegetable preparation.”†

In Plant-life the same suggestions occur. The bladderworts (*Utriculariæ*) are carnivorous, and capture small crustaceans, larvæ of gnats, &c., by the aid of small bladders with orifices closed in each case by a valve, which permits objects to penetrate into the cavity of the bladder, but not to issue out of it. “The bladders of *Utriculariæ*, living in still water, look delusively like certain Ostracoda, especially species of the genus *Daphnia*. The bladder itself resembles the shell-covered body in size and form, and the bristles the antennæ and swimmerets of one of these crustaceans.”‡ Small crustaceans are probably thus allured to their own destruction, and the bladderworts exhibit “aggressive mimicry.” In the ‘Botanical Gazette’ for April, 1896, an interesting case ascribed to mimicry is described. The seeds of the “Philippine Island bean, from the coast near Manila, so closely resemble the quartz pebbles among which they fall, in shape, size, colour, lustre, hardness, and stratification, as to be indistinguishable from them except by a very close examination.”§

Sometimes we read accounts of assimilative colouration, where it is difficult to see the *raison d'être*, if mimicry is propounded. Such an instance is given by Mr. Nicholas Pike:—“On my first visit to Round Island” (near Mauritius), “I captured a Scorpion of a bright green, just the colour of the leaves of the *Jubæa* palm it was disporting on. The creature was very active and defiant, and it was with difficulty I caught him.”||

* In ‘Zool. Results of Arthur Willey Exped.’ pt. i. p. 78.

† ‘Cambridge Nat. Hist.’ vol. v. p. 271.

‡ Kerner and Oliver, ‘Nat. Hist. Plants,’ vol. i. p. 122.

§ ‘Nature,’ vol. liv. p. 106.

|| ‘Sub-Tropical Rambles,’ p. 162.

As proving the great caution which is necessary before dogmatically asserting anything more than "suggested or probable mimicry" with reference to the preceding instances of simulative resemblances in animals and plants, it may be well to record some cases of what may be considered as

Suggestive but Disputed or Mistaken Mimicry.

Prof. Semper, when staying in the Balearic Islands, found among the polypes of a coral (*Cladocora cæspitosa*) Annelids belonging to the genus *Myxicola*, which lived in long mucilaginous tubes which they had formed in the rifts of the coral. "As long as no light was thrown upon them they protruded themselves just so far as that the top rim of the corona of tentacles was on a level with the tentacles of the polyps, so that the worm and the polyps were both extended; the coral itself presented a perfectly level surface of cups. Moreover, the funnels of *Myxicola* were of precisely the same chocolate-brown colour as the polyps; and, when fully extended, the interior of the funnel formed by the tentacles looked exactly like the oval disc of one of the neighbouring polyps, for the radial pinnules were in the same position as those lines which, on the oval disc of the polyp, radiate towards the narrow central oval slit; in the *Myxicola* a small central slit was observable, and all the parts which corresponded so exactly in size and position also displayed exactly the same colouring of greenish grey, with radial lines of a lighter hue and a narrow white streak in the middle. In short, the resemblance in size, position, and colour of every part of the two creatures was so perfect that for a long time I took the corona of the Annelid for a polyp, until, by an accidental blow, I caused all the *Myxicolæ* of a large coral-stock to shrink suddenly into their tubes, though it was not severe enough to induce an equally rapid movement in the polyps of the apathetic *Cladocora*." At the time the Professor "felt an almost childish delight at having detected so flagrant an instance of protective mimicry," but soon found reason to doubt this interpretation of the facts. He subsequently found a marine Sponge in which hundreds of this same *Myxicola* were living, but the Sponge was coloured very differently from the Annelida, so that no protection was offered. Seeking it in other spots, he found the *Myxicola* almost everywhere, "on the rifts of rocks

and in the sand, between marine plants, or the tubes of other worms"; and, whenever he examined it closely, "it was exactly of the size and colour of the polyps of *Cladocora cæspitosa*." As Prof. Semper concludes, "Mimicry, it is plain, is out of the question; the resemblance between the two creatures is simply and wholly accidental."* The second illustration is from the pen of Mr. Trimen, so well known for his entomological advocacy of the claims of mimicry, and who describes a most remarkable instance which came to his notice in connection with the pupa of *Papilio lyæus*. He received from a correspondent a small box containing what he took at the first glance for three ordinary green chrysalids of that butterfly. Only one of these objects, however, was a veritable chrysalis, the two others being the seed-capsules of a plant stated to be a species of *Hakea*. "The tint of green, the general lateral outline (especially the bulging ventral convexity of the wing-covers), the projections of the bifid head, the attenuated form of the posterior abdomen and anal extremity, and even the slight ferruginous tips of the projections of the head, are all reproduced in the seed-capsules to a very deceptive extent." The chrysalis was found "in the neighbourhood of a hedge of the *Hakea*, and if this plant had been a native of South Africa it can scarcely be questioned that a strong case of mimicry would readily have been admitted by observers. As a recent introduction from Australia, however, it is clear that *Hakea* cannot have been the model for the pupa of a *Papilio* of a specially African group."† Mr. Belt, so well known for his excellent observations in support of mimicry, gives us another warning against guessing conclusions. "Ant-like Spiders have been noticed throughout Tropical America, and also in Africa. The use that the deceptive resemblance is to them has been explained to be the facility it affords them for approaching Ants, on which they prey. I am convinced that this explanation is incorrect so far as the Central American species are concerned. Ants, and especially the stinging species, are, so far as my experience goes, not preyed upon by any other insects. No disguise need be adopted to approach them, as they are so bold that they are more likely to attack the Spider than a Spider them. Neither have

* 'Animal Life,' pp. 402-3.

† 'South African Butterflies,' vol. iii. p. 241, note.

they wings to escape by flying, and generally go in large bodies easily found and approached." Mr. Belt, however, concludes that the Spider is thus protected against the attacks of small insectivorous birds.* Subsequently, however, Mr. Herbert H. Smith has reaffirmed what Mr. Belt denied—"the Spiders eat the Ants," and "they eat the particular Ants which they mimic. At all events, we verify this fact in a great number of cases, and we never find the Spiders eating any but the mimicked species."† Dr. Scharff thinks "that the colours of Slugs in Ireland are at all ages, as a rule, protective";‡ while Mr. Adams is inclined to think "that climate may be a factor in the matter." He has "taken more brilliant forms, and those more abundantly in the South of England (*where the climate is warmer*), than in the North." Again, "all along the south coasts of England and Wales, Cardigan Bay, and the west coast of the Isle of Man, and the north coast of Ireland (*all of which are noted for a mild climate*), I have taken coloured forms abundantly; while on the coasts of Lancashire and North Wales, and the east coast of England from the Thames to the Tees (*where the climate is more bracing*), I have no personal records for anything but the type."§

In plant-life such resemblances are not uncommon. In parasitic fungi "the fructification of *Polyporus betulinus* strongly resembles the whitish bark of the birch, and that of *P. fomentarius*, parasitic on old beech trees, exhibits the same pale grey as does the trunk of a beech."|| There is a butterfly common in certain parts of the Argentine which Dr. Seitz at first mistook for the European *Vanessa (Araschnia) levana*, so closely does it resemble that butterfly in colour, in the notching of the wings,

* 'The Naturalist in Nicaragua,' pp. 314-5.

† 'Brazil, the Amazons, and the Coast,' p. 223.

‡ 'Slugs of Ireland,' p. 554.

§ 'Coll. Man. Brit. Land and Freshwater Shells,' 2nd edit. p. 23.

|| Kerner and Oliver, 'Nat. Hist. Plants,' vol. i. p. 166.

The genus *Volucella* comprise large flies which mimic Humble-Bees in colour and form. As observed by Mr. Pocock: "It was long supposed that the females were thus enabled with impunity to enter the nests of Humble-Bees, and lay their eggs amongst those of the proper owners." But these mimics of Humble-Bees also "visit for the same purpose the nests of Wasps, to which the flies bear no particular resemblance."

and in other ways. Moreover, there is a variety of this form which is in the same way exceedingly like the form *prorsa*. A closer examination of the insect showed that it did not belong to this species at all, or even to the same genus; it is a member of another genus, *Phyciodes*. "If," says Dr. Seitz, "these were found in our country, no one would doubt that this was a case of mimicry as perfect as any which exists." It might be suggested that it is a case of mimicry, but the mimicking and mimicked forms have each gone their own way, one migrating to one country, and one to another; they might possibly at one time have both lived in North America, and later on separated, one going south and the other east, crossing over into Asia by way of Behring's Strait. Such an explanation would be, as Dr. Seitz points out, entirely contrary to what is known of the distribution of these insects; for the genus *Araschnia* is absolutely confined to the Old World, and *Phyciodes* to the New World.* Of course it may be contended that the case does not apply, as it is an integral axiom in the theory of mimicry that the mimicker and the mimicked must, and are, always found together in the same part of the world, or that one of them may have become extinct. But here we see the phenomenon can be observed in widely separated habitats, and in birds one cannot help being amazed at the great superficial resemblance between the Secretary Vulture (*Serpentarius secretarius*) of South Africa, and the Brazilian Seriema (*Cariama cristata*).

Mr. J. H. Gurney has given twenty cases, "On the tendency in Birds to resemble other Species":—"On three occasions adult males of our British Sparrow-Hawk (*Accipiter nisus*) have been shot in this country, which so far resembled the South African (*A. rufiventris*, Smith) as to have the breast and under parts a clear rufous without any transverse bands (cf. 'Ibis,' 1893, p. 346). Buzzards which were indistinguishable from the rufous North African Buzzard (*Buteo desertorum*) have been killed in England three or four times (cf. 'Ibis,' 1889, p. 574). . . . In 1861 an example of *Picus major*, our Greater Spotted Woodpecker, obtained in Shetland, varied so as a little to resemble *P. leuconotus*, the White-backed Woodpecker, and was even figured as such in Gould's 'Birds of Great Britain.' . . . Snipes

* Cf. Beddard, 'Animal Coloration,' 2nd edit. p. 47.

have twice been shot which presented some of the characters of the American *Gallinago wilsoni*.”*

In Southern Africa the Anhinga (*Plotus levaillanti*, Licht.) affords a mimicry which is apparently purposeless. Le Vaillant himself, its discoverer, states:—“Indeed, there is no person who, upon seeing the head and neck only of an Anhinga, while the rest of the body is hid among the foliage of the tree on which it is perched, would not take it for one of those serpents accustomed to climb and reside in trees, and the mistake is so much the easier, as all its tortuous motions singularly favour the illusion.”† This bird swims so low in the water that only its neck is to be seen; and, from observations in Natal, Mr. Ayres says that “in this position the bird might easily be taken, by those unacquainted with it, for a Water-snake.”‡

According to Dr. Bowdler Sharpe, one of the most interesting of all birds is the Common Cuckoo (*Cuculus canorus*), not the least remarkable feature in its conformation being its great similarity to a Hawk, as not only shown by its colour and form, but also by its mode of flight, and which is so marked that the bird is always mobbed by smaller birds, as if it was really a Hawk.§ Jefferies, who excelled as an observer, was clearly not of this opinion, and he thus writes on the subject:—“The Cuckoo flies so much like the Hawk, and so resembles it, as at the first glance to be barely distinguishable; but on watching more closely it will be seen that the Cuckoo flies straight and level, with a gentle fluttering of the wings, which never seem to come forward; so that in outline he resembles a crescent, the convex side in front. His tail appears longer in proportion, and more pointed; his flight is like that of a very large Swallow flying straight.”|| Again he remarks that birds “will pursue a Cuckoo exactly as they will a Hawk,” but adds:—“I will not say that

* ‘Trans. Norf. and Norw. Nat. Soc.’ vol. vi. pp. 241-243.

† ‘New Trav. Int. Parts Africa,’ Engl. transl. vol. i. pp. 181-2.

‡ Cf. Layard’s ‘Birds of S. Africa,’ Sharpe’s edit. p. 783.

§ ‘Royal Nat. Hist.’ vol. iv. p. 3.—It was a saying of Goethe that “there was a time when the study of natural history was so much behindhand that the opinion was universally spread that the Cuckoo was a Cuckoo only in summer, but in winter a bird of prey.” (‘Conversations of Goethe,’ Engl. transl. new edit. p. 295.)

|| ‘Wild Life in a Southern County,’ p. 252.

that is because they mistake it for a Hawk, for the longer I observe the more I am convinced that birds and animals often act from causes quite distinct from those which at first sight appears sufficient to account for their motions."* The dread experienced by small birds for their larger brethren of prey is probably open to qualification, for Gilbert White tells us of a Swallow who "built its nest on the wings and body of an Owl that happened by accident to hang dead and dry from the rafters of a barn."†

As with "mimicry," so the theory of "warning colours" may be hastily predicated. Among Flatworms in the terricolous Triclad or Land Planarians, some species "are frequently banded or striped with brilliant colours. *Geoplana cærulea*, Mos., has a blue ventral surface, and is olive-green or dark Prussian blue above. *G. splendens*, Dendy, is marked dorsally by three stripes of emerald-green alternating with four dark brown longitudinal bands. The mode of colouration, though somewhat variable, is an important specific character. Its significance, however, is not clearly understood. The colours may be a warning signal, as some *Geoplana* at least are disagreeable to the taste of man and some birds; but since Land Planarians are largely nocturnal animals, living by day under logs, banana-leaves, and in other moist and dark situations, this explanation is clearly insufficient."‡ Among the Polychaete Worms the same caution is necessary. "Carnivorous forms like Amphinomids and Syllids present as wide a range of tint as the limnivoruous forms, like *Cirratulus*, *Sabella*, or Maldanids. Shore-lovers and deep-sea dwellers and surface-swimmers all exhibit equally bright or equally sombre tints; it is therefore difficult and rash to dogmatise on the 'use' of these colourings to these animals, or to point to this worm as being protectively, to the other as being warningly, coloured; for we are too ignorant as to the habits of the worms."§

As we record instances of what appear only capable of being ascribed to "suggestive but mistaken mimicry," we meet with natural resemblances which seem to fall under a category of

* 'Wild Life in a Southern County,' p. 265.

† 'Nat. Hist. Selborne' (Harting's edit.), p. 194.

‡ F. W. Gamble, 'Cambridge Nat. Hist.' vol. ii. p. 33.

§ W. Blaxland Benham, *ibid.* p. 293.

Purposeless Mimicry.

Some orchids have a curious resemblance to insects, after which they have accordingly been named the Bee-orchis, Fly-orchis, Butterfly-orchis, &c., but it has not yet been satisfactorily shown what advantage the resemblance is to the plant.* The fungi, known by the name of club-tops, much-branched, flesh-coloured, yellow or white *Clavariæ*, which often adorn whole tracts of ground in a wood, imitate the structure of corals; *Hydneæ* are like Sea-urchins, and *Geaster* like a Starfish, whilst the various species of *Tremella*, *Exidia*, and *Guepinia*, which are flesh-pink, orange, or brownish in colour, and the white translucent *Tremellodon gelatinosum*, resemble gelatinous Sponges. The small stiff Toadstools (*Marasmius*) which raise their slender stalks on fallen pine-needles, remind one of the rigid *Acetabulariæ*. Other Toadstools, with flat or convex caps exhibiting concentric bands and stripes, such as the different species of *Craterellus*, have an appearance similar to the salt-water alga known by the name of *Padina*. Dark species of *Geoglossum* imitate the brown *Fucoideæ*; and one may fancy the red warts of *Lycogala epidendron*, a plasmoid fungus inhabiting the rotten wood of dead weather-beaten trees, to be red Sea-anemones with their tentacles drawn in, clinging to grey rocks. However far-

* Sir John Lubbock, 'The Beauties of Nature,' p. 156.—On this point it may be mentioned that Father Kircher, in his *Mundus Subterraneus*, published in Amsterdam in 1678, "depicted the genesis of birds, apes, and men by means of the transformation of some orchids. He had been struck with the resemblance of these strange flowers to many animals, and therefore concluded that the latter were derived from the former." (Cf. Varigny, 'Experimental Evolution,' p. 14.)—*Per contra*, examples abound of men, who, undoubtedly authorities on their own subject, needlessly give themselves away by ludicrous comments on matters of which they are absolutely ignorant. An amusing instance of this may be found in W. Day's well-known book 'The Racehorse in Training.' The author of this book, thoroughly versed in his own business, having passed through the stages of an accomplished jockey, a successful trainer, and an astute owner, in discussing the evils of "sweating" horses, which he ascribes to "theory," points the moral of his tale by alluding to other theories, not excluding that of Mr. Darwin. We are treated to the following effusion:—"We have Mr. Darwin's theory, arising out of Lord Monboddo's idea. His lordship said over a century ago, 'that in some countries the human species have tails like other beasts, and traces Monkeys up to men.'" ('The Racehorse in Training,' 5th edit. p. 90.)

fetched this comparison between the two localities may seem at first sight, everyone who has had an opportunity of thoroughly observing the characteristic forms of vegetable and animal life in woods, and at the bottom of the sea, will inevitably be convinced of its accuracy.* Again, in primitive plant life (Thallophyta), in the family *Caulerpaceæ*, "the genus *Caulerpa* contains nearly one hundred species, which present the most varied external forms, simulating those of many of the higher plants, such as Mosses, Ferns, Mare's-tails, Cactuses, Conifers, &c." † It has been suggested that some of the seeds of *Euphorbiaceæ*, notably those of the Castor-oil plant (*Ricinus*), resemble beetles, and, as such, may be mistaken by birds and carried a small distance before being dropped. This seems very doubtful. *Ricinus* seeds and those of Para Rubber (*Hevea brasiliensis*), which resemble them on a large scale, are ejected explosively from their capsules to a distance quite sufficient for their dispersal, and falling, as they constantly do, among the herbage, would certainly escape most insect-eating birds.‡

Fishes of the family *Pomacentridæ*, belonging to the spiny-finned division, which frequent the neighbourhood of coral reefs and islands, and thus closely resemble the scaly-finned fishes, Chætodonts, in their mode of life, also are very similarly and beautifully coloured. But in the opinion of Dr. Günther this is one of many instances showing that the colouration is due to a great extent to "the agencies of climate, of the surroundings, and of the habits of animals." §

Active Mimicry.

Another and very important distinction to be drawn when dealing with instances of mimicry and protective resemblance is one long since pointed out by Kirby and Spence, and one that demands the utmost consideration. To use the words of the teleological authors of the immortal 'Introduction to Entomology,' there are *Passive* means of defence, such as are independent of any efforts of the insect; and *Active* means of defence, such as

* Kerner and Oliver, 'Nat. Hist. Plants,' vol. i. p. 112.

† *Ibid.* vol. ii. p. 645.

‡ H. M. Ridley, 'Nat. Science,' vol. viii. p. 196.

§ 'Introd. Study Fishes,' p. 524.

result from certain efforts of the insect, in the employment of those instincts and instruments with which Providence has furnished it for this purpose.* Thus, in a little book on British Hawk Moths, the writer states that some of these insects "seem to put all their trust in a resemblance they may bear to some natural object, which by a wonderful and unerring instinct they seldom fail to find."† Many of the illustrations given by authors of protective resemblances and mimicry are "passive," and considered as the result of natural selection, slowly accentuating and perpetuating the current of variation that makes for protection, and of which, on every philosophical consideration, the animal thus evolved can have no consciousness, beyond a more or less habit of adaptation to its environment; in fact, a Cartesian would say the whole phenomenon was indicative of animal automatism. But it is open to strong suggestion that this is only one, and a subordinate phase of the phenomenon, and that animals of their own volition, and in their efforts to avoid their enemies, place themselves where possible in such adaptation to their surroundings, that protective resemblance and some forms of mimicry are due to animal intelligence, and not so entirely to what is generally understood as the unconscious process of natural selection.‡ Mr. Coe has also affirmed that "there is an enormous amount of evidence, which shows that animals are conscious of the protection afforded by colour, and that they assist the 'disguises' which arise from their likeness to inanimate objects by their own intelligence and contrivance."§ Thus Mr. Wakefield Richardson has recently recorded an observation he made by which a Wren

* 'Introd. Entomology,' 2nd edit. p. 404.—Prof. Henslow has also quite recently remarked "that there appears to be two distinct kinds of mimicry: (1) automatic and unconscious; (2) brought about by conscious action of the creature." ('Journ. Roy. Horticultural Soc.' xxiii. p. 28 (1899).)

† W. J. Lucas, 'Book of Brit. Hawk Moths,' p. 13.

‡ Col. Pollok has suggested an excellent example of limited intelligence in the Tiger:—"All Deer possess an acute sense of smell, and against it a Tiger has to contend before he can provide his larder with game; but how does he manage it? We cannot give him the credit of the intellect of man, who, in pursuit of game, is well aware nothing can be done down wind. Were it so, not a Sambur or Deer would be left alive. The Tiger would bag them all just as he pleased,—in fact, he would then be able to kill any Deer when he wanted it." ('Zoologist,' 1898, p. 155.)

§ 'Nature versus Natural Selection,' p. 171.

Zool. 4th ser. vol. III., October, 1899.

supplied the insect food required for her young by carrying the excrements of the nestlings, as is the habit of some birds, and placing them with great care on different parts of a thorn bush. "Apparently she had placed them thus to attract the flies, for each time she alighted on the bush she visited several, picking off the flies until she had enough to take back to her young."* This may surely be taken as an instance of aggressive mimicry, consciously or actively pursued. According to Mr. Matthias Dunn, "Some fishes have such power over their own appearance that when they like they can change the colour of their skin in keeping with their surroundings. I have seen Surmulletts, when going from the brown sand to the dark rocks, quickly change from one colour to the other, and I know of about forty other fishes which can do the like in more or less time."† On this statement a writer has recorded that, in 1898 in the Aquarium at Concarneau, in Brittany, Turbot were seen "that gradually assumed the colour of the sand in which they were placed; so much so that it required a very keen eye to detect them lying at the bottom of the tank."‡ Another writer has more recently remarked, in discussing "the beautiful and protective resemblance" which some insects "bear to their surroundings," that there can be no doubt that such species "possess an inherited and instinctive knowledge of this assimilation, and select such places as a protection against their *natural* enemies."§ Of course the suggestion of active mimicry must not be made too absolute. Thus Mr. Storrs Fox has proposed a very reasonable hypo-

* 'Field,' July 29th, 1899, p. 227. Cf. also Dr. John Lowe, 'Zoologist,' 1896, pp. 1-10, as to habits of both Blackcap and Garden Warbler at Teneriffe.

† 'Contemporary Review,' vol. lxxvi. pp. 202-3. This observation has a distinct reference to what we previously discussed as "Assimilative Colouration," which cannot be divorced from the consideration of the theory of "Mimicry."

‡ J. G. in 'Westminster Gazette,' Aug. 10th, 1899.—A blind fish, according to the observation of Pouchet, is unable to respond to the colour of its surroundings." (Cf. Blake, 'Journ. Roy. Horticultural Soc.' xxiii. p. 24, 1899.) Prof. Henslow has given an analogous case in which the eyes of Shrimps had been covered, and the result was that "these Shrimps were not coloured like the normal ones, in imitation of their surroundings." (*Ibid.* p. 28.)

§ T. B. Jefferys, 'Entomologist,' vol. xxxi. p. 241.

thesis that supposing certain caterpillars not very particular as to their food, either Elm, Lime, Birch, &c., and further assuming that such caterpillars were more easily overlooked on Birch by resembling the catkins of that tree, then those broods which fed on trees other than Birch would be most likely to be devoured by enemies, and so gradually a race would grow up which invariably fed on Birch.*

The active mimicry here discussed does not deal with the mimicking by birds of the songs of their fellows. This imitative faculty had been recorded of birds in captivity by Aristotle. But in a state of nature the same thing occurs. Mr. Butterfield has narrated his having heard a Whinchat, a bird of no extensive vocal capacity, imitate "in quick succession the song of the Wren, Song Thrush, Chaffinch, Corn Bunting, Tree Pipit, Greenfinch, and Starling."† Mr. Riley Fortune has known the Starling to give perfect imitation of the cries of the Sparrow, Lapwing, Golden Plover, Chaffinch, Blackbird, Yellowhammer, Thrush, Jackdaw, Swallow, and many other birds.‡ Prof. Lloyd Morgan is of opinion that "mimetic activities are due to a mimetic impulse. Some of them are probably involuntary and due to connate impulse; but others are certainly due to intelligent imitation."§ Thus Lumholtz, in Queensland, observed the mental process in the Lotus-bird (*Parra gallinacea*): "The grown bird is not shy, but the young are extremely timid. I had once or twice seen the old birds with young, but as soon as I approached them the young always disappeared, while the old birds walked about fearlessly, as if there was no danger. It long remained a mystery to me how they could conceal themselves so well and so long, but one day the problem was solved. An old bird came walking with two young ones near shore. I hid behind a tree and let them come close to me. As I suddenly made my appearance, the small ones dived under the water and held themselves fast to the bottom, while I watched them for a quarter of an hour before

* Extr. MS. Lecture to the Bakewell U. E. Students' Association.

† 'Zoologist,' 1877, p. 384.—Mr. Godfrey in these pages (*ante*, p. 267) has also corroborated this bird's power of mimicry.

‡ 'Ornithology in relation to Agriculture and Horticulture' (1893), p. 142.

§ 'Natural Science,' vol. vi. p. 328.

taking them up."* The difficulty in cognizing the phenomenon of active mimicry is no greater than that experienced in endeavouring to explain the derivation, or evolution, of active means of defence, in fact it is much less formidable; for it is easy to comprehend even from our own experience that concealment is frequently a need, and is an art capable of cultivation and improvement. But many of the means of animal defence are in themselves almost inscrutable; we see the weapon used, but cannot account for its present existence. Natural selection may explain the improvement and survival of such useful organs, but their origin is still obscure. We will briefly allude to a few in order to make our comparison clear. The Horned Lizard (*Phrynosoma* sp.), commonly known as the "Californian Toad," possesses the power of ejecting jets of blood from the eyes, apparently as a means of defence. The Sand Shrimp (*Crangon vulgaris*) can suddenly raise a perfect cloud of fine sand round itself—"firing, so to speak, a 'broadside for the sake of the smoke,' and literally throwing dust in the eyes of his enemies."† The well-known instance of the "Cuttle-fish," which is able to discharge its inky secretion, and escape, like a diplomatist, in the darkness thus effected, is another illustration, as is also the Bombardier Beetle (*Pheropsophus* sp.), which when caught explodes its abdominal artillery, producing sound, smoke, and pain alike. The larva of the Puss Moth (*Cerura vinula*) can squirt a fluid—formic acid—when handled.‡ The common Partridge will "feign itself wounded and run along the ground fluttering and crying before either dog or man, to draw them away from its helpless unfledged young ones."§ Sometimes the indications of intelligent action may be almost inappreciable to our untrained cognitions in animal psychology, but even then the loosely used, and still more vaguely understood term, instinct, would have to be applied. At other times volition seems to be influenced by environment. Humboldt relates that "in the Missions of the Orinoco, and on the banks of the river Amazon, the Indians who

* 'Among Cannibals,' p. 23.

† W. B. Lord, 'Crab, Shrimp, and Lobster Lore,' p. 74.

‡ J. W. Tutt, 'British Moths,' p. 101.

§ Gilbert White and Markwick, 'Nat. Hist. Selborne,' Harting's edition, p. 325.

catch Monkeys to sell them, know very well that they can easily succeed in taming those which inhabit certain islands; while Monkeys of the same species, caught on the neighbouring continent, die of terror or rage when they find themselves in the power of man. The Crocodiles of one lake in the llanos are cowardly, and flee even when in the water; whilst those of another lake will attack with extreme intrepidity. It would be difficult to explain this difference of disposition and habits by the mere aspect of the respective localities. The Sharks of the port of La Guayra seem to furnish an analogous example. They are dangerous and bloodthirsty at the island opposite the coast of Caracas, at the Roques, at Bonayre, and at Curassao; while they forbear to attack persons swimming in the ports of La Guayra and Santa Martha.* According to Hudson, the Puma possesses "a unique instinct of friendliness for man," though it violently attacks other large Carnivora, and is, within the tropics, "a great hunter and eater of Monkeys, which of all animals most resemble men."† Another instance is the "dying-places" of the Guanaco (*Lama guanacus*) at the southern extremity of Patagonia, as recorded by Darwin, Fitzroy, and Hudson. That young Haddock should frequent deep water, and the young Cod seek the inshore water, "is one of those mysteries it is difficult to unravel."‡ The Apron (*Aspro vulgaris*), a freshwater fish belonging to the family *Percidæ*, according to Prof. Seeley, "lives at the bottom, and comes to the surface only in bad weather with a north or west wind, when other fishes take refuge at the bottom."§

Many actions of animals of a peculiar, constant, and distinctive character seem quite purposeless. This is particularly striking in the account given of the habits of the two species of African Rhinoceros (*R. simus* and *R. bicornis*). The calf of *R. simus* "always runs in front of the cow, while the calf of *R. bicornis* invariably follows its mother; this habit never varies." Again, *R. bicornis*, after dropping its dung, "proceeds

* 'Personal Narrative,' Bohn's edit. vol. i. p. 377.

† 'The Naturalist in La Plata,' pp. 48-9.

‡ Cf. McIntosh, 'Fifteenth Annual Report of the Fishery Board of Scotland,' p. 207.

§ 'The Freshwater Fishes of Europe,' p. 48.

to stamp upon the dung and to tear and dig up the ground in the immediate vicinity, so that there is absolutely no chance of anyone missing the place where a *R. bicornis* has spent the day. *R. simus*, however, leaves his dung alone, and does not trample and scatter it about; moreover, he is conservative in these matters; he always drops his dung in one place until he has raised a huge heap, then he starts the same operation in another place, and so on."* In Patagonia, the Guanaco has somewhat similar habits. Cunningham writes:—"Darwin has commented on the singular habit which they possess of depositing their droppings on successive days in the same defined heap, and this I have likewise frequently observed."† According to Romanes, "The dusting over of their excrements by certain freely roaming carnivora; the choice by certain herbivora of particular places on which to void their urine, or in which to die; the howling of Wolves at the moon; purring of Cats, &c., under pleasurable emotions; and sundry other hereditary actions of the same apparently unmeaning kind, all admit of being readily accounted for as useless habits originally acquired in various ways, and afterwards perpetuated by heredity, because not sufficiently deleterious to have been stamped out by natural selection."‡

* Coryndon, 'Proc. Zool. Soc.' 1894, pp. 331-2.—Col. Pollok relates a similar practice of the Indian Rhinoceros (*R. unicornis*):—"Whilst it remains in a locality it will deposit its ordure only on one spot, and visits it for that purpose once when it commences feeding at night, and again before leaving off soon after daybreak." ('Zoologist,' 1898, p. 173.)

† 'Nat. Hist. Straits Magellan,' p. 109.

‡ 'Darwin and after Darwin,' vol. ii. p. 89. For further treatment on this topic, cf. same author's 'Mental Evolution in Animals,' pp. 274-285, 378-9, 381-3.

(To be continued.)

THE MODE IN WHICH BATS SECURE THEIR PREY.

BY CHARLES OLDHAM.

OBSERVATIONS made during the past few months have to a great extent confirmed my suggestion (*ante*, p. 51) that the method adopted by the Whiskered Bat (*Myotis mystacinus*) and the Long-eared Bat (*Plecotus auritus*) to secure their prey was common to other species. This curious habit seems to be little known, or, if noticed at all, to have been misunderstood,* and is so remarkable that a further description of it, even at the expense of repetition, will, I trust, be forgiven.

When walking, most of our British Bats carry the tail curved downward and forward beneath the body, the interfemoral membrane forming a pouch or bag. If a moth or other large insect be encountered, the Bat seizes it with a rapid snatch, slightly spreading its fore limbs with the wings still folded, and, pressing them firmly on the ground at the carpus in order to steady itself, brings its feet forward in order to increase the capacity of the pouch, into which, by bending its neck and thrusting its head beneath its body, it pushes its prey. If the moth be a large one the Bat often struggles convulsively for a few seconds before it can adjust its grip to its satisfaction; but once in the pouch the insect rarely escapes, and, when effectually secured, is brought out and eaten openly. If the Bat can be induced to feed whilst hanging head downwards, suspended by its toes, its actions can be observed much more easily. Its tactics are then more efficacious, as the tail is not pressed close to the belly, and the pouch is in consequence held open, as it would be, of course, during flight.

This habit, practised readily and frequently in captivity, is so perfect an adaptation of means to an end that it must obtain with equal frequency among Bats in a free state. These creatures,

* In Bell's 'British Quadrupeds,' 2nd edit. p. 64, Daubenton's Bat is described as thrusting its nose more or less downwards under its breast in feeding; and in 'The Zoologist,' 1890, p. 99, a captive Pipistrelle is said to have beaten moths against its breast to stun them.

when at large, capture most, if not all, of their food during flight—I have known a captive Long-eared Bat to remain on the wing for over an hour at one time—and it seems in the highest degree probable that they habitually use this method to secure insects which are large and vigorous, and therefore difficult to manage, without being compelled to alight.

One species at any rate has actually been observed to use the interfemoral membrane as a pouch when on the wing. My friend Mr. J. R. B. Masefield writes, under date March 1st, 1899:—“I have no doubt whatever that the Long-eared Bat makes use of the interfemoral pouch in the way you mention. I have been close to them when picking moths off shallows, and the Bat always hovers when taking off the moth, and bends up the tail so as to form a receptacle for the insect as it drops. As you know, the shallow-feeding *Noctuæ* (*Tæniocampa gothica*, *stabilis*, *instabilis*, *cruda*, &c.) all drop immediately the flower or bush is touched or shaken, and thus the head of the Bat and the interfemoral pouch form a trap from which the moth cannot escape. When feeding in captivity I have often seen this Bat, as soon as it had seized a moth, sit, as it were, on its tail and double up its head in the way you describe. The Long-eared Bat does not always succeed in holding a large moth at the first snap, and this is an additional argument in favour of your theory.” A Long-eared Bat which I found in the old copper-mines on Alderley Edge, and kept for some days in February last, used always to thrust moths (*Scotosia dubitata* and *Gonoptera libatrix*) into its pouch, but only treated mealworms in this manner when they struggled violently, seizing and eating them at other times quite openly.

In July and August I caught several examples of Daubenton's Bat (*Myotis daubentoni*) as they emerged from a hole beneath the eaves of a house near Redes Mere, Cheshire. They seized and ate mealworms quite openly, but always thrust moths into the interfemoral pouch. Small thin-bodied moths (*Cidaria populata*) were thrust in and withdrawn again almost immediately; a larger species (*Urapteryx sambucata*) was obviously more difficult to manage, whilst vigorous thick-bodied species (*Xylophasia polyodon*, *Triphæna pronuba*, and *Mamestra brassicæ*) occasioned many struggles, and were not firmly secured until they had been held in the pouch for some seconds. Once, one of the Bats, having seized a

large and powerful *T. pronuba*, brought its feet so far forward that it fell over on to its back, but pluckily held the moth in its pouch until it was secured. Owing to the late hour at which it appears in the evening, it is not easy to distinguish the actions of this Bat as it skims over the shady pools which are its favourite haunts. It probably subsists to a large extent on gnats and other insects which fly just above the surface of the water and are too small to necessitate the use of the interfemoral pouch. Its behaviour in captivity shows, however, that, when occasion requires, this method of securing its prey is readily and effectually adopted. Daubenton's Bat has the tail only slightly curved during flight, to about the same extent as the Pipistrelle, less than the Whiskered and Long-eared Bats, and more than the Noctule, which holds its tail almost straight behind it. In his account of Daubenton's Bat, Tomes says (Bell, 'British Quadrupeds,' 2nd edit. p. 64):—"When a fly or other food was taken which was rather large, the carpus was always brought into use to do the office of a hand, and the food was pushed into the mouth with it." This is entirely opposed to my experience, for neither this Bat nor any of the other species I have kept has ever made use of either carpus or foot in feeding.

The Pipistrelle (*Pipistrellus pipistrellus*) is abundant in the neighbourhood of Alderley Edge, and I have kept several for a few days at different times during the past summer. The habit under consideration is much less pronounced in this species than in those already mentioned. My captives used to seize and eat mealworms quite openly, but on one occasion a particularly large and vigorous worm was thrust into the pouch. Thin-bodied moths (*Larentia fluctuata* and *Cidaria populata*) were also seized and eaten openly, as was a male *Hepialus sylvinus*; but larger moths (*T. pronuba*, *Polia chi*, and other *Noctuæ*) were pouched before being eaten.

The Noctule (*Pipistrellus noctula*) occurs commonly at Alderley Edge, but my efforts to obtain one alive have so far been unsuccessful. This Bat comes abroad early, and during the long midsummer evenings is silhouetted so clearly against the sky that the contour of its ears may be seen distinctly. Under such favourable conditions I have spent hours watching Noctules, both with the naked eye and with a strong glass, but have never seen

them use the interfemoral membrane as a pouch, nor have I been able to detect them using the thumb to rend asunder their prey, as Mr. O. Grabham (*ante*, p. 131) states they do. It is certain that the oblique downward plunge, so noticeable in the flight of the Noctule, is not *always* due to the loss of balance which would be involved in bringing the thumb to the mouth, for I have often seen Noctules plunge when the light was sufficiently good to show that both wings were fully extended. Mr. T. A. Coward, who has constantly watched Noctules in Dunham Park, suggests that a loss of balance would involve a vertical fall such as occurs when one wing is broken by shot, and not an oblique dive with extended wings. It must be remembered, however, that the diet of the Noctule is not restricted to large beetles (*Melolontha* and *Geotrupes*), and neither the pouch nor the thumb would be required to secure or dismember small insects; but whether this species uses the interfemoral membrane as a pouch, as its congener the Pipistrelle undoubtedly does, could be definitely settled by observing individuals in captivity.

A number of Lesser Horseshoe Bats (*Rhinolophus hipposiderus*), obtained at Cefn, Denbighshire, on March 4th, died before the end of the third day of their captivity. I could not induce them to feed, and they were so loath to take wing that I was unable to ascertain definitely the position of the tail during flight. In repose this organ is reflexed over the back (*cf.* R. Newstead, *Zool.* 1897, p. 538), and when on the ground the Bat carries it erect, *i. e.* at right angles to the long axis of its body. The legs showed very distinctly against a white ceiling when viewed from below, but this was possibly due to the shortness of the tail, and not to its being erect or recurved. Even if the tail were curved beneath the body during flight, its shortness and the small extent of the interfemoral membrane would constitute only an inefficient pouch, and it seems improbable that in the genus *Rhinolophus* these parts subserve the same purpose as in *Plecotus*, *Myotis*, and *Pipistrellus*.

I have put together these notes in the hope that others interested in the British Bats, who may be able to obtain the Barbastelle, Natterer's Bat, the Noctule, and more especially the Horseshoe Bats, will make observations on the methods adopted by them to secure their prey.

NOTES AND QUERIES.

MAMMALIA.

CHIROPTERA.

Death of a Whiskered Bat by Misadventure.—In spite of the adroitness with which Bats avoid obstacles encountered in their rapid flight, and the precision with which they thread their way among the branches and foliage of trees, they are not exempt from occasional accidents. At the end of last April, when walking along the margin of the mere at Siddington, I saw a Whiskered Bat (*Myotis mystacinus*), as I thought, asleep and hanging by its feet to a brier overhanging the water. A closer examination showed that the wings were half open, and not folded closely to its sides as in sleep, and that the Bat was not supported by its feet, but by a thorn which had pierced the interfemoral membrane on the right side close to the extremity of the tail. In its struggles to free itself, the Bat had lapped its tail firmly round the twig from which the thorn projected, and was thus held a fast prisoner. When found it was alive but moribund, and a large portion of the wing-membrane was already dry and shrivelled. It made a feeble but unsuccessful attempt to drink some milk which I offered it, but died within two hours of its release.—CHAS. OLDHAM (Alderley Edge).

AVES.

Is the Whinchat a Mimic?—In confirmation of Mr. Robert Godfrey's affirmative answer to this question respecting *Fratincola rubetra* in 'The Zoologist' (*ante*, p. 267), I venture to quote the following from St. John's 'Natural History and Sport in Moray' (p. 147):—"May 28th (1850). The loch (Spynie) is full of Sedge Warblers now. I heard a most extraordinary singing in some alders to-day; at one time it was like a person whistling, at another like a very sweet and full-toned Blackbird, but always ending in a song like a Sedge Warbler. After watching it for some time, we shot the bird, which turned out to be a Whinchat. I cannot understand its note, quite unlike any bird that I ever heard."—F. FINN (Indian Museum, Calcutta).

Icterine Warbler and Buff-breasted Sandpiper in Norfolk.—It may interest readers to know that on September 5th I secured an Icterine Warbler (*Hypolais icterina*) in some scrub between Wells and Cromer.

The light margins of the tertiaries were very conspicuous as it flew, giving it somewhat the appearance of an immature Pied Flycatcher. There was nothing in the stomach. It arrived when the wind was south-west. On Sept. 7th I shot an immature Buff-breasted Sandpiper (*Tryngites rufescens*) near the same spot. It appeared a dull sandy colour as it rose, and the flight was slow. It was a fine day, with north-west wind following forty-eight hours of a wet south-easter. It proved to be a male, and there were some green-coated beetles in the stomach. Both birds were afterwards examined by Mr. J. H. Gurney at Norwich. I believe this Sandpiper has not occurred in Norfolk for fifty-six years. Curiously enough, I was not far off when the last Icterine was killed by Mr. R. Gurney in 1896, and I saw his bird in the flesh. We compared the two in Norwich Museum, and they were very similar, but some skins then produced were of a decidedly yellower colour.—E. C. ARNOLD (The Close, Winchester).

Swallows and Hobbies.—Last year, on Sept. 8th, while watching the vast gatherings of Swallows and Martins which at this time assemble to roost in a large withy-bed near here, I observed a small long-winged Hawk darting about among them, but was unable to determine the species owing to the growing darkness. During the last few days, however, I have repeatedly seen one or more Hobbies (*Falco subbuteo*) performing wonderful evolutions among the dense clouds of Swallows at sunset, and looking themselves very much like Swallows magnified two or three times. Last night (Sept. 11th) a Hobby arrived rather too soon, and made off again when he found no Swallows in the usual place. I have not as yet been able to see these beautiful little Falcons secure a victim, nor did the Swallows appear to be much disconcerted by their presence. Except at this time of year, I have never seen a Hobby here, and I suppose it is possible that these birds are following the Swallows on their autumnal migration. I find that in his 'Birds of Wilts,' p. 73, the Rev. A. C. Smith noted a similar occurrence in that county, when several Hobbies waited upon vast flocks of Sand Martins which assembled nightly to roost in withy-beds. — W. WARDE FOWLER (Kingham, Chipping Norton).

Breeding of the Tufted Duck in South-west Derbyshire.—As the records of the breeding of this Duck (*Fuligula cristata*) in Derbyshire are somewhat scanty, and in the new edition of Howard Saunders's 'Manual' it is not mentioned in the list of counties in which this bird is known to breed, the following notes with regard to the Ashbourne district are worth recording:—F. B. Whitlock ('Birds of Derbyshire,' p. 172) mentions, on the authority of Mr. F. B. Wright, that "a pair bred at Osmaston Manor Lake in 1854." No doubt they bred occasionally after that date, but it was not until about 1886 that they began regularly to resort to the ponds for

breeding purposes. Since then a brood or two has been reared almost every year, and during the present summer (1899) at least two broods have been successfully hatched off. From Osmaston they seem to have spread to neighbouring ponds, and at a private sheet of water not far off they were first noticed about 1889, and have now bred regularly for some years past. Two nests were found only a few yards apart on May 28th and June 1st of the present year, with fifteen and nine eggs respectively. Both these nests were taken, but they began to lay again very soon afterwards, and fresh nests were found on June 6th (eight eggs) and June 16th (eleven eggs). Unfortunately both these nests were destroyed, and it is doubtful whether any birds were reared here this year. Attempts have been made to colonize other likely spots in the district, for they were observed on the Ashbourne Hall pond in the spring of 1892, and one couple certainly bred at Sturston Mill in 1895, and probably also in the following year.—FRANCIS C. R. JOURDAIN (Clifton Vicarage, Ashbourne).

Grey Phalarope in Co. Armagh, Ireland.—On Sept. 30th I received, from Mr. W. Keatley, a male Grey Phalarope (*Phalaropus fulicarius*), young of the year, shot by him on Sept. 28th on the Logan, near Lurgan. It was too damaged to set up, but the back, wings, head, and tail are preserved as a flat skin.—H. W. MARSDEN (Clifton, Bristol).

AVICULTURAL NOTES.

The Colour of the Iris in the Jay.—In all books that I have consulted which deal with British Birds, the iris of the adult Jay is said to be pale blue; and Howard Saunders, in his 'Manual of British Birds,' states that the young bird differs in having brown eyes. Towards the end of May, 1898, I had a young Jay given to me; it had been taken from the nest about a fortnight previously (with three others). When it came into my possession its irides were silver-grey, and this colour they retained until the second moult (in August of the present year), when they gradually changed to vinous brown. The bird is an exceptionally handsome and vigorous male, in every respect so well developed that when its crest is depressed the corners form distinctly perceptible ear-like terminations on each side at the back of the head. Is the colouring of the irides abnormal in my specimen, or has the colouring in young and adult birds been inadvertently reversed by describers?—A. G. BUTLER (Beckenham, Kent).

EDITORIAL GLEANINGS.

MR. W. L. SCLATER, the Director of the South African Museum at Cape Town, has prepared, for the use of his friends and correspondents, a 'List of the Birds of South Africa' (Cape Town, 1899). This list comprises the species of birds found within the area over which his proposed 'Fauna of South Africa' will extend. This area is thus defined:—"The northern limits of South Africa, as treated of in this work, will be a line drawn from the Cunéné River on the West to the Zambesi at the Victoria Falls, and thence along that river to its mouth. Within it will therefore be enclosed the British Colonies of the Cape and Natal, the two Republics of the Transvaal and the Orange Free State, the southern half of the Chartered Company's territory, German South-west Africa, and that portion of Portuguese East Africa which lies south of the Zambesi." The number of species enumerated in this list is 775, to which, however, considerable additions will doubtless have to be made. The first volume, by Arthur C. Stark, M.B., containing Part I. of the Birds, will shortly appear, and it is hoped that that relating to the Mammals, by Mr. Sclater, will be ready for publication during the course of the present year. This work will be a worthy companion to 'The Fauna of British India,' edited by W. T. Blanford. The London publisher is Mr. R. H. Porter.

THE Natural History Department of the British Museum have issued a small pamphlet, 'How to collect Mosquitoes' (*Culicidæ*), and doubtless any traveller or resident abroad who is willing to assist the Museum by sending specimens can freely obtain this useful guide for collecting, preserving, and transmitting. It contains much accurate zoological teaching. Mosquitoes or Gnats (strictly speaking the terms are synonymous) are the names popularly applied to the family *Culicidæ* (Diptera). *Culicidæ* are by no means the only blood-sucking Diptera, for the order also comprises the blood-sucking Midges (genus *Ceratopogon*, belonging to the family *Chironomidæ*), the *Simulidæ*, *Tabanidæ*, and blood-sucking *Muscidæ* (*Glossina*, *Stomoxys*, *Hæmatobia*). The females of all of these suck blood in the perfect state, while the males are usually harmless, though in the Tsetse-fly the blood-sucking habit is stated to be common to both sexes,* as has

* Surgeon-Major David Bruce, A.M.S., 'Further Report on the Tsetse Fly Disease, or Nagana, in Zululand,' p. 3. London: Harrison & Sons. 1897.

been asserted to be the case in certain species of Mosquitoes. The other blood-sucking Diptera, with the possible exception of *Ceratopogon*, are sufficiently distinct from *Culicidæ* in outward form to obviate any risk of confusion. In countries in which Mosquitoes abound they are recognized without difficulty. In England, however, where some seventeen species of the family occur, though not, as a rule, in any great abundance, or causing much annoyance by their bites, a large amount of confusion apparently exists as to the characteristics of a Mosquito, or, as it is more commonly called, a Gnat. This confusion is mainly due to the fact that the Midges (*Chironomidæ*), which, with the exception of the genus *Ceratopogon*, are perfectly harmless, often attract attention from the habit of the males of dancing in the air in swarms on fine evenings in spring and early summer, and, owing to their similarity in shape, size, and general appearance, are commonly mistaken for Gnats (*Culicidæ*). A good plate well exhibits the differences between the wing of a Mosquito or Gnat (*Culex* sp.) and of a Midge (*Chironomus plumosus*).

WE have received from Messrs. Friedländer and Sohn, of Berlin, a complete set of their 'Naturæ Novitates' for 1898, bound in one volume. This well-known publication, which not only records current biological literature, but is also a priced catalogue by which very many *separata* may be obtained, is much enhanced in value and convenience by being issued in a yearly volume. A good index is appended, and one "made in Germany" is seldom to be despised.

By the death of Samuel Stevens, F.L.S., F.E.S., who died on August 29th, after a few days' illness, in his eighty-third year, many readers of this magazine will regret the loss of a friend, and of a very familiar figure at meetings of naturalists, especially at those of the Entomological Society and Entomological Club. At the first—with one exception—he was the oldest member; of the second he was practically at one time a preserver. As an entomologist, he was a collector and lover of the study rather than a scientific worker, and probably acquired more happiness from the pursuit than is obtained by many of the better known and more technical workers. At one time he conducted a Natural History Agency, and was broker in the sales of the enormous collections made by Bates and Wallace. As to the way he conducted this business, the late H. W. Bates has often spoken to the writer of the gratitude he felt for the exhaustive manner in which his interests were safeguarded by Stevens. As these old familiar faces pass away, we realize how the old order changeth, and how practically we are meeting new men and an almost new science. Many present naturalists will long cherish the remembrance of kindly Samuel Stevens.

IN the 'Scientific American' there has recently appeared a memoir on "The Pearl-Button Industry of the Mississippi River," by Mr. Hugh M. Smith, of the U. S. Commission of Fish and Fisheries. The manufacture of buttons from the shells of native fresh-water Mussels began in the United States in 1891. Button-making has now become one of the principal businesses along a section of the Mississippi nearly two hundred miles in length. There are about four hundred species of Mussels found in the Mississippi River and its tributaries, but comparatively few are now utilized in or are adapted to button-making. We naturally find complaints as to the treatment of the "golden goose." "Not the least injurious feature of the fishery is the gathering of small Mussels for market, and the incidental destruction of small shells that are not utilized, but left on the banks or the ice to die." Mussels have many perils to surmount. "Animals which are known to prey on the Mussels are Muskrats, Minks, Raccoons, and Hogs, the first and last being especially destructive. The freshets to which the Mississippi is periodically subject undoubtedly do great damage to the Mussel-beds, burying them under sand and mud. Shifting sand-bars are also known to cover up beds. The fishermen sometimes find extensive beds of dead shells which appear to have been recently uncovered by the current. During freshets, when the stream finds new channels, many Mussels are carried from their beds, and left dry when the water subsides. Droughts are also liable to expose Mussel-beds, and cause much destruction. However, pollution of the water by refuse from cities and manufacturing establishments is perhaps the most serious menace to the Mussel-beds, next to the operations of the fishermen."

THE ZOOLOGIST

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ORNITHOLOGICAL NOTES FROM THE NORTH- WEST OF IRELAND.

BY H. E. HOWARD.

BEING on the north-west coast of Ireland during August, a few remarks about the bird-life there may be of interest to some of the readers of 'The Zoologist.' Not that they will find any new facts among them, but, by comparing them with notes from other districts, some conclusion may be arrived at as to the movement of birds at this time of year.

The district that I was in was perhaps as wild as any in Ireland, and the cliffs some of the finest in the British Islands. Only those who have seen the sea-birds on these cliffs during May, June, and July have any idea of the swarms that breed there. Of course, in August very few were left, those that were consisting chiefly of Kittiwakes, and the faces of the cliffs were lined in many places by the young birds, nearly all of which were ready to fly; some I did see with a good deal of down, but by far the majority were already commencing to take short flights. The old birds were very fearless, and would almost let you touch them before they would leave the rocks. Puffins I did not find with young on this occasion, although last year about the same time I saw the old birds entering burrows in inaccessible places with their bills full of fry. There were also plenty of young Shags sitting about the rocks, but all able to follow the parent birds. Razorbills and

Guillemots had practically all left, though a few Black Guillemots were round one particular spot where they always breed.

About the 12th of the month very large flocks of Gulls were hovering over the sea, most probably after Mackerel-fry or Sand-eels. The fishermen here call these flocks "Gribbers," and are delighted to see them, as they generally denote the coming of Herrings; they know by the different way in which they fly whether they are after Herring-fry, the flock being then more scattered.

On some islands off the coast I found Stormy Petrels breeding in fair numbers; they were difficult to approach, being on a grassy slope at the top of a precipice. It is easy to find the holes they are in by the smell, which is very strong. The young were hatched about the beginning of the month, and looked like fluffy balls of down, their eyes not being open; they grow very slowly, but I cannot say the date at which they leave the nest. The old birds never attempted to fly away when taken off the nest, but uttered a little squeak, and ran straight back down the burrow. The slope I found them on faced due east. They are called "oil birds" by the natives, as most probably they are in other places. On the same island a few Great Black-backed Gulls breed, but for some reason they do not do so on the mainland.

A certain number of Choughs are always to be found; their numbers seem to vary very little year by year. In one or two places round the cliffs a pair always build, generally in a hole in an overhanging cliff at about fifty feet or so from the sea. There is one typical hole they build in, and from all accounts they have done so for years; it is almost impossible to get at, which is just as well, though the eggs are not often taken, except in one place, where the nest is occasionally robbed. As I said, they do not seem either to much increase or decrease. Why, I do not know. It cannot be because there are not enough suitable places for them to breed in, for the cliffs are at least six miles round, and vary in height up to six hundred feet. Some people seem to think it is on account of the great numbers of Jackdaws, which, they say, drive the Choughs away; but I do not think that accounts for it here. I have never seen more than four together, and when I saw those they were more inland among the moun-

tains, about fifteen hundred feet up, feeding with a few Rooks on a grassy slope.

The Raven is another bird which never seems to increase much here, but I expect in this case the young birds are driven away by the old ones. A good many Ravens are trapped yearly by the farmers, as they seem to think they do considerable harm; they will also tell you that if they trap a Raven the surviving one will get another mate in a few days. It is impossible here, even with a rope, to get at the nest, which is always built in an overhanging part of the cliff; the young birds leave this nest about the end of March. I only saw three pairs during August, but they seem to wander a good deal at this time of year.

There are always a good number of Peregrines to be seen, and Kestrels are plentiful enough; they were by far the most common of the Hawks; there were often four or five together, and they seemed to annoy the Choughs very much, as they were continually chasing them. I only saw two or three Sparrowhawks, and there was one Brown Owl round the house; one pair of the latter generally nest here. I could not find out where the Eagles bred this year; as a rule a pair breed annually among the mountains. For the last two years I have known where the nest was, and am glad to say they are well looked after.

In the middle of a little fresh-water lake there is a small island, upon which numbers of Terns breed annually. The island is round, and not more than ten yards in diameter; it is completely overgrown with nettles, except round the edge, where there is nothing but loose stones. I am sorry to say I was too late to see much of the Terns; there were a few Common Terns about, and I feel sure I saw some Arctic Terns flying round. I was also told on fairly good authority that a very little Tern bred there; also that eggs which were supposed to have been those of the Roseate Tern were taken there this year. I give these statements for what they are worth, not being able to corroborate them from my own observation. I intend to visit the island earlier another year. A few Black-headed Gulls also build on the same island; they are quite the most common of all the Gulls I saw during August.

Coming to the smaller birds, Wheatears could be seen everywhere, the highest point I found them at being two thousand feet.

The majority of them were in very good plumage, but there were a few not long out of the nest. They would allow you to get quite close to them without showing any sign of fear; as a rule, my experience is rather the opposite in England. The earliest date I have seen them in these parts is March 27th. I could not find any Meadow Pipits' nests, although I have watched old birds with their bills full of insects, evidently waiting to feed their young. There were a few young about; and these, as well as the old birds, seem to me to be darker than they are in other places. In a few cases they had begun to flock, but not more than a dozen were together, and always on the grassy slopes at the edge of the cliffs. Stonechats were common enough, and the young, though fully fledged, were still being fed by the old birds. Some of the old males were in very fine plumage, but the majority were not. A few Ring-Ouzels were to be seen, generally on the face of the cliffs covered with vegetation, the only other inhabitants of which were Wrens; and they always seem plentiful in the wildest and most inaccessible parts of the cliffs.

Of Wagtails, Pied were common, but Grey not very. I only saw a few solitary ones, and the fact of these being single is curious, as I have almost invariably found them in pairs in autumn and winter.

Twites were generally in flocks of from five to twenty, feeding on seeds of various plants. I saw one Cuckoo, evidently a young bird. Swallows were beginning to flock, but Sand Martins were still breeding; in most cases the young were fully fledged, but I found one nest with eggs hard-set—this was on the 17th of the month. A few Swifts were flying about the top of one of the mountains, two thousand feet high—that was the only place I saw them; it was on the 11th of the month.

On the 23rd Flycatchers and Whitethroats were still about, and on the 29th I heard a Chiffchaff; these were the only two Warblers that I noticed. Curlews were more plentiful than they have been for some years, and were in fairly big flocks. Oystercatchers were also flocking; I counted one hundred and fifty in one flock. A few Sanderlings and Dunlins were about towards the end of the month, but only in very small flocks of four or five.

There is a point in connection with the song of birds which I have not seen mentioned, although it must have been noticed by

many who are interested in ornithology ; it is the differences in the note, or rather in the tone of the note, of a bird, in different parts of the United Kingdom. I have observed a great difference in this way in the North of Scotland as compared with Worcestershire, and again between the birds here and in Worcestershire. The difference seems to exist more among the birds that are resident during the year, but of this I cannot be quite sure, as I have not been in the district during the time of year when the Warblers were singing. The difference is most noticeable in the note of the Chaffinch, Greenfinch, Hedge-Sparrow, and Wren. I say note, because it is more in the call-note than in the song, and, I think, more in the Chaffinch than in any of the others ; but in all of them the note seemed to be pitched lower. Probably it is the climate that has some effect, the same way as it does on the human voice ; but it is a point that will take a great deal of clearing up, and I shall be glad to learn the opinion of more observant naturalists than myself.

Before concluding this article I should like to mention the wholesale destruction of sea-birds that goes on round the north coast of Ireland.

There is a certain class of people, who come chiefly from the large towns in the north, and who call themselves *sportsmen*, and whose only idea of sport is to shoot as many sea-birds as possible, and leave the bodies lying with their legs cut off ; the legs, I presume, are kept as trophies. The slaughter is indiscriminate ; even bodies of Black Guillemots have been picked up floating about minus their legs.

I was told by a native that the destruction of Cormorants had done him a great deal of damage, by the number of sheep he lost over the cliffs. His farm is situated close by a breeding haunt of the Cormorants, and while they breed there the smell is so strong that the sheep will not go down the cliffs. Now this breeding place is destroyed, and, there being no longer any odour, the sheep wander down after food, and are often lost.

I mention this slaughter in the hope that it may catch the eye of some one who may be able to exert his influence on behalf of the sea-birds.

AN OBSERVATIONAL DIARY OF THE HABITS
OF NIGHTJARS (*CAPRIMULGUS EUROPÆUS*),
MOSTLY OF A SITTING PAIR. NOTES TAKEN
AT TIME AND ON SPOT.

BY EDMUND SELOUS.

(Concluded from p. 402.)

June 29th.—9.15. I suppose the eggs to have been hatched since 12.45 to-day, as I saw no sign of the young birds during the nearly three-quarters of an hour I was there, and saw at least one of the eggs projecting a little beyond the sitting bird's body. It might possibly, however, have been the empty shell projecting beyond the young bird as it lay under the mother's breast. Shortly afterwards one of the chicks made two or three quick little jumps upwards towards the parent bird's head, reaching its beak to hers. She bent down her head, and taking, as it appeared to me, the chick's bill in her own, she made two or three times that particular motion with the head so well known to those who have watched Doves or Pigeons feeding their young by regurgitation from the crop.* The chick then crept back under the mother bird's breast. Very shortly the other chick came out and jumped up to the mother's bill in the same way, and this took place two or three times. If it is not feeding by regurgitation which takes place, I am at a loss to account for the actions of both the parent and the young birds so strongly resembling those of Doves and Pigeons under similar circumstances. During all this time the parent bird kept uttering a

* I take this opportunity of stating from my own observation that the parent Dove (that foreign species, at least, usually kept in confinement here) regurgitates the food from her crop into the beaks of both her young ones placed within hers at the same time. Not always, however; they are frequently fed separately. Neither in Seebohm, Morris, Lydekker, Howard Saunders, Prof. Newton, or the British or Chambers's Encyclopædias, can I find anything as to the Nightjar's feeding of its young, it being evidently assumed that it does so in the usual manner.

low croodling sound expressive of pleasure and tenderness, and making one more distinctive note. Failure of light a great annoyance.

9.25.—Bird suddenly flew away, leaving the chicks.

9.30.—Bird (I believe the same one) settled on stump near young ones, and in a second or two flew down and covered them. The chicks then again jumped up to her, and again she appeared to me to feed them by regurgitation, this taking place two or three times. But again, and still more, I must regret the failing light. Whilst the bird sat quite near me on the stump, I noticed nothing in her bill, which, I believe, I should have done against the sky had she been holding anything not very small. On the first occasion the bird, of course, had nothing, and had (I make no doubt from my previous observations) been there all day.

9.40.—Bird relieved, and at once flew away; the partner covered the young birds. I do not think any more feeding took place, but it was now too dark to do more than guess.

9.45.—The first bird back, and took charge of the young, the other flying away. No further change up to 10.15, when I left.

June 30th.—(Cloudy, beginning to rain). Must have been about 5.30 a.m. when I got there, but had forgotten my watch. Bird brooding on its young. Another position, head turned away. Eye about a quarter open. Chicks quite covered. Bird shifted right round so as to face me. Young one struggled quite out, looking then, I thought, rather reddish and naked. The old bird kept shifting about, and slightly altering her position in consequence of the movements of the young ones under her. Cannot be sure now if both the eggs are hatched, or only one. At any rate, the eggs, whether both are empty or not, seem to be still under the bird. Both are hatched, I think (though one is much more *en évidence*). What I saw was a piece of the empty egg-shell. A piece of the shell of one egg at least—the bulk of it—seems to have been moved away some six inches, but cannot make sure of this for fear of disturbing the bird. It now coming on to rain, and having no waterproof, I had to go. It must have been 6 a.m. or a little later.

3.20 p.m.—Bird sitting, position changed. The greater part at least of the shell of each egg has been moved. The nearest

lies some three or four inches from the bird, the farthest more than twice that distance. Eyes closed, opening very slightly at any noise of rustling, &c., which I could not avoid making. This time the wings cross each other over the tail, which projects about an inch beyond them; sometimes they lie (probably crossed) under the tail. Till about 4.30 bird sat quite motionless, with the chicks entirely hidden under it. Then one of the chicks began to grow restless, and several times crawled out beyond the parent bird's breast. It seemed to want food, and on one occasion in particular stretched itself up and touched its mother's beak (for I assume that the bird which sits all day on the eggs and young is the mother) with its own, as if seeking to be fed. But the mother, much to my disappointment, did not respond. The feathers of the old bird's throat were to-day more still; once only, whilst I was there, she twitched them, but not in quite the same way. The band or gorget of feathers just under the bird's throat is evidently very responsive to the slightest movement of the throatal muscles.

At 5 p.m. came away, disappointed in not having seen the chicks fed, which I thought might perhaps take place occasionally in the daytime.

8.5 p.m.—Returned and found bird in much the same position, but either it had moved a little back or pushed out another piece of shell, which now lay just beside it. Eyes closed. Chicks not visible.

8.40.—Chicks came out from under the mother's breast, jumped up to her beak, and were fed by her in the plainest manner—sparingly, however. The chicks were importunate, but the parent bird by no means bountiful, doubtless for good reasons of her own.

8.45.—Partner flew up, and the other one flew off silently whilst he was still in the air. He settled close by the chicks, and walked on to them. They immediately sprang up at his bill (as just before with the mother), and he fed one of them by regurgitation. This time the process was still more unmistakable than before, for, as the old bird fed the chick more thoroughly, his motions were more emphatic, and exactly like a Dove's.

8.50.—Bird flew off. In another two minutes a bird (probably

the other, the hen) returned, and both chicks were fed by the regurgitatory process. The light, I am glad to say, was amply sufficient, and there could not be the smallest doubt. The chicks were thus fed several times—four or five times. A minute or two after feeding the chicks, and before flying away, the old bird opened, twice in succession, its enormous beak, or rather mouth. Quite a revelation; it looked as if it opened its head. The other bird had also done this, but neither of them before to-night whilst under my observation. They also moved their bills in much the same way as we do our lips after having swallowed something, and still having the taste of it in the mouth. The old birds could not have fed the chicks two or three times in succession, as they did, with anything they brought in their beaks; nor did I ever observe them to have anything in the beak, which I am sure I should have done had this been the case. Moreover, I observed the swelling and subsiding of the throat, suggesting the pumping of something through it.

9.5.—Bird flew off. In about a minute both birds flew up, and, I think, settled near on ground; then flew off again. The two birds now sported close by in the air, one of them uttering a note like “quick quick, quick quick”—a kind of loud modified twitter.

9.10.—Bird flew up and perched on same elder stump as night before, then almost at once flew to chicks and fed them as before. The light was now fast fading, but it seemed to me as if both the chicks had their beaks in the old bird's mouth at the same time, as with Doves. This, of course, may be a mistake, or it may have been due merely to the eagerness of the chicks. (This would explain the origin of the habit.)

9.25.—Bird rose suddenly, and flew away in silence. About a second afterwards bird flew down on to young, and churred slightly for a moment, then uttered the little croodling note of content. I could just see the lighter coloured bodies of the chicks in motion, and have no doubt they were being fed as before, but too dark to see it or anything.

9.35.—Bird perched on same elder stump, upon which the other bird left the chicks, this time quaw-eeing when it got a little way off. A second or two afterwards bird on stump flew down to young.

9.50.—No further change. I now left, it being too dark to observe anything beyond the coming and going of the birds.

July 1st.—(Raining, but had been fine day.) Came without watch. Must have been about 8.25 p.m. when I got there. Found bird sitting some six inches nearer to me than day before—the first time it has left its original position. Sat facing me. Eye closed or just blinking. Chicks quite covered. Wings of bird not crossed, but some inch and a half between the tips. Chicks came out from under old bird's breast, and jumped up importunately to be fed, but, she not complying, went back. A second time *même jeu*. And a third; and a fourth; and a fifth; and a sixth. This time the chick pulled at the mother's beak, but she refused to feed it. The other bird settled near, and the one with the chicks flew off. Chicks left uncovered for some minutes before bird came (cannot say which), and fed one of them by regurgitation in the plainest possible way. Could see the throat of the old bird swelling and subsiding. Afterwards it opened its mouth as on night before. Bird relieved and flew off before the other had taken its place. Feeding renewed. Always the same process, but am not quite clear whether the chick put its beak in the parent bird's or *vice versâ*. Bird flew away. Had stayed much less time than the other. After some five or six minutes one of the birds flew back, and settled on elder stump; then flew down to chicks, which were fed as before. Too dark now to see properly, and also had to go on account of rain.

July 2nd.—(Fine all day.) At 8.30 found bird sitting in the old place, with tail crossing the dried stalk. Eyes closed. Chicks quite covered.

8.35.—Bird, which, I think, was the partner, flew near quaw-eeing. The sitting bird took no notice—that is to say, she did not "churr."

8.37.—Young ones out to be fed, but old bird declined.

8.40.—Partner flew up and settled on ground near, where he churred softly. Sitting bird did not answer.

8.40.—Other bird flew up, and settled beside the one on chicks, who immediately flew off. The other, after churring slightly for a second or so, followed. One is much lighter coloured than the other; both are covered with down. When handled they opened their enormous mouths (which seemed as

large in proportion to their size as in the old birds), and one jumped up at my finger from the ground as at the old bird's beak. Though dependent on the parents for food, the chicks seem almost as active and well able to get about as young Fowls or Pheasants; but, their food being in the air, and they being unable to fly, there is no inducement for them to run about.

8.50.—Bird settled on ground near by, and churred slightly; then almost immediately flew to chicks, but seemed unwilling to feed them.

8.53.—Bird relieved and flew off. Chick fed by the other four times, the parent bird making a low clucking or crooning noise during the feeding.

9.2.—Partner flew near, and bird left the chicks. Both birds now circled round about in the air, hawking as it seemed for insects, and often clapping their wings. They would sink gracefully down, and then rise up, somewhat perpendicularly,* with a curious fluttering action of the wings. I take this to be an antic, and nothing to do with securing prey. I notice now, or rather I now pay attention to, the fact that one of these pair of birds is lighter than the other in the colouring of its plumage. The lighter bird is the one that sits all day, and which I take to be the female.

9.8.—Lighter coloured bird back. Chicks fed once or twice.

9.12.—Bird flew off silently.

9.17.—Bird hovered above chicks, who uttered a note.

9.17.—Lighter bird back, and fed both chicks twice; other bird flew near.

9.20.—Bird left chicks.

9.20.—Darker bird flew down and fed chicks, I think twice.

9.28.—Bird flew off.

9.28.—Lighter bird settled on elder-stump near, and then flew to chicks and fed them. Too dark now to see properly.

9.32.—Bird flew off clapping its wings. It is the bill of the young bird which receives that of the parent during the process of feeding. To-night heard a bird making a peculiarly shrill "churr."

9.50.—Bird flew away.

* I mean straight up, whilst retaining the horizontal attitude as one might draw up a toy bird dangling from a string.

9.55.—One of the birds back. Too dark, of course, to observe. Both the chicks were fed once at least by the arriving bird, and in a manner which suggested regurgitation and nothing else—jerking of the parent bird's head, muscular action of the throat, &c. Whatever they got was disgorged in some manner from the crop or gullet. It was not carried in the beak and dropped into their mouths. But to-night I could not feel so sure that the chicks were fed a second, third, or fourth time. If fed at all after the first time, it was in a very inferior degree. The bill of the old bird, indeed, was placed within that of the chick (or rather the chicks so placed it by grasping it with theirs), and jerks of the head were made by the parent bird, but with much less emphasis than the first time.

At 10.10 came away, leaving bird still with the chicks.

July 3rd.—(Fine all day.) Arrived at 8.30 p.m. Bird had moved again, and was sitting where I found her on July 1st. Note here that "Bird" at beginning of entry means throughout the lighter coloured bird that sits all day, and which I take to be the hen. Henceforth I shall call the dark bird the male, and the light one the female. This, however, is only assumption, however probable.

8.45.—Chicks came out and jumped up to be fed, but, as far as I could see, were refused. This twice. The third time they may have got something, but I do not think they did. Nor the fourth. During this, one of the little chicks ran with perfect ease some four or five inches from the old bird, and then returned. Afterwards the other did the same. Find it difficult to be quite sure if the parent bird gives the chicks anything before she flies away for the first time. One of the chicks running all about.* Again, they may have got something, but cannot be certain. Old bird gave a great gape with her enormous jaws—and just now again; quite a wonderful sight. This makes me think that the chicks did get something, as I have not seen the birds gape except in connection with the process of feeding, either at the time or afterwards, that is to say.

* "The young of this bird, when able to crawl about," &c. (Seebohm, 'A History of British Birds'). "The nestlings . . . *have been known* to display a precocious activity approaching to that of the young of gallinaceous," &c. (Howard Saunders, 'Manual of British Birds'). I do not suppose my chicks were two infant prodigies. [My own italics.]

8.58.—Hen bird flew off, uttering a note which was not the “quaw-ee.” An indefinite note, as of impatience. Chicks still; they do not move when left by the parent bird.

9.4.—Hen bird settles on stump close by. In a minute flies to chicks, and feeds them—both of them—more than once. Then a pause whilst the chicks are covered. It must be by some process of disgorging—regurgitation, that is, After pause chicks fed again, more gently, less violent motions; but feel sure they got something. Could make out nothing in the bird’s bill. Chicks out again. May have got a little. They seize the parent’s bill. Another chick fed. Feel sure he was fed, though gently. Feeding attended with little crooning noise on part of parent bird (not, of course, while she is actually regurgitating the food).

9.13.—Female bird flew off suddenly and in silence. Chicks quiet.

9.15.—Same bird back. Both chicks fed more than once. Regurgitation it must be.

9.18.—Chicks out again to be fed. Only gentle motions of beak on part of old bird.

9.19.—Old bird flies off. No cry. Chicks quiet.

9.24.—Bird (same one—I think, female) on elder-stump.

9.25.—Flew down and fed chicks as before, but not so much it seemed. As bird sat on stump (four paces off) I could see head and beak pretty plainly against the sky, and she seemed to have nothing in the beak. Chicks (I believe) fed again, making third time. Too dark to see well, but judge from movements of old bird’s head and croodling noise. Believe chicks fed again. Much croodling. It does not seem likely that the bird would croodle if she merely refused to feed the chicks, and she croodles when she certainly does feed them. To go by the croodling the chicks were fed four or five times.

9.40.—Bird off, silently.

9.40.—Bird on stump. Almost immediately down to chicks, and fed them with much croodling. Croodling repeated twice, at intervals, up to 9.50, when bird flew off, and I left. The two birds were never together this night; I mean, of course, near nest. At least, I did not see them. I think it was the hen bird that was down the last time before I left, but could not see if it

was. To-night, as I walked away, I heard two Nightjars uttering a new note—a sort of “jig jig jig jig jig jig” to each other—varied with the usual “quaw-ee” and “queek.” One of these birds clapped its wings quite thirty times, for I did not begin to count till after the first bout, and then counted to twenty. There was a short pause between the two bursts of clapping, as a pause in music.

July 4th.—(Fine most of the day.) At 8.43 p.m. found bird covering young. Place changed; more than a pace nearer to me than originally. Eye quite shut.

8.50.—Chicks came out from under breast, jumped up and tugged vigorously at old bird's bill; but, as far as I could see, she refused to feed them. Also the croodling noise made by the chicks, not the old bird.

8.55.—Chicks again tried, both tugging together with all their might, at old bird's beak; but no good. Think the croodling is made by the chicks, but difficult to be quite sure.

8.57.—Tried again, but to no purpose; bothering the old bird very much—so much that at last she went away to the place she was in last night. The chicks ran after her and tried again, but gave it up, and then ran under her breast. The croodling sound seems too full for the chicks, and has too much expression in it. Yet it ceases after they get under the hen. This, however, is not decisive.

9.2.—Chicks tried again, and again, I thought, got nothing.

9.3.—Tried again importunately. No result. I think it is the old bird that makes the croodling.

9.5.—Old bird begins to turn her head and look about with eyes open; then gives tremendous gape.

9.10.—Another gape; and at 9.11 flies off. Ran out to clear away some nettles slightly obstructing view. Chicks lay quiet at first, then all at once scuttled away into surrounding herbage. I had not seen old bird about, or heard any note uttered.

9.18.—Same bird back, and settles in the empty place. One little chick runs out of grass from one side, and is fed twice with *empressement*. The other one comes afterwards from the other side farther off. The hen bird walks to it, and feeds it twice also. Process always the same. A minute afterwards one of the chicks tries for some more, but do not think he gets any.

9.23.—Both chicks try again. Doubtful if they get anything.

9.27.—Chicks out again, and it looks as if they are fed just a little.

9.28.—Bird flies off uttering a low and yet sharp sound—an unquiet sound. She circles around and about in the air, hawking, I imagine, for insects. Yet no cockchafers, moths, or other large insects are visible to my eyes where she is in the (to-night) cloudless sky. I believe she engulphs in her great cavernous jaws a vast quantity of minute insects, gnats, flies, &c., and that these are disgorged on her return down the chicks' throats.

9.33.—Same bird (hen) settles on elder-stump. Seems to have nothing in beak; nothing breaks its outline against the sky. Almost immediately she flies to chicks and feeds them, but not so fully as before.

9.42.—Chicks try again. Probably get nothing. Too dark now to see properly.

9.45.—Bird off. Circles about a little, and back at 9.48.

9.48.—Feeds chicks, but, so far as I can make out, very little. There is now a little piping note, no doubt from the chicks. The croodle is, I think, the old bird. It is, I feel sure, the same bird as before that has just fed the chicks, but cannot see that it is. Moon now rising.

9.52.—Leave, meaning to return when the moon, now full, is risen. Bird still with chicks. The sky, however, shortly clouded over, and I did not come back.

July 5th.—(Fine day.) 8.33 p.m. Found bird sitting in place where I left her last night. Eyes closed. Lighter coloured chick ran suddenly from mother to the egg-shells, some six or eight inches off, sat there a minute or two, then ran back, tugged at her bill, got nothing, and went under breast again.

8.41.—Chicks come out and try to get fed, tugging long and vigorously at the old bird's beak; but, as far I could see, she simply pulled back again, and they got nothing.

8.45.—Chick runs out from under old bird's tail, then round to her breast, and tries hard to get fed; but in vain.

8.46.—Bird flies off with the impatient or unquiet note. Came out and touched chicks with my finger. They sat quiet. Old bird has disappeared. Coming on to rain.

8.50.—Lighter bird flies up and settles on elder-stump; other

bird flies after her, passes her, settles somewhere near, and "churrs." Bird on stump flies down almost directly to chicks, and feeds them as usual. She is careful, as it seems to me, to feed both, and not one only. The light-coloured chick is very greedy, but she dodged his importunate bill some half a dozen times and fed the other. During feeding the other bird flew by.

9 o'clock.—Lighter bird flies off. The two birds (as I think them to be) now together circle near about in the air. A bird settles somewhere close by on the ground, then rises and flies off with the "choo-oo-oo-oo" note, and clapping the wings repeatedly. Then settles (probably the same) somewhere near, and continues to "churr."

9.6. — The lighter bird circles round, making the most astonishing twists and zigzags in the air, and certainly seeming to pursue insects. I can see no insects, though I should certainly see anything like a cockchafer or fair-sized moth. Again she flies by, near, doing the same. My theory is that the bird engulphs numerous minute insects (much as a Whale does Infusoria), and disgorges them into the chick's mouth as a pulp.* Several times during this the male bird (as I take it to be) has sat near churring, then rising with "choo-oo-oo-oo," and clapping of wings.

9.15.—Hen bird flies up, uttering a note like "chug chug chug," and settles on stump. Has nothing in beak that I can see. If she had anything, perhaps she would be less likely to utter a note; but this must go for nothing, as I have observed that small birds (Redstarts) bring food in their bills, yet make a plaintive cry in neighbourhood of the nest. In a minute she flies down and feeds the chicks. One (the lighter one probably)

* It is true that I never observed the bird flying with its mouth open, but neither did I ever *observe* it open its mouth during those astonishing twists and twirls (presumably after insects). The beak need not be widely opened for many minute insects to be swallowed whilst sailing through a strata of such, nor need it be continuously opened. The Nightjar, it must be remembered, flies and feeds by night, when it is both dark and people are in bed. Still, I find in Seebohm's 'History of British Birds' the following: "The bird has been said to hunt for its food with its large mouth wide open, but this is certainly an error." The first part of the sentence impresses me more than the last. Why *has* the bird its tremendous bristle-fringed gape? Other birds catch individual insects as cleverly without it.

is very greedy, and seems to get more than the other ; but getting dark now. A bird (I think the partner) flies near quaw-eeing.

9.20.—Bird leaves chicks.

9.25.—Bird back on stump. Too dark now to see which one, though I believe it to be the hen. However, I get outline of beak against the sky, and it is not broken by anything projecting from it. In a minute bird flies down and feeds chicks in the usual way, her actions being almost exactly those of a Dove. Both chicks, I think, are fed, but too dark to be sure. It is the old bird, I feel sure, that makes the croodling noise. The chicks have a plaintive, piping note, and the two notes are often being made at the same time. The croodling is always made by the old bird when the chicks want to be fed, but she has nothing for them. Equally therefore when she feeds and does not feed them, so that my inference to the contrary was wrong.

9.35.—Croodling again, meaning that chicks are trying to be fed. The chicks begin now to hold up their wings, and wave or flap them more than at first.

9.40.—A bird (doubtless the partner) flies close by quaw-eeing, and the other bird flies from chicks. The partner then settles near and “churrs” softly for a moment, then flies to chicks, feeds them, and instantly flies away. I thought I recognized the dark bird’s voice—the male’s, as I take it to be. It is not likely that the hen, after flying off, would have returned almost instantly and fed the chicks again. Moreover, since the eggs have hatched out I have not heard her “churr.”*

Left at 9.45. Both birds away.

July 6th.—Arrived at 8.40 p.m., and found chicks alone quite three feet nearer to me than the original place where the eggs were.

8.44.—Hen bird perched on elder-stump. Held nothing in beak. The light good. She opened and shut her beak once, and I saw the light between the mandibles. Wings, when thus perched, reached very nearly to end of tail ; would do quite, I think, were they straight instead of the tips curved towards—sometimes crossing—each other.

8.47.—Bird flies to chicks and feeds them in the usual way.

* After the hatching of the eggs the hen bird never greeted the male with a soft “churr” as he came up, or, indeed, paid any attention to him. This is human !

One at least certainly, but cannot feel sure about the other. It tugs at her beak, but whether her movements were not only to pull it away, as they certainly were at the end, I cannot say.

8.50.—Chicks out again, and the lighter and greedier one pulls long and vehemently at the hen's beak, but whether with success I cannot certainly say. Begin to think they must get something, after all—I mean after the first time they are fed by the old bird on each return.

8.54.—Other chick tries to get something, but old bird immediately flies away. The feeding went on in the original place—as night before—for the old bird walked away to it, and the chicks had to follow her. During above, a bird (I think the male) flew close by quaw-eeing. I notice that of the two chicks the light-coloured one is the most vigorous and greedy, which might suggest its being the male; but if so, the old bird, who sits all day and does most (if not now all) of the feeding, is probably the male too. This I can hardly think.

9.3.—Bird flies round with twists and evolutions in the air. Imagine it to be hawking for insects, but see none in the light clear air. I should certainly see insects of any size, even that of a bluebottle—I mean, of course, where the bird hawks—near me.

9.5.—Hen bird back on stump. In a moment flies to chicks. Feeds light one (who insists on it) first, then the darker one, both unmistakably (always in same way), and again flies away. Could see nothing again in bird's bill whilst she sat on stump. At a rustling which I make in my shelter, the light-coloured chick scurries away into nettles; the dark one sits still.

9.11.—Bird flies by hawking.

9.12.—Hen bird perches on stump. Can detect nothing held in bill.

9.13.—Bird on stump flies to chicks, and feeds the darker one well. The lighter chick comes running from nettles, and is fed much less, if at all. Bird then flies to stump, and for a moment I think I notice a swollen appearance of the beak, as if something was held or sticking within it. Then there are motions of bill and throat, as if the bird was swallowing something down, and, this done, she flies off. It looks as if she had retained something of what she had brought up into her mouth to feed the chicks.

Thus the only time I have seen, or thought I have seen, anything in the parent bird's bill was not just before but just after she fed her young.

9.21.—Same bird back. No appearance of anything in beak.

9.22.—Bird flies to chicks and feeds them, I think more than once, but I cannot say for certain, nor if both chicks are fed or only one.

9.24.—Chicks try to get fed again, on which parent bird flies away with the impatient note. The chicks have now a well-defined piping cry, which they utter when the parent bird is with them; when alone they are silent. The croodling, I now know, is made by the old bird.

9.30.—Three birds fly by close together, one or more of them clapping their wings.

9.31.—Bird (I think the lighter one) back on stump. Nothing in beak, I think. Another bird, churring close by, rises and flies near (but cannot see it) with loud double claps of the wings.

9.35.—Bird on stump. Flies to chicks, and (as I think) either feeds them both or one of them twice.

9.33.—Bird churring on ground somewhere near, and rises choo-oo-oo-ing and clapping wings.

9.40.—Bird leaves chicks, and I come away.

July 7th.—Arrive at 2.40 a.m.—Cycling down, I put up a Nightjar sitting in the road. This bird kept flying in front of me all the way down the road (some two hundred or three hundred yards), and when I turned into the footpath amongst the trees leading to plantations still followed or rather headed, me nearly as far again. It seemed as if my appearance at such an hour piqued the bird's curiosity.

2.40.—Hen bird settles on elder-stump, and then keeps uttering a note like "tchug tchug," a low somewhat parrot-like sound. Soon the other bird flies to her as she sits on the stump, flutters about her without alighting, and flies off. In a minute or two again flies close by her.

2.50.—Bird flies twice quite near, clapping wings, and then twice again in as many minutes.

2.54.—Bird leaves stump.

3 o'clock.—Same bird back on stump. In a minute or two flies to chicks and feeds both well. She darted at them in a

somewhat impetuous way, and fluttered over and about them several seconds before alighting with much whirring of wings. Both whilst thus fluttering, and afterwards whilst feeding the chicks, the male bird made a dash at her in the air, and then flew and settled a little way off. The instant the hen bird had fed the second chick she flew a few paces off amongst the nettles, where evidently the other had been waiting for her. I could see the two running about excitedly, pursuing each other as in courtship.* They soon, however, got out of sight amongst the nettles, so that I could not establish this farther.

3.10.—Churring of Nightjars all about. Quite light—almost broad daylight—though moon still bright.

3.15.—The two birds disport themselves in the air near, in narrower or wider circles, pursuing each other with animated cries (“quaw-ee” or “quee”), and clapping their wings loudly. The two chicks sit tightly pressed against each other.

3.22.—Turtle-Doves begin to call.

3.25.—Wood-Pigeons ditto.

3.30.—Broad daylight. Number of Bats flying about. Both birds away. Can hear one Nightjar churring, but not loudly.

3.40.—See no Bats now, but Swallows. May have mistaken the Swallows for Bats just before, the distance being considerable, but do not think so. Wood-Pigeons begin to fly about. The clapping of their wings above the back is now quite a marked feature, much more so than later in the day. Hear no more churring now. Turtle-Doves turring everywhere. Chicks still left alone.

3.45.—Chicks all at once begin to utter a note I have not heard before—“quirr quirr”—quite different to the piping note; more like a rudimentary “churr,” but having no continuance. They seem excited about something, and begin to move from where they were. Soon I hear the old bird croodling, uttering various low sounds—call-notes evidently. Chicks get more and more excited, and run towards the sounds, running a little, then stopping, running again, and so on, always “quirr, quurring.” They soon got right away from the nest. The old bird does

* And pretty fast. This from memory twenty hours afterwards. “Its helplessness on the ground, where it can only walk with difficulty.” See-bohm, ‘A History of British Birds.’

not call continuously. There is an interval, and the chicks sit still. She again calls, and they run on. Same again. Old bird keeps calling them at intervals, and each time they get farther away from the old place, stopping between the calls. I walk after them. When I get to them—some seven or eight paces off—both the old birds start up from the ground. One (the lighter-coloured one) spins along the ground as though injured, with her wings extended (as a Partridge in same case), but when I walk away flies to the old elder-stump, where she sits clucking—perhaps to call the chicks back again. I then walk some distance off, keeping the bird in view, and sit down on tree-stump watching her. It must now be 4 o'clock or past (have left watch at bush). Thinking it better to let the bird get easy in her mind, I walk away altogether, and when I return to the bush (at 4.25) neither old birds nor chicks are to be seen. It would seem that the birds had divined my presence early in the morning, and called off their chicks to a safer spot. This, however, is merely conjecture. No action on the part of either of the old birds previous to the calling off of the chicks suggested that they were suspicious of my presence, and the more I think of it the less I believe that they were. Following the chicks was a great mistake. Leave at a little past 5 a.m., neither old birds nor chicks having come back.

July 12th.—(Fine.) 8.25 p.m. Found the birds again.* They were some fifty yards from the original place. Put up both the old birds. One (the hen, I have no doubt) first spun along the ground, then flew about much disturbed, then settled on ground some little way off, and kept up a loud continuous clucking. One chick had already run out of the way. The other—the darker one—lay there, apparently not at all disturbed. After a time hen bird rose from ground, and flew about in great state of excitement, coming quite near me as I sat on the ground, and hovering about; then darting off again, then sitting on thistle-tuft, then again on the ground, always making the distressed kind of clucking note, which at times became shriller, rising, as it were, to an agony. The other bird—the male—also flew about near, behaving in the same way, but not so violently—a little less

* They had not returned to the old place, nor had I been able to find them during the interval.

moved. Sometimes he came quite near, and often clapped his wings. Also settled on elder-stump near.

8.45.—Took one of the young ones up, and put it down in the old place, then sat behind screen as before. The birds continued to fly about both near the place where I was and that from which I had taken the chick. Once the latter gave a loud harsh cry, which was not repeated. As one of the birds hovered for some time near the ground where I had put the chick, I think she must have seen it.

9.—Hen bird settled on the elder-stump near my shelter.

9.1.—Rose and flew off with impatient note, and in unquiet manner.

9.9.—Bird again on stump. In less than minute flies off suddenly and violently with short cry. Put chick back from where I had taken it with the other, which I found near. This one (the lighter one) was so much the larger of the two that I could hardly think they were of the same hatching. Yet it must have been so, for, having walked all about there before the time at which the Nightjar takes wing, I had disturbed no other grown birds than this one pair. They sit very close, however, so the possibility is not excluded.

Nightjars. (General Observations.)

June 17th and 18th, 1898.—Commence their churring about 8.30 p.m. Sit on the very extreme top of young fir trees in plantation. “Churr” for a very long time in succession (I believe sometimes for upwards of a quarter of an hour, but have not yet succeeded in timing a very long one, as it is never known at the beginning whether it will be long or short). Then rise into the air, giving very often several loud claps with the wings above the back, and uttering another note—“quaw-ee quaw-ee”—which I have not heard them make whilst sitting on tree.

I have heard—though only once, I think—a curious modification of the “churr” at its ending. It became less mechanical, less instrumental as it were, more voice entered into it, and it seemed to express joy. I did not see the bird at this time. It was possibly joined by its mate. Often when the bird has finished churring on the tree it settles, after a few circles, on the ground on which it crouches. Sometimes whilst here it will give

a sort of hop into the air with wings extended, and then crouch down again. In a very short time it rises from the ground, and flies either to the same tree or another not far away, "churrs" again, and again settles on the ground either in exactly the same spot or close by. Last night (17th) I watched it do this four or five times in succession. Could not make out that this had anything to do with feeding, and think it probable the bird's mate is somewhere near on her eggs, though have looked all about for them without success. At this time (from 8.30 to 9.30 or 10 p.m.) they do not seem to be much occupied in catching insects—very different from Bats or Swallows. The short flights between "churr" and "churr" on the trees did not seem to be made for this purpose, though they may have been. I have never seen them settle on any part of these young firs except the extreme tip.

June 22nd.—(Fine.) A bird would be circling about in the open when another would dart from a clump of fir trees close by and pursue it. Instantly the first bird would clap its wings loudly and excitedly above its back a dozen, sixteen, or twenty-five times in succession. These numbers must be taken as the minimum in each case. Very probably there were more claps. It is difficult to count them all, and one is always behind. Again, a bird circling about over grass and low sparsely scattered bushes has stayed hovering in the air a few feet above the grass, clapping its wings loudly and continuously, then sunk like a shadow on to the ground. My impression is that its mate was crouched there. Again, one has sprung from the branch of a fir tree in a swift downward flight to the ground, with a continual clapping of the wings, poising a moment just above the earth with the wings raised high above the back (most graceful), and then sinking down. Immediately afterwards the bird would rise again, still clapping its wings, whilst in front of it, also from the ground, rose another, which it pursued.* They by no means

* "In general its flight is silent, but at times, when disturbed from its repose, its wings may be heard to smite together" (Professor Newton, 'A Dictionary of Birds'). It is in joy, not in fear, that the wings are smitten, and when the bird is least troubled by man's "gaucheries." Disturbance may produce the sound, but is no key to its real nature. Its ordinary cause is social, and especially (as I believe) sexual pleasurable excitement, of which it is the true expression, though so implanted that most excitations will produce it.

always, however, clap the wings when taking flight after churring. Often they do so with absolute silence, as silently as an Owl. No words can give an idea of the extreme beauty of the flight of these birds. In their soft moods they seem to swoon on the air, and again they flout, coquette, and play all manner of tricks with it. Grace and jerkiness are qualities quite opposite to each other. The Nightjar, when "i' the vein," combines them with easy mastery, and to see this is almost to have a new sensation. It is as though Shakespeare's Ariel were to dance in a pantomime, yet still be Shakespeare's Ariel. As one watches such beings in the deepening gloom they seem not to be real but parts of the night's pageant only—dusky imaginings, shadows in the shapes of birds. What glorious powers of motion! One cannot see them without wishing to be one of them.

The following are the different notes which I have heard uttered by the Nightjar, and have been able more or less to catch. There are many others which I could not set down:—

1. The ordinary "churr" uttered whilst sitting, either lengthways along a branch, or perched on the extreme tip of a young fir tree, or on the ground,* &c. I have never heard the bird make it whilst flying.

2. The "choo-oo choo-oo choo-oo," or "choo-ey choo-ey choo-ey," at the end of the churring uttered as the bird takes flight, and generally (perhaps always) accompanied with clapping of the wings.

3. The jubilee of gurgling notes, impossible to describe; also at end of the "churr." Whether uttered sitting or on taking flight, or indifferently, I do not know. Not so often heard.

4. The "quir quir quir" at end of the "churr," as above.

5. The beatification, as it were, of the "churr" itself towards the end, the sound becoming more vocal and expressive, and losing the hard woody insect-like character which it usually has. I have only heard this peculiar modification once, but the bird was quite near, and it was very noticeable.

6. The "quaw-ee" note uttered at and during flight, often immediately after the churring as the bird takes flight.

7. The "queek-queek" or "quee quee," uttered as above.

* On or near eggs or young, according to my own observations. Whether otherwise I do not know.

8. The "chook chook chook," being, I think, the danger-signal to the young, to hide themselves; whilst sitting, and, I think, whilst flying also.

9. The low crooning note (one syllable) of content, which the two birds utter when together in neighbourhood of eggs (as heard by me), and probably whilst caressing.

10. The little querulous note uttered when the bird is in trouble or perplexity; also one-syllabled.

11. A low guttural note (I think of two syllables) which I heard the bird make whilst sitting on the ground in near neighbourhood of eggs.

12. A note like "jig jig jig," which I have heard whilst two or more birds were sporting together in the air.

13. A note very much resembling one made by Blackbirds, so that I at first mistook it for this, but cannot now remember the note itself so as to write it down. The resemblance, however, was remarked on to me independently* by a good ornithologist.

14. A low croodling sound, expressive of pleasure and tenderness. With chicks.

15. A low guttural note, something like "ho-oo ho-oo ho-oo," but impossible to write it.

16. Peculiar single note, like "quo quo."

17. The "quick quick—quick quick," like a sort of loud twitter, uttered whilst birds sport in the air together.

18. A note expressive of disquiet and impatience, short and of indefinite sound, often uttered at the point when the bird, unable to sit still longer, flies hurriedly off.

19. A low somewhat Parrot-like noise, like "tchug tchug tchug." I do not now remember why I thought it Parrot-like, but something in the sound must have caught my ear at the time.

* In conversation afterwards, and as a general fact. I was alone at the time.

ORIGINAL SKETCHES OF BRITISH BIRDS.

BY H. S. DAVENPORT.

THE REDBREAST (*Erithacus rubecula*).

A FEW years ago a lady whom I knew very well, and who resided at Halstead Grange in this county, Mrs. Chester by name, published a small brochure detailing some extraordinary incidents in connection with two Redbreasts that had lost their bills in traps set to catch mice, and subsequently sought her protection and kindly favour. One bird, so far as I remember, lived in the house, chiefly in her bedroom, and would come almost at any time to her call, while the other passed its time out of doors, but was equally tame; and if any of the readers of these notes meet with the pamphlet in question, they will find recorded that the latter of the two birds was in the habit of accompanying the carriage when Mrs. Chester went out to pay calls, and that, on one occasion, when her carriage was announced for her departure, the Robin was announced at the same time. Mr. Knox's reference to apocryphal anecdotes is still ringing in my ears, but I merely relate the gist of what I have read with my own eyes and seen attested by the signature of the lady who published the story.

The nesting-sites chosen by the Redbreast are many and varied. In 'The Vertebrate Animals of Leicestershire and Rutland' instances are recorded of this species having bred in an old tea-kettle tossed aside into a hedge, also in a flower-pot and in a meat-tin; but illustrations of the kind might be multiplied indefinitely.

The average clutch in my experience is six eggs; I have taken seven, and regard eight as quite unusual. Sometimes perfectly white eggs, without spot or speck, are met with, and this beautiful variety was not uncommon in my schoolboy days in Herefordshire. I took a clutch of this character near to Ashlands in May, 1880.

THE NIGHTINGALE (*Daulias luscinia*).

I never once met with this bird in Herefordshire, and it is certainly not in the habit of singing at my doors in Leicestershire, though in most years it turns up in comparative abundance in a district with which I am very familiar—I refer to Maidwell, in Northamptonshire, only about fifteen miles distant from my late home. The best Nightingale year, so to designate it, I remember in Leicestershire was in 1893. I knew of four pairs of birds that were nesting in the course of that summer in and about the plantations which tend so materially to enhance the beauty of the landscape in the immediate neighbourhood of Keythorpe.

One of the greatest treats I ever enjoyed in connection with the Nightingale occurred in the year above mentioned, when a Nightingale condescended to pay my grounds a visit and remain the best part of the spring months cheering us with its liquid notes by day and night. It was said at the time that fifteen years had elapsed since one had been heard in the village of Skeffington.

I am glad to add it found shelter and protection in my garden for its nest, and, though the young stayed about in the bushes for a short time after they could fly, the visit was not repeated in 1894, so the assertion that Nightingales always return to the same haunts to nidificate, if unmolested, seems to require considerable qualification, for, though my experience of the species is, I fully confess, limited, I never knew a single instance of a particular haunt in Leicestershire being frequented two years in succession. Curiously enough, in connection with *my* Nightingale, I had only a short time previously seen hounds pull a Fox down in positively the very bushes where I had heard it on its first appearance, and where subsequently it seemed to spend the greater part of its time. It never sang on cold wet nights, and its aversion to exhibit itself in public was palpable and pronounced.

One has only to watch a Nightingale for a few moments to become impressed with the marked resemblance its movements and actions bear to those of the Redbreast. On the other hand, I have found it—unlike its allied species—none too willing to admit of a close inspection, and have frequently been amused at the mental struggle that has obviously gone on between its desire

to avoid being observed and its curiosity to learn all about the observer. Its croaking note I have especially remarked after the young have left the nest; it is undoubtedly a signal of danger.

I have seen few nests, comparatively speaking, *in situ*; one, however, that now lies before me, and was taken in this county after the young had left it, is constructed externally of flags, a little dry grass, and a profusion of oak leaves; while the interior, which is of some depth, is lined with very fine dry grasses and a few small oak leaves. The nest itself was placed in some old exposed roots amidst some brushwood in the centre of a small plantation, and was close to that of a bird I have only once met with breeding in Leicestershire—I mean the Red-backed Shrike. A second nest of a similar character, though ragged in appearance, was placed in a hedgerow-bottom, and contained four eggs of the usual olive-brown colour.

THE WHITETHROAT (*Sylvia cinerea*).

Many are the nests I have found of this species—hundreds, I may say—but I do not recollect having noticed any in abnormal situations. Sometimes it is placed very low down, but more often it is built two or three feet above the ground, and it may be noticed amongst nettles and coarse vegetation generally, in brambles, shrubs, whitethorn, gooseberry-bushes—indeed, in a variety of kindred situations; but when I said just now that I did not remember having discovered a nest abnormally placed, I had for the moment forgotten the fact that in the summer of 1894 I came upon one containing five eggs of a beautiful type all but on the ground. It was in a tuft of rushes in the middle of a grass field near to Bala Lake. Perhaps I am not justified in deeming the actual site quite so uncommon as the fact that the nest itself was located right away from the haunts the Whitethroat usually affects for shelter as well as for breeding purposes.

A few summers ago I was indebted for the discovery of not a few of the commoner nests usually to be found low down in hedges and bushes to a couple of Clumber Spaniels. That Clumber Spaniels should have taken to this form of pastime—hunting for little birds' nests—may seem singular, and I can only account for it in this way:—They were in the habit of frequently accompanying me in my roadside rambles, and herein

I make a distinction advisedly, as had I taken them into the coverts, not only would they have proved an eyesore to gamekeepers, but, inasmuch as the entire absence of all noise should be the watchword of those who study the habits of birds in their woodland haunts, the mere presence of dogs would have tended to defeat the very object I had in view. However, what I was about to say was this:—I noticed one day they were taking unusual interest in the way I was poking and peering into the roadside bushes, and they certainly saw me find and remove some nests. Shortly afterwards they themselves took to what I can only describe as “setting” bushes in which any nests might be placed, and not only would they intelligently look round to see if I was coming, and as much as to say, “Here you are!” but when I reached the spot they would display manifest signs of delight, and get quite excited if a bird fluttered out in front of them. I am afraid I cannot add I ever saw one “backing” the other! I am aware that some dogs have been trained to hunt for eggs—*viz.* for those of Lapwings, but here was an instance of a habit acquired solely from seeing me interesting myself in such matters; and in connection with the same I particularly made note of two things—*viz.* they never once “set” an old nest, and the bird was invariably on those they found. I presume it was the scent of the latter that accounted for no false points, but it was strange that they should have voluntarily taken upon themselves to lend me such serviceable aid.

A characteristic feature of a large series of the nests of the Whitethroat is the profusion of dark horse-hair which is used for the lining, though, on occasions, I have noticed hair only sparingly employed—much less seldom none at all. The exterior of the structure is chiefly composed of the withered stems of goose-grass and the cocoons of caterpillars, its component parts being so dexterously and beautifully interwoven as to render the nest quite firm and compact. It is perhaps worthy of remark that Whitethroats are not in the habit of utilising thin roots and fibrous rootlets, as some writers assert; though, as in the case of other species, it is obvious that varieties of construction may occur. The nest is more substantially built than those of its smaller relative, and less so than those of the Garden Warbler—it hits, in fact, the happy medium.

The eggs are not very variable, five being a favourite number for a clutch ; very rarely have I known so many laid as six. Mr. W. J. Horn is lucky in the possession of some nice specimens, while his cabinet also contains eggs of both the Lesser White-throat and Tree Pipit, which for beauty of colouring I have never seen equalled. Though I have remarked that Whitethroats' eggs are not very variable, as, for instance, in comparison with those of the Tree Pipit, it is notorious that their ground-colour runs through different shades of bluish white and pale green, and that some specimens are more boldly and elaborately marked with the typical wreath of light brown, violet grey, or olive green spots as the case may be, some of them underlying the shell, than others. One of the most peculiar-looking eggs I ever found was in a nest in a gooseberry-bush at Fronfeuno, near to Bala, in the spring of 1894. It was a single specimen, without shape or comeliness, and approximated more in colouring to the eggs of the Orphean Warbler than to those of the Whitethroat. The bird incubated it for a day or so, and then finally deserted its malformed abortion which proved to be yolkless.

Whitethroats have a great partiality for currants and raspberries, and in July and August they raid the bushes of my kitchen garden in considerable numbers, and, though I am always hearing that "the birds take the fruit so," I do not grudge it them. "Live and let live" is a good old-fashioned principle, and though Finches pilfer the newly-sown seeds, and, later in the year, Tits filch the peas, I deem myself amply repaid by the facilities they afford me for observing—amidst several other characteristic habits—their thievish propensities.

ORNITHOLOGICAL MEETING AT SERAJEVO,
BOSNIA.*

FROM the 25th to 28th September last there was held in Serajevo, the capital of Bosnia, under the auspices of the Local Government of Bosnia, an Ornithological Meeting, which has especially discussed questions of Phænology.† The Meeting was attended by sixty-four members, of whom there were thirty from Hungary, eighteen from Bosnia, nine from Austria, six from Germany, and one from Italy.

During the meeting, which was presided over by Professor R. Blasius, of Brunswick, the following communications were made:—

O. Reiser (Serajevo): On the Ornithological Researches of the Serajevo Museum in the Balkan Peninsula.

O. Herman (Budapest): Report on the present status of Phænology, and on the activity of the Hungarian Ornithological Central Office.

Rev. T. Hegyföky (Turkeve, Hungary): On the relations between Phænology and Meteorology.

Dr. L. Lorenz von Liburnau (Vienna): Report on the organization and activity of the Austrian Commission for Ornithological Observations, and on the results obtained by the observations of Migratory Birds in the years 1897–98 in Austria.

Gaston Gaal (Csaszta, Hungary): The great abundance of the Swallow (*Hirundo rustica*) during the year 1898 in Hungary.

Steph. Chernel (Köszeg, Hungary): On the utility and injuriousness of Birds judged upon positive basis.

Prof. H. Nitsche (Tharandt, Germany): The distribution of the Common Heron in Saxony.

* For this report we are indebted to the good offices of Dr. G. Horvath, the Natural History Director of the "Museum National Hongrois" at Budapest.

† This word is seldom used, and we have been informed by a very high authority that it may be defined as "Observational Biology," and as applied to birds, as it is here, may be taken to mean the study or science of observations on the appearance of birds.—(ED.)

Prof. T. Knotek (Serajevo): On the dates of the migration of Birds as hitherto known from Bosnia and Herzegovina.

Very interesting and instructive for the members of this meeting were the collections in the Museum of Serajevo, by which the fauna of the Balkan Peninsula is richly represented, and which comprise about eight thousand skins of birds from all parts of the peninsula. These skins have been collected since 1887, and mostly by the indefatigable O. Reiser, Custos of the Museum.

ON THE SPAWNING OF *BOMBINATOR PACHYPUS*
AFTER TWO YEARS OF CAPTIVITY IN
ENGLAND.

BY J. L. MONK.

THE difficulty with which Batrachians are brought to breed in confinement, whether kept indoors or in the open, is well known to all who have attempted to study the habits of this interesting class of animals. It is also generally believed that when once the annual discharge of the genital products has been interrupted by captivity, the individuals are for ever barren. For example, the *Xenopus lævis* in the reptile-house at the Zoological Gardens bred in the year of their arrival, but in no subsequent year could they be induced to do so.

The case I have the pleasure of putting on record is therefore a most interesting one. Some specimens of *Bombinator pachypus*, captured by my friend Mr. Boulenger in Belgium in the early spring of 1897, before the breeding season had set in, have been kept in an aquarium for two years, when it was ascertained that, although pairing repeatedly took place, no spawn was ever deposited. Having placed them this spring in a small pond in my garden at Forest Gate, they have, to my surprise and satisfaction, paired and spawned under my eyes; and I append some notes on the observations I was able to make on this occasion, which may be acceptable to the readers of this Journal, since, apart from the late naturalist, Héron-Royer, no one has yet been able to ascertain with anything approaching precision the number of eggs that are laid by one female in the course of the breeding season.

There were two pairs of this species, the females both in breeding condition; but only one of the males appeared animated with genesic ardour, showing himself most constant in his attentions, not only to his legitimate mates, but even to a small *Rana temporaria* sharing the same pond.

The first spawn was deposited on July 3rd, one hundred and nine ova, in small bunches of two to ten, adhering to the weeds. There was an imperfect albino amongst the embryos that hatched, but it never appeared at all healthy, and did not reach maturity.

On the 6th a second brood of seventy-seven appeared; six days later another of sixty-nine. On the 15th forty-seven more; and a fifth brood of only seven appeared to exhaust the capacities of one female. After an interval of five days (on the 21st) there was a fresh oviposition of one hundred and twenty-seven eggs, the first effort of the other female; forty more on the 23rd completed the spawning, making a total of four hundred and seventy-six eggs.

There can be no doubt that three hundred and nine of these eggs can be ascribed to one female, and the balance to the other. These numbers will be seen to be in accordance with the computations of Héron-Royer.

The rapidity with which the embryo develops and breaks through its capsule is striking, two or three of the broods taking only four days to hatch into wriggling larvæ with small four-branched external gills, which disappeared after a few hours.

The gelatinous capsule measured from between 5 and 7 mm.; the vitellus 2·3 mm., dark brown, with large white pale. Length of larva when first hatched, 9 mm.; colour light greyish; tail, well-developed, 5 mm. Length after fifteen days, 15 mm.; tail, 7·5 mm.; light brownish, speckled with darker brown; a darker streak along the vertebral line remaining throughout the larval stage.

After twenty-six days there was only an increase of 2 mm. in the length; the hind legs had just begun to appear as small white stumps.

In thirty-five days they had rapidly reached the length of 25 mm.; and in fifty-four days, after some hot weather, they were 34 mm. long.

Length of body, 16 mm.

Width of body, 10·5 mm.

From tip of snout to eye, 5 mm.

Width between eyes, 4 mm.

Front limbs just visible under the skin; hind limbs with digits

well-developed, and transverse lines across femur and tibia. In sixty-nine days the metamorphosis was completed.

This development took place in the garden without any covering or artificial warmth, the tadpoles feeding most voraciously on raw meat.

The first two broods will metamorphose this year, but at the time I write there are many whose development has practically ceased, and will probably not be resumed until the return of spring.

NOTES AND QUERIES.

MAMMALIA.

CARNIVORA.

The Suricate in the Transvaal.—With reference to my note on *Cynictis penicillata* (*ante*, p. 179), I have a similar observation to make respecting the true Meer-Kat or Suricate (*Suricata tetradactyla*). The ‘Royal Natural History’ positively asserts that it does not inhabit the country north of the Orange River.* I have myself seen the animals on the Free State Flats several years ago, and now have come across them in the Transvaal. On the 27th July a Boer brought in a Suricate, which was perfectly full-grown and apparently old. What is more, it was as savage as could be; and all who know the habits of this interesting little mammal must also be aware that it is very easily tamed. In addition, the Boer roared with laughter when I asked him whether the animal had really been caught in the Transvaal. “Waar anders?” (Where else?) he answered. “Do you think I brought or had this little beast sent from the Free State or Cape Colony?” For a long time past I had the idea that the Suricate inhabited the Transvaal, for the following reasons. Several acquaintances had tame ones, and they all, without exception, assured me that the animals had been caught in the Heidelberg and Pretoria districts. My suspicions were confirmed by the bringing in, straight from the veld, so to say, of a snapping, snarling creature. I have also long noticed their burrows. The ground is always in a way ploughed up within a certain radius of a “Meer-Kat’s location.” There can be no doubt as to the creature’s identity. The ‘Royal Natural History’ itself says that there is no other Mongoose which has ears of another tint than its general body colour. The other characteristics of a Suricate need not be enumerated here. It is, however, certain that the animal is not in any way plentiful here in the Transvaal.—ALWIN C. HAAGNER (P. O. Modderfontein, S. A. K.)

[This animal is not unknown in the Transvaal. I not only kept a pair alive when in Pretoria, but brought them home with me a few years ago. When coaching between Potchefstroom and Vryburg, I have seen quantities about their holes.—ED.]

* The statement in the work referred to is: “Meerkats appear to be confined to the Cape Colony, extending at least as far north as Algoa Bay.” —(ED.)

AVES.

Chiffchaff building on the top of small Yew and Box Trees.—My friend Mr. George Alcock, who is much interested in British birds, sends me the following note, which, I think, is worth publishing:—"A Chiffchaff (*Phylloscopus rufus*) built in my garden at the top of a yew ten feet above ground. It built a second time on the top of a box-bush four feet above ground. I have found scores, but have never before seen one in these positions. In each case the young came to maturity; there were four eggs each time." Mr. Alcock well knows what he is talking about, or I should have been inclined to think that he had mistaken the nest of the Willow Warbler for that of the Chiffchaff; but the late Lord Lilford was of opinion that the latter bird more frequently built at some height from the ground than the former, an experience opposed to my own, but (without any doubt) based upon considerably greater knowledge of the two species.—A. G. BUTLER (Beckenham, Kent).

Swallows and Hobbies (*ante*, p. 476).—It may perhaps be remembered that in 'The Zoologist' for 1892, p. 26, I called attention to the fact which Mr. Warde Fowler, in his interesting note, has corroborated. Strange to say, one evening about the middle of September, as I sat at a window in the dusk of evening watching the Swallows as they with hurried and erratic flight dashed over the houses towards the river, I observed a much larger and darker bird accompanying them, and at the time suspected it was a Hawk; but it had gone out of sight too quickly for me to determine what it was. It no doubt has been observed that the flight of the Swallows at such a time is very low—only just over the housetops—and silent, as if they feared to get benighted ere they reached their roosting place; or that something had frightened them, and they wished to get out of sight as quickly and quietly as possible; so different to the gliding, twittering, happy, and, I always think, friendly and fearless flight of the birds at other times. It is gratifying to be able to say that the handsome little Hobby still visits this locality, and I have every reason to suppose it bred near here during the past summer, as I saw a pair near a certain wood in July, a male was killed in another direction in August, and I have no doubt the bird I saw in September following the Swallows was of the same species, for it is well known that this little Falcon is often on the wing very late in the day; and I have seen the stomach of more than one specimen where the remains of the dusk-loving Dor-beetle (*Geotrupes stercorarius*) indicated that the coleopteron named was a particular article of diet.—G. B. CORBIN (Ringwood, Hants).

Sky-Lark (*Alauda arvensis*) singing in October.—On the morning of October 16th I heard a Lark singing, which was repeated on the 17th,

about the same hour, *viz.* 6 a.m. I again heard the song on the 18th, but in this case it was about 8 a.m., and I also heard it some seven miles from my home on the 20th, also about 8 a.m.; so that this occurrence has not been confined to one bird or to one place. The weather was very mild, and this may have occasioned the song. I do not recollect hearing the Lark sing at the same time of year before. In the last instance there were several Larks in a flock, but only one was singing. In the other cases there were also several in the vicinity, but one only sang. The songs were of fair duration; but I have not again heard more up to the time of writing (Oct. 27th).—WM. WILSON (Alford, Aberdeen, N.B.)

Green Woodpecker near London.—I have had brought to me a male Green Woodpecker (*Gecinus viridis*), which had been shot here on the 19th October. It was only about half through its moult, and had been seen about for some time, evidently coming from Dulwich Wood. I am sorry it could not have been spared, as this bird is rarely seen so near London.—FRANK SLADE (Horniman Museum, Forest Hill, S.E.)

Birds of Cheshire.—We have for some years been engaged in preparing a book on the 'Birds of Cheshire,' which will be published early in the ensuing year; and we shall be grateful for assistance in the shape of notes of the occurrence or capture of rare species, lists of local bird names, or other matters relating to the avifauna of the county.—T. A. COWARD (Tryfan, Peel Causeway, Bowdon); CHAS. OLDHAM (Alderley Edge).

REPTILIA.

A Viper feeding in Confinement.—During a holiday spent in the Land's End district of Cornwall, in August of last year, I obtained several Vipers (*Vipera verus*), two of which I kept alive in a large case—a fine male and small female—the latter giving birth to seven young about a fortnight later. Up to this period she had refused to eat (I might mention that the male refused all food during the three months it lived), but, on putting a live Mouse into the case, I was fortunate enough to observe the perfectly natural action of both animals. The Viper, on seeing the Mouse, followed it cautiously, striking a hind limb, which appeared to cause very little inconvenience to the Mouse; the Viper, however, still following up, struck again, this time fairly across the loins, and then retired to the further part of the case, seemingly to await results. In less than two minutes the Mouse was dead. Soon the Viper came slowly towards the body, with head lowered, prodding the earth as if smelling the track of its prey, and, although the body was completely hidden by grassy turf, went straight to it. After several unsuccessful attempts to swallow it by means of the legs, the head was seized, and the body disappeared in

about ten minutes. Strangely enough, after this it refused to feed, and died of starvation the following November. The young were totally ignored by the mother, although when at rest they generally kept near her (avoiding the male), invariably lying upon or around her, and at the slightest alarm slipping under and along the coils of her body, thus disappearing from view. This habit has no doubt given origin to the numerous reports of female Vipers temporarily swallowing their families till danger was past.—F. W. TERRY (102, Kingston Road, Wimbledon, Surrey).

Viper killed by a Mouse.—I was in the same district last July, and captured, amongst others, a very fine gravid female, with which I hoped to be more successful than in the previous year; but the result was still more disastrous. Although particularly vicious at first, after a few weeks' confinement it became sufficiently docile to allow free handling. Some time previous to giving birth it became sickly, and the young, when born, soon died. Guided by my previous experience, I tried it with a Mouse, but this was ignored, and for over a week both lived on perfectly happy terms. One evening, on going to feed the Mouse, I was amazed to find it hanging on to the Viper's head, like a miniature Bull-dog, the unfortunate reptile vainly endeavouring to shake it off. I promptly killed the aggressor, and found also that it was necessary to treat the Snake likewise, for, on examination, I found that both eyes had been eaten out, and the maxillary bearing the poison-fang bitten through. How the Mouse passed unscathed is a mystery, for the Snake, although weak, was quite capable of striking, the uninjured fang being erected freely after the attack. Was it instinct that taught this (a house Mouse) that a dangerous enemy deprived of sight became practically harmless? Certainly, it was not hunger, for plenty of fresh food remained untouched.—F. W. TERRY (102, Kingston Road, Wimbledon, Surrey).

[I had a somewhat similar experience with a large Python (*P. sebae*), which I kept for some months, and never induced to feed. Among other proffered viands was a live Rät, which I positively had to remove after about thirty-six hours, as it had attacked the body of the lethargic serpent. In this case I presume that hunger had overcome fear.—ED.]

NOTICES OF NEW BOOKS.

A Dictionary of Birds. By ALFRED NEWTON, assisted by HANS GADOW, with contributions from R. LYDEKKER, C. S. ROY, & R. W. SHUFELDT. Cheap issue, unabridged. Adam & Charles Black.

WE may indeed welcome a cheaper edition—and unabridged—of this great work on Ornithology, of which Parts I. and II. were reviewed in these pages by another pen in 1893. Since then the work has been completed, and now, in a single volume of 1232 pages, is within the reach of most naturalists, for its circulation will not be confined to ornithologists alone.

It is seldom that an Introduction forms such an important feature in a book as does the one which accompanies the volume under notice. It is a history of ornithology from the time of Aristotle, written by an expert both in the science and its literature. It is essentially a criticism throughout, and though the author alludes to the charm in Gilbert White by the apparent absence of conscious personality in those classical pages, his own individuality is, and happily is, stamped on every paragraph. When criticism is really intended it should not be invertebrate; a freedom of expression avoids the sting of innuendo, and even hostility is disarmed when anonymity is absent. These reflections are prompted by the weird appearance of Seebohm in the review of British ornithologists. He is linked with Morris! Whether this course unduly extols Morris, or underestimates Seebohm, is a question for the qualified reader, and is probably the *crux criticorum* of this encyclopædic summary. Few will disagree with the fair and judicial estimate of other writers: Le Vaillant is honestly treated, and the verdict on the late George Robert Gray is both kindly in spirit and brilliant in pungency. Macgillivray is classed with Willughby, and ornithological genius receives its recognition. Of Buffon—“It is certain that he despised any kind of scientific phraseology,

a crime in the eyes of those who consider precise nomenclature to be the end of science; but those who deem it merely a means whereby knowledge can be securely stored will take a different view—and have done so.” We need quote no more from this part of the work, the pages of which have quite a literary charm of their own, stimulating perusal, and with much original criticism compelling either acquiescence or dissent.

As regards the main body of the work, it has been, as already stated, previously noticed in these pages. A dictionary of birds is a fair trial of strength for any ornithologist. It indispensably requires three possessions: scientific capacity, knowledge of the literature, and the critical faculty; and if the great lexicographer shared the illusion that a language might be “fixed” by making a catalogue of its words, the present dictionary has very largely focussed ornithology to date. But, apart from special ornithology, Professor Newton, his assistant, and three contributors, have probably produced one of the best books on natural history that has appeared in the English language.

Man, Past and Present. By A. H. KEANE, F.R.G.S. &c.
Cambridge: University Press. 1899.

SOME two years ago a notice appeared in these pages of a precursor to this book,—we allude to Mr. Keane’s ‘Ethnology.’ That book discussed the fundamental problems of the science; the present work is of a more descriptive ethnological character, and deals with the various races of mankind. The four primary divisions of the Hominidæ, as proposed in his ‘Ethnology,’ are in the main followed here, due weight being given “to all available data—physical and mental characters, usages, religion, speech, cultural features, history, and geographical range.” Whenever two or more groups are found agreeing in all, or at least in the more essential, of such elements, they are treated as branches of one stock. “So far, and no farther, is a strictly zoological or genetic classification possible in the present state of the multifarious inhabitants of the globe.”

There was a time in Anthropology, and probably that period is not closed, when the non-acceptors of the evolutionary view

of the origin of man triumphantly asked for the production of the missing link. There seems now to be a little extra reliance placed by some anthropologists on the discovery of *Pithecanthropus erectus*. Mr. Keane boldly states, "This pliocene inhabitant of Java may thus, in a sense, be taken as the long-sought-for "First Man"; and as it is not very probable that he can have had any undoubtedly human precursors, the Indo-Malaysian inter-tropical lands may also, with some confidence, be regarded as the cradle of the human family." Reference of approval is also made to the views of the Danish anthropologist, Herluf Winge, who considers that Man is more closely allied to the Gibbon than to the other Simians,—“a conclusion also pointed at by the Java skull.”

The wide reading of the author is perceptible on every page, and this is the most necessary equipment for the ethnologist. Very much information must and can only be obtained from travellers, who are frequently men without ethnological insight, or, in other words, possessed of local prejudice. Hence travellers' tales do not always agree, and the key to the reconciliation of their narratives is not the invocation of fiction, but often the clear understanding of psychological variation and racial warps. Thus, how much is still to be learned as to the disgusting practice of cannibalism, of which Herrera is quoted as saying of the Colombian aborigines, "the living are the grave of the dead; for the husband has been seen to eat his wife, the brother his brother or sister, the son his father." And yet we are astonished to read that this savage brutalism is condoned by the Cocomas of the Marañon, who said "it was better to be inside a friend than to be swallowed up by the cold earth," while a baptized member of the Mayorunas of the Upper Amazons "complained on his death-bed that he would not now provide a meal for his Christian friends, but must be devoured by worms."

We cannot quote further from this mine of information relating to our own species; it describes many of the early errors which still cling to our onward march, and is a sound guide to events in our history of which the most ancient written records are but of yesterday.

The Distribution of the Negritos in the Philippine Islands and Elsewhere. By A. B. MEYER, M.D., &c. Dresden: Stengel & Co.

THIS small book is an English translation of two chapters from Dr. Meyer's great work on the Negritos of the Philippines, and relates to the distribution of this peculiar and ancient race, the real affinities and derivation of which have long puzzled ethnologists and promoted more than one conclusion. The Negritos have been proved to inhabit many of the Philippines, and may possibly be eventually found on the whole of the islands when they are better known and more scientifically visited. The Philippines are, however, certainly the present headquarters of the Negritos. They are also well represented in the Malay Peninsula and the Andaman Islands, but as regards the Malayan Archipelago outside the Philippines, the accounts of their occurrence are considered by Dr. Meyer as "based on very poor evidence (properly speaking on none at all), or are the result of errors in consequence of insufficient criticism of the sources, or misunderstanding of the original statements, which in their turn are frequently unreliable and perverted."

The results of an exhaustive and critical reading of all that has been written on the subject are given in a very condensed form, in which process such generally considered authorities as De Quatrefages and Hamy are very freely handled. More than two hundred other authors are referred to, and the publication is in the best sense a monograph on the subject.

The Natural History of Selborne. By GILBERT WHITE. Edited with Notes by GRANT ALLEN. Illustrated by EDMUND H. NEW. John Lane.

THE recent death of Mr. Grant Allen gives a melancholy interest to the last edition of our old classic. Each edition has its specialty; sometimes the editorial notes on the natural history topics treated of by White are almost a host in themselves; at other times the illustrations or general "get-up" is the inducement to procure another copy of the book we all

possess and know so well. The feature of this edition is that it is edited by one who was a literary man first and a naturalist afterwards, though this was the irony of Mr. Grant Allen's life, and, could he have lived up to his tastes, the arrangement would probably have been reversed. Gilbert White's masterpiece, however, appeals to the literary taste as much as it belongs to the science of natural history, and it is very questionable whether it would have obtained its immortality had its pure and charming style not have recorded its wealth of observation. This editor has a sympathetic touch with his author, and he is not far from his subject when he writes of "the life of a quiet, well-to-do, comparatively unoccupied, gentleman of cultivated manners and scientific tastes, studying nature at his ease in his own domain, untroubled by trains, by telegrams, by duns, by domestic worries; amply satisfied to give up ten years of his life to settling some question of ornithological detail, and well pleased if in the end his conclusions are fortunate enough to meet the approval of the learned Mr. Pennant, or the ingenious Mr. Barrington."

This book is well printed on good paper, and with *wide margins*; the illustrations are profuse, and enable us to almost master the present aspects of Selborne and its vicinity, but these are far superior to those given of zoological subjects. It is a good copy to possess, and those who care to make marginal notes will appreciate the appendix of the "Marginalia" from Samuel Taylor Coleridge's copy here printed for the first time. Of course we expect something original from Coleridge, and we are not disappointed. "Instinct is the wisdom of the species, not of the individual," is an anticipation of modern thought; while the keen but delightful criticism of the lines at the end of Letter XLI., commencing, "Say, what impels, amidst surrounding snow," is simply "a noble paraphrase of '*I don't know.*'"

The North American Slime-Moulds. By THOMAS H. MACBRIDE, A.M., Ph.D. New York: The Macmillan Company.

To many, if not to most, readers the above title will denote a purely botanical book foreign to our scope and pages. But much may be said, and has been said, as to the zoological affinities of the Myxomycetes, or Slime-Moulds, which "include certain very

delicate and extremely beautiful fungus-like organisms common in all the moist and wooded regions of the earth." They were formerly classed with the "puff-balls," but their physiological characters have prompted the question, "Are they not animals?" This is the position suggested by De Bary in 1858, and adopted since by, amongst others, Mr. Saville Kent and Dr. William Zopf. The first was inclined to join them to the Sponges, whilst the second associated both Slime-Moulds and Monads. Prof. Macbride strikes a distinctly middle course. He asks:—"But why call them either animals or plants? Was nature then so poor that forsooth only two lines of differentiation were at the beginning open for her effort? May we not rather believe that Life's tree may have risen at first in hundreds of tentative trunks, of which two have become in the progress of ages so far dominant as to entirely obscure less progressive types? The Myxomycetes are independent; all that we may attempt is to assert their nearer kinship with one or other of Life's great branches."

This is an excellently illustrated technical book, with a purely biological and philosophical introduction.

Bird Stuffing and Mounting. By the author of 'Hints on Egg Collecting and Nesting.' Dartford: J. & W. Davis.

A SMALL and inexpensive book on a very difficult subject. There is an old proverb that he who is his own lawyer has a fool for a client, and the young ornithologist might be advised, if he has the funds, to no more attempt to set up his birds in cases than to try to make his own gun. A few succeed, the many do not. The setting-up of birds is distinctly a profession, as the hideous work of the ordinary tradesman sufficiently testifies. To make one's own skins is, however, quite another matter; while a baronial hall and a respectable rent-roll are both necessary if even the British ornithologist is to possess a cased collection. But to fill one's cabinet drawers with good skins, and in sufficient variety, is not beyond the power of any real student or collector. Hence this small volume may be found useful for those who wish to learn how to skin and preserve, though "stuffing and mounting" are its main instructions.

EDITORIAL GLEANINGS.

DR. A. ALCOCK, the Superintendent of the Indian Museum, Calcutta, has just published, in the 'Journ. Asiat. Soc. Bengal,' a very interesting account of a new Hermit-Crab (*Chlanopagurus andersoni*) exhibiting adaptive commensalism with a Sea-Anemone.* The Hermit-Crab is noteworthy (1) in having for its refuge, not the usual mollusc-shell, but a sheet or blanket formed by the cœnosarc of a colony of Sea-Anemones; (2) in being—as far as the male is concerned—symmetrical; and (3) in having the appendages of the 3rd–5th somites of the male, and of the 2nd–5th segments of the female, present on the right or left side indifferently.

“There is nothing unusual in the fact that the protective covering of the abdomen is not a mollusc-shell, for in these seas† alone there are several well-known instances of Hermit-Crabs making use of other convenient receptacles. For instance, *Pylocheles miersi* is found impacted in hollow twigs of sunken drift-wood; *Troglopagurus*, according to Messrs. Thurston and Henderson, lives in small cavities in coral; and I have myself seen a large *Cænobita*, on the island of Minnikoy, holding the empty shell of a small coco-nut over its abdomen. Again, in other parts of the world, *Gryllopagurus* lives in burrows of its own construction; *Pylocheles Agassizii* was found concealed in a cavity in a piece of sandstone, and another specimen was taken from the gastral chamber of a siliceous sponge; *Xylopagurus rectus*, like our *Pylocheles miersi*, was discovered in a lodging in drift-wood; *Ostraconotus* and *Tylaspis* are both believed to have some special protective shield, other than a shell; and *Porcellanopagurus* lives free among seaweed.

“Again, the association of our new form of Hermit-Crab with a Sea-Anemone is nothing strange: indeed, commensalism between Crustacea and Sea-Anemones is one of the most familiar facts of zoology, and a large number of instances of it have been described. In most cases, however, the facts seem to be that an individual of a definite species of Crab and an individual of a definite species of Sea-Anemone have both at once taken possession of the same mollusc-shell, which they continue to inhabit for their mutual advantage,—the Crab acting as locomotive to the Sea-Anemone,

* Belonging to the family *Zoanthidæ*, but apparently not referable to any known genus.

† The species was dredged by the 'Investigator' off Cape Comorin.

and the Sea-Anemone in return acting as a defence and warning-post, and possibly also as a decoy, for the benefit of the Crab. But, though the mutual advantage of the association is plain enough, the absolute and essential necessity of it is not so plainly seen, and it is reasonable to imagine that when in the course of growth the Hermit-Crab has to seek a new and larger shell, the partnership with the Sea-Anemone can be dissolved by simple withdrawal, without dangerously affecting the life of either individual—at any rate until such time as each can find a new partner of suitable size. In other words, there is no adaptation of either animal to the other, and each seems capable of existing apart from the other. In the present case there is no shell to act as introduction to and bond between the two animals; and the Sea-Anemone, which is a colonial form with a spreading cœnosarc, merely forms a sheet, which the Crab simply tucks under its telson by one end and pulls over its back by the other end—the polyps seeming to have no power of adhesion, and to depend on the Crab for a fast hold.

“The nearest approach to this state of affairs is found in *Parapagurus pilosimanus*, which, when full-grown, lives in a cavity hollowed out of the coenosarc of a colony of a large species of *Epizoanthus*. But in this case the individual Hermit-Crab and Sea-Anemone start their partnership with an empty mollusc-shell, which in course of time, as the occupants increase in size, becomes absorbed, so that at last the Crab is entirely dependent on the polyp-colony for the protection of its soft abdomen. But even here, though the association seems to have become much more intimate and permanent, there seems to be no essential adaptation of either animal to the other, nor does it appear to be beyond the bounds of possibility that each might exist—though its existence might not be so complete and secure—apart from the other.

“In the case of the new form of Hermit-Crab, now described, there is no evidence of the intervention of a shell, or other adventitious support, at any stage. Captain Anderson dredged 205 specimens, of both sexes and all ages, and in every observable instance the parent polyp of the protective colony appears to have settled on the hinder end of the abdomen of the Crab, and to have gradually spread by budding as the latter increased in size; so that the intimate and immediate connection between the two animals appears to be, from the first, a necessary one. In other words, the peculiar interest of the case is that the two animals seem to have become directly adapted to one another, and to be incapable of a separate and independent existence.”

In August last there was published at St. Petersburg the first number of the ‘International Review of Fisheries and Fishculture,’ of which the

contents are printed either in the English, German, or French languages. Among much that is both interesting and valuable may be found an article by Dr. Einar Lönnberg, of Sweden, on "A short comparison between the Caspian and the Baltic Seas." In the first, animal life is much richer than in the second, and we are given a summary of the principal features of the faunas of these seas.

"Passing on to draw an incomplete sketch of the fauna of these seas, I think, we can omit the Seals, three species in the Baltic and one (of northern origin) in the Caspian Sea, although they are destructive to the fish. The fish-fauna has many characteristics in common. Firstly we see a whole lot of freshwater fishes being common to both seas. Nearly all the Baltic freshwater fishes are also found in the Caspian Sea, but the latter is inhabited by a great number of very important foodfishes which are entirely wanting in the Baltic. Among those I think the Belorybitza (*Lucioperca*), the different species of Sturgeons and the Caspian Pikeperch (*Stizostedion caspium*) must be ranked first, not forgetting the Caspian Herrings and others. The Baltic has, in addition to its freshwater fishes, some marine fishes which may have entered through the Sound and the Belts, but of these the Plaice and Turbot are of commercial value only in the southern parts, the Flounder up to the neighbourhood of Stockholm, but the Cod still further north to the islands Ulföarne near Hernösand, although of less importance north of Aaland. The Baltic Herring yields the largest quantities and the anadromous Salmon and katadromous Eel are the best paid fishes in the market. Among the fishes which belong to the Baltic relict fauna, only *Cottus quadricornis* is used for food, but of course being a small fish it is of little value. The fishes of the Caspian Sea seem mostly to belong to the freshwater fauna or to that of brackish water; true marine types are scarce. The Belorybitza being closely related to the "White Salmon" of the Arctic Sea, seems to point to a northern origin, as do the Caspian Seal and some of the lower animals. The Sturgeons are also, at least partly, inhabitants of the Black Sea. But the Mediterranean fauna, which has taken possession of the Black Sea, does not seem to have been able to enter the Caspian Sea." Comparisons of the lower animals are of "great interest, because they show (as is also done by many species of fish) that hardy forms can endure to live and thrive well both in the Caspian and the Baltic Sea, in spite of all differences between these seas. But it must not be forgotten that the greatest part of the Caspian fauna is endemic and characteristic, for that region and the lower fauna of the Baltic is partly hardy marine forms which mostly have entered through the sounds in the south-west, although some are relict forms, and partly freshwater species."

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BIOLOGICAL SUGGESTIONS. MIMICRY.

BY W. L. DISTANT.

(Continued from p. 470.)

To revert to “active mimicry,”* and to render our signification of the term as clear as possible, we will first adduce an instance given by that competent lepidopterist, Georg Semper:—“During the last ten years the well-known white-leaved variety of *Acer negundo* has been largely planted in gardens in Hamburg, and since this the common White Cabbage Butterfly has accustomed itself to settle by preference on this shrub. It is then extremely difficult to distinguish the butterflies as they sit on the leaves, their yellowish colour being lost in that of the leaves.” † Had Hamburg been a locality in some *terra incognita*, and visited by a travelling naturalist of observing faculties, who can doubt—and why should surprise be felt under the circumstances—that this observation would have appeared, and been recorded, as an

* This term receives no support in the best work on Birds yet written. Prof. Newton maintains that mimicry must have the prefix “unconscious,” “which in every department of Zoology should be always expressed or understood”; and, again, wherever mimicry is not only possible, but even probable, “we must always remember that however produced it is *unconscious*.” (‘Dictionary of Birds,’ edit. 1899, pp. 572 and 575.)

† Cf. Karl Semper’s ‘Animal Life,’ p. 466.

instance of passive mimicry? A similar observation was communicated to Mr. Trimen by Mrs. Barber. She was impressed by the behaviour of a male of the conspicuous butterfly, *Papilio cenea*, which twice deliberately selected in her garden, as a resting place during a shower of rain, a shrub whose pale yellow and brown seeds and flowers entirely agreed with the colouring of the under side of its wings.* Of butterflies belonging to the Tropical American genus *Siderone*, Mr. Dent states:—"They always rest with wings folded over their bodies on branchlets, the markings and colouring of the under side of the wings resembling exactly dry brown or yellow leaves."† Mr. Cornish has written:—"Many of the small blue British butterflies have greyish spotted backs to their wings. At night they fly regularly to sheltered corners on the chalk downs where they live, alight head downwards on the tops of the grasses which there flourish, and, closing and lowering their wings as far as possible, look exactly like a seed-head on the grasses."‡ Mr. Carrington noticed for several evenings that a large White Cabbage Butterfly (*Pieris brassicæ*) searched out a few "sportive" whitish or cream-coloured leaves of a variety of ivy, and roosted upon one for the night.§ Mr. Trimen has observed the Satyrid butterfly *Melanitis leda*, which "rests among dead leaves on the ground in shady places, and is then indistinguishable from them"; and a parallel case, and a similar effect, is produced by the female *Eronia leda*, which settles on the faded bright yellow leaves of the *Erythrina* tree.|| Our well-known Orange-tip Butterfly (*Euchloë cardamines*), as observed by Mr. T. W. Wood towards evening or in cloudy weather, may be found at rest on the tops of grass or flowers, but more particularly on *Anthriscus sylvestris*, and almost always near that plant; the chequered white and green alone visible when the insect is at rest assimilates with the white flowers of the *Anthriscus* as seen against the green background.¶ Attention has recently been called to what appears to

* 'S. African Butterflies,' vol. i. p. 34. † 'A Year in Brazil,' p. 384.

‡ 'Animals of To-day,' p. 197. § 'Sci. Gossip,' new ser. vol. i. p. 10.

|| Pres. Addr. to S. Afr. Philosoph. Soc. 1884, p. lxxiv.

¶ 'Proc. Ent. Soc. Lond.' 3rd ser. vol. i. p. 147 (1863).—Mr. Wood states that "it was remarkable also that the butterfly did not appear to be partial to the *Anthriscus*, except as a secure resting place, but preferred to hover over and suck the juices of the wild geranium and other flowers."

be more or less active mimicry in two small British moths. *Penthina gentianana*, in its larval condition, feeds on the pith of the receptacle in teasel-heads, seed-heads of *Dipsacus sylvestris*; while another moth (*Eupœcilia roseana*) feeds on the seeds themselves. "The habit of *P. gentianana* on its emergence is to sit with head buried between the spinous scales of the receptacle, and with the posterior portion of its wings projecting a little beyond them. Roughly divided (as the insect is into a light upper and a dark lower part), its resemblance when in this position to a bird's excrement is very noticeable. If a number of teasel-heads be examined, it will be found that in some instances the inner part of the seeds—*i.e.* that part which is in contact with adjacent seeds—assumes a bright pink colour. Now, *E. roseana* has a very frequent habit of sitting lengthways along the spines of the scales above referred to, and here again the resemblance of the insect, with its colouring of rosy pink shading into yellow, to a partly displaced seed is worthy of notice."* One of the strongest illustrations of protective mimicry by a butterfly, and one of the most widely known—for who has not read Wallace's 'Malay Archipelago'?—is afforded by leaf-butterflies of the genus *Kallima*. But, as Mr. Badenoch has well enquired, "Of what avail would be the disguise were the insect prone to settle upon a flower, or green leaf, or other inappropriate surface?" † The partiality of this insect for settling on dry and withered leaves appears a true instance of active mimicry. The idea of some conscious volition in the protective habits of this butterfly is supported by remarks made by the Indian naturalist who writes under the name of "Eha":—"They see a little better in front of them, and I have noticed that the leaf-butterfly always alights head downwards, so as to face anything coming up the tree, which is much the most likely direction of assault from a Lizard. (In pictures generally, and in the show-case at the British Museum (Nat. Hist.), the butterfly is turned the opposite way, facing upwards, which is no doubt more appropriate to its character as a leaf; but that is a detail rather above the intelligence of a Lizard: at any rate, I never saw a *Kallima* sit in that position.)" ‡

* H. F. Fryer, 'Ent. Month. Mag.' 2nd ser. vol. x. p. 6.

† 'Romance of the Insect World,' p. 217.

‡ 'Natural Science,' vol. ix. p. 299.—This is in direct contradiction to

The well-known Tropical American butterflies belonging to the genus *Ageronia*, which flatten their similarly coloured wings on the lichen-covered trunks, are also described as to "invariably rest head downwards."* Mr. Geo. Windsor Earl relates that at Sourabaya he saw Lizards attack large moths, but they were not always successful, "unless they could manage to seize the head, when, after a struggle of a few minutes, the little reptile would bear away his prey to devour at his leisure."† Weismann seems more or less of this opinion also, for he observes:—"These markings are composed of two parts, the upper of which is on the fore wings, while the lower one is on the hind wings. The butterfly when at rest must therefore keep the wings in such a position that the two parts of each marking exactly correspond, for otherwise the character would be valueless; and, as a matter of fact, the wings are held in the approximate position, although the butterfly is, of course, unconscious of what it is doing. Hence a mechanism must exist in the insect's brain which compels it to assume this attitude, and it is clear that the mechanism cannot have been developed before the peculiar manner of holding the wings became advantageous to the butterfly, *viz.* before the similarity to a leaf had made its first appearance."‡ We should opine, however, that the *Kallima* is exercising some volition in seeking the environment of the withered leaves with which the under surface of its wings approximate, an action we have seen pursued by other butterflies with reference to different surroundings, and that the exact corresponding position of the wings is hereditary, and perhaps now describable as unconscious cerebration, or reflex action. Animals do not all use the same means for protection; the method may be different, but the

the description of the habits of another species of the genus as given by Wallace in his 'Malay Archipelago.'

* H. C. Dent, 'A Year in Brazil,' p. 384.

† 'The Eastern Seas,' p. 53.

‡ 'Essays upon Heredity,' &c., Eng. transl., vol. i. p. 287. — Weismann adds that "even this protective resemblance to or mimicry of a leaf is not perfect, for out of sixteen specimens in the collections at Amsterdam and Leyden which he examined, he could not find a single one which had more than two lateral veins on one side of the midrib of the supposed leaf, or more than three upon the other side; while about six or seven veins should have been present on each side" (*ibid.* p. 315).

purpose is similar. Thus Partridges “roost close to the ground, and sleep with their heads tucked close together. A covey in this position represents little more than a mass of feathers. They always spend their nights in the open, for protective reasons. Birds which do not perch would soon be extinct as a species were they to seek the protection of woods and hedge-bottoms by night. Such ground generally affords cover to vermin—Weasels, Polecats, and Stoats.”*

An active or aggressive mimicry is probably the explanation of the observation recorded by Mr. Woodford, made on Peel Island, Moreton Bay, where in the yellow-and-white blooms of different shrubs he found Spiders which were practically concealed by their assimilative colouration to these flowers. They were seen to attack the Bees which visited the bloom.† M. E. Heckel, of Marseilles, has described an interesting case, which may be frequently seen in the South of France. The Spider, *Thomisus onustus*, is often found in the flowers of *Convolvulus arvensis*, where it hides itself for the purpose of snaring two Diptera, *Nomioides minutissimus* and *Melithreptus origani*, on which it feeds. *Convolvulus* is abundant, and three principal colour variations are met with—there is a white form, a pink one with deep pink spots, and a light pink form with a slight greenishness on the external wall of the corolla. Each of these forms is particularly visited by one of three varieties of *Thomisus*. The variety which visits the greenish form has a green hue, and keeps on the greener part of the corolla; that which lives in the white form is white, with a faint blue cross on the abdomen, and some blue at the end of the legs; the variety which lives in the pink form is pink itself on the prominent parts of the abdomen and legs. The colour, however, is of an assimilative nature, as M. Heckel found that when the pink, white, green, and yellow varieties of the Spider are confined together in a box they all become nearly white.‡

That undoubted examples of *active* mimicry are to be found among the Arthropoda will occur to the mind of every naturalist at the mention of “Trap-door Spiders.” It is unnecessary to

* J. Watson, ‘Poachers and Poaching,’ p. 9.

† ‘A Naturalist among the Head-Hunters,’ p. 70, note.

‡ ‘Nature,’ vol. xlv. p. 451.

quote here all the observations made by competent and veracious authorities as to the beautiful adaptations effected by these Spiders, by which the lid or door of their burrows is made to perfectly assimilate with the surrounding surface. Gillies, describing the habits of a New Zealand species, writes :—"The evidences of thought, ingenuity, and reason are displayed in the selection of the particular materials used in special places ; in the calculation of the probabilities of certain contingencies happening ; and in the apparently careless arrangement of both living and dead matter, so as to make what is in reality the *highest art* appear to be the result of natural and ordinary circumstances." In some cases there is "a plant of green grass . . . planted artificially, and growing on the lid." In other cases "you will find clay on the outside of the lid, plastered and smooth, or possibly with an *imitation crack*, introduced apparently at random." In others, again, "the skilful artist brings to his aid all the taste and knowledge of the practical gardener—selects plants suited for his purpose, brings them from a distance, and actually transplants them to the top of his trap-door with astonishingly natural variety and arrangement"; or "you will find mosses of various hues and colours growing green, and sometimes brown and dead, upon the lid"; or sometimes "this tiny pasture is brilliantly ornamented with parti-coloured patches of lichens," or "sprigs of lycopods, ferns or heaths, veronicas, and white-berry plants are introduced to correspond with the bolder herbage around"; or, "if the common white tussock is the prevailing vegetation in the locality, . . . the dead bits (of that kind) of grass are woven adroitly into the trap-door or round its mouth, so as to deceive the most practised eye," &c.* Moggridge found a nest in a plant which had been brought to him which was quite covered on the surface with moss, and the moss grew on the surface of the door itself, and looked exactly like that growing all round.† Livingstone describes a nest of which "the outside looks exactly like the surrounding surface of the ground, so that when the door is shut it is impossible to find the nest. The hole can therefore only be seen when the inhabitant has gone out and

* Quoted by W. Lauder Lindsay, 'Mind in the Lower Animals,' vol. i. p. 528.

† 'Harvesting Ants and Trap-door Spiders,' p. 97.

has left the door open behind it.”* It may be contended that this shows only mimicry in the habitation, and not in the appearance of the animal itself; or, again, that “aggressive” rather than “active” should be the qualitative term applied to this mimicry; but we can refer to instances where animals disguise their own bodies in a similar manner, and with a like intelligence, to these Spiders. The little *Æsop’s Prawns* (*Hippolyte (virbius) varians*. Leach, and *H. fascigera*, Gosse) may perhaps be cited as practisers of active mimicry. Prof. Herdman, in 1893, described four variations of *H. varians*, each agreeing in hue with the colour of its special habitat,† and was inclined to accept the fourth possibility of explanation which he suggested, viz. “The young may be very variable in tint, and then, by the action of natural selection, such as do not agree in hue with the surroundings will be eliminated.” Mr. James Hornell, at the Jersey Biological Station, has made a further series of experiments with these species, and has accepted the third postulate of Prof. Herdman, viz. the “adaptability may be retained throughout the rest of their lives, and the adults may change hue upon change of environment.” Mr. Hornell found that a pale olive-brown *H. varians* taken from amid similarly coloured seaweed became of a vivid green within an hour when placed with *Enteromorpha*, and the same specimen changed to a pinkish red within three hours when placed amid *Delesseria*. Again, red-coloured specimens of the same species from amongst tufts of red weeds changed to green during a single night when placed with *Enteromorpha*. or with *Cladophora*, and back again to red within four hours when placed once more amid red weed. This change of hue took place as rapidly in the dark as in the light. The weeds affected by the smooth-skinned *H. varians*, in the great majority of cases, are smooth in surface, and not overgrown with foreign matter. “In marked contrast, the body of *H. fascigera* is ornamented with tufts of brush-like hairs, and if a spray of the coarse *Corallina*, where this species makes its home, is examined, the stems are found covered with a multitude of abodes of tiny “messmates,” porcelain-like coils of the little tube-worm *Spirobis*, dull-looking cylinders tenanted by that lovely miniature Sabellid,

* ‘Pop. Account Travels in S. Africa,’ p. 221.

† ‘Sixth Annual Report of the Liverpool Marine Biology Committee,’

Othonia gracilis, and crusting colonies of *Bryozoa* protruding ever and anon circlets of hair-like tentacles." Hence, when the hairy *H. fascigera* is at rest on such a weed, the mimetic adaptation is greatly accentuated.* Thus also the connection of the small Short-tailed Crab (*Nautilograpsus minutus*), which swarms on the Gulf-weed, and assimilates in colour thereto. Sir John Murray, during the voyage of the 'Challenger,' studied the habits of these Crabs. He observed "that, although every floating thing upon the surface is covered with them, they are rarely met with swimming free, and that whenever they are dislodged and removed a little way from their resting place they immediately make the most vigorous efforts to regain it."† The Common Shrimp (*Crangon vulgaris*), when suspecting danger, "sinks upon the sand, and, setting his swimming-feet rapidly to work, they 'kick up such a dust' in the water that he is hidden in a cloud of fine sand, which as quickly settles down and partially buries him—sufficiently so with his sandy hue to effectually hide him."‡ Mr. W. A. Lloyd has described a somewhat similar habit of the Echinus or Sea-urchin. "Its chief delight, when in an aquarium, appears to be to cover itself with pebbles, which it picks up with its spines. At first I imagined that the little stones had fallen by mistake, and, wishing to do all in my power to render my captive happy, I removed the pebbles with a brush; but the Sea-urchin evidently did not appreciate my would-be kindness, for in a short space of time he had again covered himself with pebbles; and so completely was he hidden beneath them, that if he had not crawled up the side of the aquarium with his load I should have had some difficulty in discovering his whereabouts."§ Some species of Crabs, such as *Maja verrucosa*, *Pisa tetradon* and *P. armata*, *Inachus scorpioides*, and *Stenorrhynchus longirostris*, cut off bits of Wracks, *Florideæ*, *Ulvæ*, &c., with their claws, and place them on the top of their carapaces, securing them on peculiar spiky or hooked hairs. The fragments grow firmly to the Crabs' chitinous coats, and, far from being harmful to the animals, are, on the

* 'The Journal of Marine Zoology and Microscopy,' vol. ii. pp. 101-103.

† Cf. Sir C. Wyville Thomson, 'The Voy. of the Challenger.'— "The Atlantic," vol. ii. p. 11.

‡ Edw. Step, 'By the Deep Sea,' p. 168.

§ 'Life beneath the Waves,' pp. 83-4.

contrary, an important means of protection. The Crabs in question escape pursuit in consequence of this disguise, and it is to be observed that each species chooses the very material which makes it most unrecognizable to plant upon the exterior of its body; those species which live chiefly in regions where *Cystosiras* are indigenous deck themselves in *Cystosiras*, whilst those which inhabit the same places as *Ulva* carry *Ulva* on their backs.* This also serves as aggressive mimicry; for, as Mr. Woodward writes, "thus disguised like Indians stalking game, they can readily approach their more active prey."† Mr. Bateson observed this active mimicry at Plymouth, and describes how a Crab seizes a piece of weed, tears off a fragment, chews the end in its mouth, and then rubs it firmly on its head and legs until it is caught by the curved hairs and fixed. "The whole proceeding is most human and purposeful. Many substances, as Hydroids, Sponges, Polyzoa, and weeds of many kinds and colours, are thus used; but these various substances are nearly always symmetrically placed in corresponding parts of the body, and particularly long plume-like pieces are fixed on the head."‡ Dr. Willey records a similar observation which he made on the faces of rocks near Tjibodas (Java). "I found a quantity of small caterpillars living on the powdery Alga which makes greenish-white patches on the rocks. The caterpillars had so completely covered themselves with the Alga as to be only discernible by their movements on close inspection, and their disguise must effectually protect them from foes."§ "Equally marvellous, too, is the case of many kinds of caterpillars which spin their cocoons on the bark of trees, and cover the structures wherein they are subsequently to undergo transformation into the chrysalis state with lichens and fragments of bark, that their temporary resting place may not be noticed by insectivorous birds."|| When the caterpillar of the Indian butterfly, *Limenitis procris*, "comes out of the egg, it betakes itself at once to the very point of a tender leaf, and eats down steadily on both sides of the midrib, which

* Kerner and Oliver, 'Nat. Hist. Plants,' vol. i. p. 77.

† 'Cassell's Nat. Hist.' vol. vi. p. 197.

‡ Cf. J. A. Thomson, 'Study of Animal Life,' 2nd edit. p. 62.

§ 'Natural Science,' vol. vi. p. 407.

|| Kerner and Oliver, 'Nat. Hist. Plants,' vol. ii. p. 159.

stands out bare and dry. As the little thing advances it cuts up much more of the leaf than it eats, and these crumbs, with other refuse, are gradually accumulated, and loosely bound together with silk till they form a breastwork across the whole breadth of the leaf. Behind this rampart of refuse, of which its brown and ragged form seems to be a portion, the little architect lives, pushing the work back from day to day as it eats on.* Kirby and Spence pointed out many instances of the same active and intelligent mimicry. "Of this description is a little water-beetle (*Elophorus aquaticus*), which is always found covered with mud, and so when feeding at the bottom of a pool or pond can scarcely be distinguished by the predaceous aquatic insects from the soil on which it rests. Another very minute insect of the same order (*Limnius æneus*), that is found in rivulets under stones and the like, sometimes conceals its elytra with a thick coating of sand that becomes nearly as hard as stone." "A species of a minute coleopterous genus (*Georyssus areniferus*), which lives in wet spots where the Toad-rush (*Juncus bufonius*) grows, covers itself with sand; and another nearly related to it (*Chætophorus cretiferus*, K.), which frequents chalk, whitens itself all over with that substance. As this animal when clean is very black, were it not for this manœuvre it would be too conspicuous upon its white territory to have any chance of escape from the birds and its other assailants."†

Many examples of active mimicry are exhibited by our British moths, as may be learned by consulting the pages of Mr. Barrett's excellent work on the 'Lepidoptera of the British Islands.' Thus *Eriogaster lanestris* is an instance, for "even when sitting on a hawthorn spray it so accurately mimics a dead leaf twisted round the twig that it becomes almost impossible of recognition."‡ *Cerura furcula* sits in the daytime "on the trunk, or more usually on a branch, of one of its food-trees, its outstretched downy legs and grey markings giving it a most deceptive likeness to an entangled downy feather, or even a more close resemblance to a ripe sallow catkin from which the downy seeds are bursting."§

* Eha, 'A Naturalist on the Prowl,' pp. 127-8.

† 'Introd. Entomology,' 7th edit. pp. 424-5.

‡ 'The Lepidoptera of the British Islands,' vol. iii. p. 12.

§ *Ibid.* p. 89.

Its larva feeds on willow and alder. *Petasia cassinea* is said in the daytime "to sit upon old posts and railings, and is very hard to see, from its close resemblance to a bit of decayed wood, or to the greyish-brown lichens. Its extended and tufted feet, and rough scales at the edge of the fore wings, all help to complete the deception."* *Cymatophora duplaris* exhibits a purpose in active mimicry of the highest description, both as a caterpillar and a perfect moth. The larva during the day "conceals itself in a habitation formed of green leaves united by silken threads upon the tree. At night it comes forth to feed."† The moth sits in the daytime on the branches of trees. "When shaken out it falls straight to the ground, and lies among the dead leaves."‡ *Arsilonche venosa*, in colour and markings, like those of so many other fen-frequenting species, is accurately suited to its habit of hiding in the daytime among the dead leaves of reed, sedge, and marsh-grasses.§ *Agrotis ashworthii* "sits in the daytime on limestone rocks, or hides among loose stones. In appearance it closely resembles the blue limestone, and it has the sagacity to hide itself in chinks and crevices, where this resemblance greatly assists in its concealment."|| All these examples scarcely bear out an automatic or semi-automatic action; we seem to see among these lowly organised insects—referring, of course, to sense organs—a capacity and endeavour to use their environmental resemblances to the best advantage. There may be much heredity in such an aptitude, but the intelligent concealment would not be questioned if practised by the higher animals.

The instances of active mimicry just given almost all pertain to decorative art, and in fact represent the impostor who with borrowed plumes flaunts in the open. We now resume the series of more modest simulation, in which advantage is taken of similarly coloured objects by which concealment may be effected. These may nearly be said to reflect the methods of the impostors who attach themselves to majorities, winning causes, and crowds, where they are submerged in resemblances, and, undetected, reap the corresponding advantage. The Australian genus of Sea-

* 'The Lepidoptera of the British Islands,' vol. iii. p. 157.

† *Ibid.* p. 195.

‡ *Ibid.* p. 196.

§ *Ibid.* p. 277.

|| *Ibid.* p. 383.

horses (*Phyllopteryx* sp.) “closely resemble the colour of sea-weeds to which they attach themselves, while the filamentous appendages of their spines appear as if they were actually a part of the vegetable growth.”* The Dragonfly larva “trusts chiefly to its sombre colouration and its motionless attitude. The larva clinging to a stem in the shady recesses of water-weeds is not easily distinguished, and the absence of movement removes the chief risk of discovery.”† Many caterpillars resort to the bark of trees, with which their colour and often notched, knotted, or spotted bodies closely assimilate. That this is a form of active mimicry may be gleaned from the remarks of a British entomologist:—“A number of these mimics of the insect world never venture to feed by day, but take in their quantum of provision during the dark hours, and practise their deceptions during the day.”‡ Active mimicry may also explain resemblances which Weismann is very emphatic in denying as due to “external influences.” “If a caterpillar, which hides itself by day in the crevices of the bark, possesses the same colour as the latter, whilst other caterpillars which rest on leaves are of a green colour, these facts cannot be explained as the result of the direct influence of the bark and leaves. And it would be even less possible to explain upon the same principle all the details of marking and colour by which these animals gain still further protection. If the upper side of the upper wings of certain moths is grey like the stone on which they rest by day, while in butterflies the under side of both wings which are exposed during rest exhibits analogous protective colours, these facts cannot be due to the direct influence of the surroundings which are resembled; but, if they have arisen in any natural manner, they must have been indirectly produced by the surroundings.”§ These last remarks appear to be obscure. Surely, to make the proposition clear, some explanation should have been given as to what is meant to be differentiated between “cannot be due to the direct influence of the surroundings,” and “must have been indirectly produced by the surroundings.” And therefore, per-

* ‘Royal Nat. Hist.’ vol. v. p. 426.

† L. C. Miall, ‘Nat. Hist. Aquatic Insects,’ p. 332.

‡ W. Furneaux, ‘Butterflies and Moths (British),’ pp. 31-2.

§ ‘Lectures on Heredity,’ &c., 2nd edit., Eng. transl., vol. i. p. 409.

haps Prof. Weismann is scarcely justified in observing, "one may reasonably complain when compelled to repeat again and again these elements of knowledge and of thought upon the causes of transformation."* A recent writer would apparently regard the *Phasmidæ* as examples of active mimicry. He is reported as saying:—"Amongst true instincts he would class such acts of protective mimicry as those performed by the *Phasmidæ*, although their alleged practice of shamming death might possibly be constitutional lethargy, which had misled observers."† We have already recorded Mr. Belt's observation in Nicaragua as to the behaviour of a leaf-like Locust when surrounded by a host of predaceous Ants. A somewhat similar fact has been narrated by "Eha":—"I was sitting high up in a tree, rifle in hand, waiting for a Tiger, when my attention was caught by one of these Crickets (exactly resembling a small patch of grey lichen) scurrying round the trunk of a neighbouring tree, with a Lizard in full pursuit. Just as the Lizard came up with it the Cricket, falling in with a slight depression in the bark, stopped dead, and flattened itself out, and the Lizard was utterly confounded. There it stood, looking ludicrously puzzled at the mysterious disappearance of its prey, which was just under its

* 'Lectures on Heredity,' &c., 2nd edit., Eng. transl., vol. i. p. 410.

† C. W. Purnell, 'Phil. Instit. Canterbury, New Zealand.'—*Cf.* abstract in 'Nature,' vol. lii. p. 384.—The "feigning of death" among some animals, especially reptiles, may be taken as a psychological parallel to active mimicry. Nevertheless, it has been argued that with insects this process is a "purely reflex phenomenon," rather than an act of volition. Mr. Latter experimented with the Currant Moth (*Abraxas grossulariata*), whose powers of "shamming" are so familiar. When seized by one wing it at once feigned death, but so it also did after being decapitated, and this action was continued in response to the same stimulus during the two days that elapsed before its death ('Nature,' vol. lii. p. 543). Like Toads, Tree-frogs do not appear to touch the insects on which they prey until these begin to move ('Roy. Nat. Hist.' vol. v. p. 281). The feigning of death apparently has a protective purpose among the inferior animals. Prince Kropotkin, on the authority of Nagel, states:—"The water-beetle (*Dytiscus*) does not perceive the presence of animals which it preys upon within a distance of a few millimetres, so long as they remain motionless" ('Nineteenth Century,' vol. xl. p. 253). Mr. Oxley Grabham records an instance of a Grasshopper Warbler (*Locustella naevia*) feigning death when touched on the nest, allowing herself to be handled as if dead—"a quivering of the eyelid was all that showed she was shamming" ('Zoologist,' 4th ser. vol. ii. p. 351).

nose.”* The Horned Frog (*Ceratobatrachus guentheri*) of the Solomon Islands is described by Mr. Guppy to so closely imitate its surroundings, both in colour and pattern, that on one occasion he captured a specimen by accidentally placing his hand upon it when clasping a tree.† This species is so variable in colouration and in the integuments, that Mr. Boulenger has remarked, “Out of the twenty specimens before me no two are perfectly alike.”‡ This is probably a case of what is here considered active mimicry.

Birds exhibit many illustrations of active mimicry. A recent writer in ‘The Zoologist’ called attention to some peculiar “attitudes of a Little Bittern observed in captivity.” The real meaning of the attitudes of this bird (*Botaurus minutus*) seem only to have been understood by the then editor, Mr. Harting, who thus comments on the same:—“The inference to be drawn from these remarks is that the curious attitudes adopted by this bird, on finding itself observed, are assumed in the exercise of what may be termed the instinct of self-preservation, and in a state of nature must tend materially to favour its concealment. Whether it be standing in or near a reed-bed, erect, with neck preternaturally elongated and beak pointed upwards, or crouching against a riverside tree-stump, the attitude is calculated to deceive the eyes of all but the keenest observers, especially since the colour of the bird’s plumage harmonizes in a remarkable degree with that of the natural surroundings.”§ Mr. Hudson has made a similar remark concerning the Common Bittern (*Botaurus stellaris*). “His buff and yellow and chestnut colour, mottled and barred and pencilled with black and brown, gives him a strange tigrine or cat-like appearance; it is a colouring well suited to his surroundings, where yellow and brown dead vegetation is mixed with the green, and the stems and loose leaves of the reeds throw numberless spots and bars of shade beneath. Secure in its imitative colouring, the Bittern remains motionless in its place until almost trodden upon.”|| A very similar pro-

* ‘Natural Science,’ vol. ix. p. 299. † ‘The Solomon Islands,’ p. 317.

‡ *Ibid.* p. 316. § ‘Zoologist,’ 3rd ser. vol. xviii. p. 456.

|| ‘British Birds,’ p. 225.—The same writer has given a vivid description of a similar habit of an Argentine Heron (*Ardetta involucris*), and refers to “a marvellous instinct that makes its peculiar conformation and imitative colour far more advantageous than they could be of themselves” (P. Z. S. 1875, p. 629-31).

ceeding, as far as intention is exhibited, though appertaining more to what is understood by "aggressive mimicry," is to be found in the account of the habits of the Cassowary (*Casuarius bennetti*), given by Mr. Wilfred Powell as observed in the island of New Britain:—"I saw a Morroop (Cassowary) come down to the water's edge, and stand for some minutes, apparently watching the water carefully; it then stepped into the river, where the water was about three feet deep, and, partially squatting down, spread its wings out, submerging them, the feathers being spread and ruffled. The bird remained perfectly motionless; I also noticed that the eyes were closed, as if asleep. It remained in this position for fully a quarter of an hour, when, suddenly closing its wings and straightening its feathers, it stepped out on the bank, where, shaking itself several times, a quantity of small fishes fell from under the wings and from amidst the feathers, which were immediately picked up and swallowed. The fishes had evidently mistaken the feathers for a description of weed that grows in the water along the banks of the rivers in this island, and very much resembles the feathers of the Cassowary, and in which the smaller fish hide to avoid the larger ones that prey on them."* The Ruffed or Birch Partridge in Canada has been described by Dr. Leith Adams as flying to a tree to escape danger, where "their statue-like posture, with neck outstretched, and their motionless position on the moss-clad spruce-bough, render it extremely difficult to recognize them." So close is this active mimicry carried out that it is sometimes only by the barking of Dogs that the sportsman is aware of the close proximity of the birds. In the words of Dr. Adams, describing an actual experience, "In vain we looked, for no Partridge was to be seen; still the Dog barked, and began to bite and tear off the bark, when at length three birds were discovered standing motionless on the moss-covered boughs, and within a few yards of us."† Even more forcibly Mr. Anthony, of San Diego, California, describes the active mimicry of the "Long-eared Owls," who can assume a "rigid, stick-like position" to the surrounding shrubs and branches. "To escape notice—so great is their faith

* 'Wanderings in a Wild Country,' pp. 271-2; and 'Proc. Zool. Soc.' June 15th, 1880.

† 'Field and Forest Rambles,' pp. 175 and 176.

in the protection afforded them by this resemblance, when several are together, as is often the case in winter—one or more may be shot without the rest showing so much as by the movement of a feather that they are disturbed.” On one occasion a friend with whom he was hunting came upon five of these Owls sitting in a row on a limb of a giant cottonwood. “Beginning at one end of the line, he shot them all, one after another, his last shot starting a sixth, which he had not seen, from a perch in the same tree.” When Mr. Anthony arrived upon the scene they began looking for the escaped Owl, but failed to discover it. “As we were leaving, however, my eyes chanced to fall upon what at first appeared to be an abnormal growth on the trunk of a small sapling near us, but which, upon a second glance, proved to be a little Screech-Owl. With its back against the trunk of a tree it was drawn up to its fullest height, all its feathers drawn tight against its body, its ear-tufts erect. It looked to be twice its normal length, and so closely did it resemble the grey bark and branches that, unprotected as it was by leaves or twigs in the strong glare of a bright winter’s day, its discovery was purely accidental. Our tracks in the snow proved that we had several times passed within ten feet of the bird, and it was quite evident that it was aware of our presence; for, while it made not the slightest movement, it watched us constantly through its half-closed lids, trusting no doubt to escape detection, but ready to fly if the occasion required.”*

Geese and Ducks seem to mimic snakes. In the opinion of Mr. Louis Robinson:—“It seems very probable that the hiss of the Goose, when it desires to show hostility, is founded upon the hiss of the serpent. Many Ducks also, when nesting, will thrust out their necks and hiss when an intruder approaches, and a Muscovy drake is almost as ready to adopt this method of intimidation as a gander. It is found that nearly all long-necked birds which nest among reeds and bushes show a similar habit. One can easily understand that among thick grass or reeds, where only the head and neck of a nesting Duck are visible, the forward dart and hiss might often be sufficient to deter a cautious enemy from making an attack.”†

* ‘Science,’ vol. xxiii. p. 64.—Capt. Bendire has made a similar observation on this species (*Asio americanus*).

† ‘Wild Traits in Tame Animals,’ pp. 281-2.

I have related my own experience in the Transvaal with *Francolinus levaillantii*, a single member of which from a covey I had disturbed squatted in a small hole in the path about eighty yards in front of me, and, depressing its back level with the earth, exhibited a good instance of the protection obtained by assimilative colouration.* A young Merganser deceived the Duke of Argyll and a party of his visitors at Inverary by simply remaining perfectly still on ground on which it was inconspicuous by reason of the protective resemblance or mimicry of its colour.† Mr. R. Kearton states:—"I have on more than one occasion seen a baby Peewit wandering about with half of its prison-house still attached to its downy rump, and if a Hawk or other bird of prey should happen to appear overhead they instinctively clap flat upon the ground, and remain motionless as stones until the danger has passed."‡ The Dabchick, on quitting the nest, according to Mr. Hudson, "invariably draws a coverlet of wet weeds over the eggs; the nest in appearance is then nothing but a bunch of dead vegetable rubbish floating in the water."§ Young Emus are very different in colour from the old birds, and bear a delicate design of a pretty dark grey with numerous stripes on their back and sides. Mr. Semon relates:—"Young Emus are often pursued by Eagles and Hawks so frequent in Australia. When (so my blacks told me) the young Emus see a bird of prey soaring above them they quickly lie down flat upon the ground. A body as big as theirs would surely be much more conspicuous, set off as it is by grass, if it were *evenly* though ever so modestly coloured, than if its colouring be varied by stripes and spots. I myself have had occasion to notice how difficult it is to discover an Emu in the grass if it nestles to the ground."|| Gilbert White remarks on the Stone Curlew (*Edicnemus crepitans*):—"The young run

* 'A Naturalist in the Transvaal,' p. 75.—Subsequently I observed how this action could become habitual without a suitable environment. I flushed a pair of *Francolinus subtorquatus*, one of which squatted in the same manner, but, by force of circumstances, among the short, black, and charred remains of a grass fire. Here its colour stood out in bold relief, and I easily bagged it.

† Cf. W. Lauder-Lindsay, 'Mind in the Lower Animals,' vol. i. p. 526.

‡ 'With Nature and a Camera,' p. 210.

§ 'Birds in London,' pp. 99-100.

|| 'In the Australian Bush,' pp. 145-6.

immediately from the egg like Partridges, &c., and are withdrawn to some flinty field by the dam, where they skulk among the stones, which are their best security, for their feathers are so exactly of the colour of our grey-spotted flints, that the most exact observer, unless he catches the eye of the young bird, may be eluded."* The same observer records an illustration of active mimicry in a Willow-Wren:—"This bird a friend and myself had observed as she sat in her nest, but were particularly careful not to disturb her, though we saw she eyed us with some degree of jealousy. Some days after, as we passed that way, we were desirous of remarking how this brood went on; but no nest could be found, till I happened to take up a large bundle of long green moss, as it were carelessly thrown over the nest, in order to dodge the eye of any impertinent intruder." †

Active mimicry, rather than natural selection *per se*, appears very largely to account for the assimilative colouration of birds' eggs to their nests or environment. Without recapitulating all the evidence which can be readily obtained from so many sources—either by observation, or reference to much illustrated literature—we may safely conclude, with Mr. Wallace, that on the whole, "while white eggs are conspicuous, and therefore especially liable to attack by egg-eating animals, they are concealed from observation in many and various ways." ‡ This is a very important consideration before we proceed farther. We find a great number of white or prominent eggs, apparently unaffected by "natural selection," but preserved by intelligent concealment, which is only a form or phase of what we have noted before, and to what will be referred to again on this very matter of birds' eggs, as active mimicry. If the process of natural selection was to be applied, according to a very frequent method, as *universal*, then birds arising from these white and prominent eggs would seem in course of time to be doomed to destruction. But we find nothing of the kind. Natural selection is here replaced by the evolution of intelligence or active mimicry. True, it may be

* 'Nat. Hist. Selborne,' Harting's edit. p. 55.—Grant Allen, in the introduction to his own edition of White, refers to this observation as "the germ of the theory of Protective Mimicry."

† *Ibid.* p. 175.

‡ 'Darwinism,' p. 214.

argued that birds laying white eggs would become extinct without they had gradually acquired the intelligent or automatic powers of concealment through a process of natural selection. But this is only begging the question. The colour of the egg has not altered under this severe stress, and we can see that many eggs are completely either adapted to their environment, or are so marked and coloured that the birds by choosing a proper environment, or, again, exercising active mimicry, can leave such in practical exposure. "Primarily the eggs of birds must have been white, from the inherent colour of the salts of lime and magnesia of the shell."* "As a rule, Sandwich Terns' eggs harmonize closely with their surroundings, and even the experienced field naturalist has to exercise a great deal of care to avoid treading upon a clutch when visiting a breeding station. A friend of mine told me a few years back that he had once visited a colony of these birds on an island where the natural breeding accommodation was so limited that many of them had conveyed patches of pebbles on to the grass, and laid their eggs thereon."† Take, for instance, our Nightjar or Goat-sucker. As Mr. Watson has remarked, "this night-flying bird, half-Owl, half-Swallow, rests during the day on bare bits of limestone on the fells. Its mottled plumage exactly corresponds with the grey of the stones, and its eggs, in colour like its plumage, are laid upon the bare ground without the slightest vestige of a nest, and again entirely resemble the stone."‡ Now take another good example from Mr. Wallace. The common Black Coot (*Fulica atra*) "only breeds in certain localities where a large water-weed (*Phragmites arundinacea*) abounds. The eggs of the Coot are stained and spotted with black on a yellowish-grey ground, and the dead leaves of the reed are of the same colour, and are stained black by small parasitic fungi of the *Uredo* family; and these leaves form the bed on which the eggs are laid. The eggs and the leaves agree so closely in colour and markings that it is a difficult thing to distinguish the eggs at any distance. It is to be noted that the Coot never covers up its eggs as its ally, the Moor-hen,

* James Newton Baskett, 'Papers presented to World's Congress on Ornithology,' Chicago, p. 95.

† Richard Kearton, 'With Nature and a Camera,' p. 254.

‡ 'Poachers and Poaching,' p. 136.

usually does."* Mr. Wallace considers that these eggs "are coloured in a specially protective manner," but it is equally open to argument, that as white eggs are concealed, and the mottled-grey egg of the Nightjar laid on the similarly coloured ground, so the concealing, or active mimicking, powers of the Coot suggest its placing its eggs among the leaves that so successfully hides them.

That birds may use a reasoning or cunning attribute in the deposition of their eggs where the colouration may prove of an assimilative character to the surrounding environment may be argued from the evidence which exists of their pursuing an equivalent mental process in the placing of their nests. Thus recently a writer has described "some curious experiences in birds' nesting." He found a Blackbird's nest "situated in a depression in the ground, in just such a position as a Sky Lark's might occupy." A keeper who accompanied him had found several other Blackbirds' nests in similar positions. Within a few hundred yards two Thrushes' nests were also found on the ground, "the edge of the nests being level with the surface." On enquiry it was stated "that the proprietor, having found that this wood was a nesting stronghold of these species, had made systematic raids on their nests in consequence of the havoc made by the birds on his fruit. I think this fact suggests why these birds had departed from their usual habit in their choice of nesting sites. Profiting from experience, they had selected safer positions." The same writer records facts to prove that the Common Sandpiper "profits by experience, and occasionally varies its choice of nesting sites." In 1886 these birds had their nests twice swept away from the river-banks by heavy floods. In the following year nests were found fully a hundred yards from the river. "From May, 1886 (the date of these floods), until 1889, the Sandpipers continued to nest at some distance from the river." † The Samoan Tooth-billed Pigeon (*Didunculus strigirostris*), which formerly bred on or near the ground, and was so greatly reduced in numbers by Cats as to be threatened with extermination, eventually took to nesting and roosting in trees, and has since been gradually on the increase." ‡ We have not

* 'Darwinism,' p. 215.

† Dr. R. Williams, 'The Zoologist,' 3rd ser. vol. xx. pp. 372-3.

‡ F. A. Lucas, 'Rept. Nation. Mus.' Washington, 1891, p. 612.

yet reached the explanation of the colours of eggs; we have only by observation seen—under “natural selection,” if you will, or active mimicry—how avian subterfuge has in so many cases combated the pertinacious search of the persistent enemies to bird existence.

Sometimes this mimicry appears only as a survival, and when its character is no longer protective. “The bird which in the arctics long ago lined its nest with green moss or grey lichens may now floor it with flax in Dakota, or pad it with cotton in Texas; and yet in either deposit a solid green or mottled greyish egg in keeping with the colours of ‘the old house at home.’”^{*} Thus the eggs of the Wild Duck are placed among the green reeds, while those of the Lapwing are with equal confidence consigned to the ploughed field or upland. The Red Grouse can safely leave its speckled eggs among the heather; the Lesser Tern has little fear that its spotted egg will be noticed on the shingle, or the Ringed Plover that its egg will be readily distinguished from the sand on which it is laid. Take Mr. Seebohm’s ‘History of British Birds,’ with its beautiful illustrations of eggs, often so decisive in colour and markings, and then find the eggs in their natural surroundings, and one will then experience how “the whole creation groaneth,” or rather the intense beauties and harmonies that have arisen in Nature because she “is red in tooth and claw.”

Mammals contribute the same evidence, and the narratives of sportsmen and travellers afford many instances. According to Mr. Buxton, the Sardinian Mouflon (*Ovis musimon*) was one of the most difficult animals to approach with which he was acquainted. He observes, that “when they are alarmed, or ‘at gaze,’ they have a habit, or at least the rams have, of placing themselves in the middle of a bush of *Macquia*, or in the shadow which it casts. The ewes, who are naturally less conspicuous, do this in a less degree.”[†] The same authority describes a similar habit in the Barbary Sheep (*Ovis tragelaphus*), known by the name of “Aroui”: “They are constantly within sight and hearing of the Arabs and their Goats, and, having no means of escaping from their neighbourhood, have developed the art of hiding themselves to

^{*} James Newton Baskett, ‘Papers, World’s Congress on Ornithology,’ Chicago, p. 100.

[†] ‘Short Stalks,’ 2nd edit. (1893), p. 22,

an extraordinary degree, and their confidence in their own invisibility is unlimited. A practical illustration of this occurred to me one evening when I had sat in one place for twenty minutes carefully spying the surrounding country. My coign of vantage was a knoll which commanded a small shallow hollow, in which there was not a vestige of cover, except the few thin thuja bushes which looked as if they could not hide a Rat. It was not till I rose to shift my position that a female Aroui and two yearlings started from these bushes. They had been lying within sixty yards of me, and must have been fully conscious of my presence."* Le Vaillant writes: "If the Giraffe stands still, and you view it in front, the effect is very different. As the fore part of its body is much larger than the hind part, it completely conceals the latter; so that the animal resembles the standing trunk of a dead tree."† Mr. Baines, the African traveller, related to Frank Buckland that "the Giraffe seems to know that if he keeps perfectly quiet he will be mistaken for a tree; if he moves, his presence will become apparent to his enemy—man."‡ Baines himself has recorded that a Giraffe he watched passing through the bush looked "for all the world, as he stopped to gaze, like the white stump of a dead tree, which anyone might have passed by without suspecting it of the power of motion."§ Sir Samuel Baker bears the same witness: "It may be readily imagined that, owing to the great height of this animal, it can be distinguished from a distance, and does not require an elaborate search; nevertheless, it is exceedingly deceptive in appearance when found among its native forests. The red-barked mimosa, which is its favourite food, seldom grows higher than fourteen or fifteen feet. Many woods are almost entirely composed of these trees, upon the flat heads of which the Giraffe can feed when looking downwards. I have frequently been mistaken when remarking some particular dead tree-stem at a distance, that appeared like a decayed relic of the forest, until, upon nearer approach, I have been struck by the peculiar inclination of the trunk: suddenly it has started into movement and disappeared."|| Gordon Cumming narrates

* 'Short Stalks,' 2nd edit. (1893), p. 136.

† 'New Travels into Int. Parts of Africa,' Eng. transl. vol. ii. pp. 278-9.

‡ 'Curiosities of Natural History,' pop. edit. 3rd ser. p. 232.

§ 'Explorations in S.W. Africa,' p. 387.

|| 'Wild Beasts and their Ways,' vol. ii. p. 151.

a similar experience:—"In the case of the Giraffe which is invariably met with among venerable forests, where innumerable blasted and weather-beaten trunks and stems occur, I have repeatedly been in doubt as to the presence of a troop, until I had recourse to my spyglass, and on referring to my savage attendants I have known even their optics to fail, at one time mistaking these dilapidated trunks for camelopards, and again confounding real camelopards with these aged veterans of the forest."* Mr. Vaughan Kirby says: "They stand perfectly still, not even swishing their tails like wildebeeste, and thus bringing about instant recognition; their mottled or dark colour, great height, and comparatively narrow bodies give them a striking resemblance to the many old vari-coloured relics of the forest, blasted by lightning or by bush-fires."† Col. Pollok attributes the same habits to the Indian Elephant (*Elephas indicus*):—"If nature has not given intellect to these animals, it has given them an instinct next thing to it. One has only to hunt them in their wilds to learn how wonderfully Providence has taught them to choose the most favourable ground, whether for feeding or encamping, and to resort to jungles where their ponderous bodies so resemble rocks or the dark foliage that it is most difficult for the sportsman to distinguish them from surrounding objects."‡ Gordon Cumming relates a similar experience in South Africa with regard to *Elephas africanus*:—"The ashy colour of his hide so corresponds with the general appearance of the grey thorny jungles which he frequents throughout the day, that a person unaccustomed to hunting Elephants, standing on a commanding situation, might look down upon a herd and fail to detect their presence."§ An even stronger case, or more pronounced opinion, as to active mimicry is given by the American naturalist E. S. Thompson, and a Fox is the animal referred to:—"A fire had swept the middle of the pasture, leaving a broad belt of black; over this he skurried till he came to the unburnt yellow grass again, when he squatted down and was lost to view.

* 'Five Years' Hunting Adventures in S. Africa' (compl. pop. edit.), p. 132.

† 'In Haunts of Wild Game,' p. 337.

‡ 'Zoologist,' ser. iv. vol. ii. p. 167.

§ 'Five Years' Hunting Adventures in S. Africa' (compl. pop. edit.), p. 132.

He had been watching us all the time, and would not have moved had we kept to the road. The wonderful part of this is, not that he resembled the round stones and dry grass, but that he *knew he did*, and was ready to profit by it.* According to Livingstone's observations on a small Antelope named "Tianyáne":—"When the young one is too tender to run about without the dam, she puts one foot on the prominence about the seventh cervical vertebra, or withers; the instinct of the young enables it to understand that it is now required to kneel down, and to remain quite still till it hears the bleating of its dam, If you see an otherwise gregarious she-Antelope separated from the herd, and going along anywhere, you may be sure she has laid her little one to sleep in some cosy spot. The colour of the hair in the young is better adapted for assimilating it with the ground than that of the older animals, which do not need to be screened from the observation of birds of prey."† "Rabbits open their nesting burrows and suckle their young by night, closing them lightly with earth again when they leave them. I had a nest under close observation last spring, and was much interested to find that its owner scattered some old hay from a Sheep foddering-station close by, over the mould with which she filled the entrance to the burrow every time she left it, a procedure which materially lessened its chances of being discovered."‡ We can find another example in the East. In the South Mahratta country, according to Sir W. Elliot, it is a common belief of the peasants that in the open plains, where there is no cover or concealment, the Indian Wolves (*Canis pallipes*) scrape a hole in the earth, in which one of the pack lies down and remains hidden while the others drive the herd of Antelopes over him.§ The usual colour of these animals is a greyish fulvous, generally with a brownish tinge, so that active or aggressive mimicry is thus obtained. A similar explanation may be applied to the fact described by Capt. Scannon respecting the Californian Sea-lion (*Otaria gillespii*). This animal, when in pursuit of a Gull, "dives deeply under water, and swims some distance from where

* 'Wild Animals I have Known,' p. 193.

† 'Mission. Travels and Researches in S. Africa,' p. 209.

‡ Richd. Kearton, 'With Nature and a Camera,' p. 180.

§ Cf. Lydekker, 'Roy. Nat. Hist.' vol. i. p. 500.

it disappeared, then, rising cautiously, it exposes the tip of its nose above the surface, at the same time giving it a rotary motion like that of a water-bug at play. The unwary bird on the wing, seeing the object near by, alights to catch it, while the Sea-lion at the same moment settles beneath the waves, and at one bound, with extended jaws, seizes its screaming prey, and instantly devours it.* Waterton has given a very similar suggestion. Beneath some agitated birds, and in the long grass, he saw what was apparently "a pale green Grasshopper," fluttering as though entangled in it. "Nothing more remained to be done but to wait in patience till it had settled, in order that you might run no risk of breaking its legs in attempting to lay hold of it while it was fluttering—it still kept fluttering, and, having quietly approached it, intending to make sure of it—behold, the head of a large Rattlesnake appeared in the grass close by. . . . What had been taken for a Grasshopper was, in fact, the elevated rattle of the snake."† Aflalo has remarked:—"The snake's power of fascinating birds is another moot point, on which Dr. Stradling has offered about the best suggestion, fully endorsed in Miss Hopley's charming book. His opinion is that the birds mistake the quivering tongue for a worm or insect, and that organ, considered by the ignorant to be endowed with 'stinging powers,' may consequently act as a bait to lure the incautious food within reach of the fatal jaws."‡ The Tree-Frog (*Hyla*) is of a light green colour when seated upon a light green leaf, but becomes dark brown when transferred to dark surroundings. "Hence this animal adapts itself to the colour of its environment, and thus gains protection from its enemies."§

* Cf. J. A. Allen, 'Hist. N. Amer. Pinnipeds,' pp. 301-2.

† 'Wanderings,' Wood's edit., pp. 166-7.

‡ 'Sketch of the Nat. Hist. Australia,' p. 161.

§ Weismann, 'Lectures on Heredity,' &c., Eng. transl., 2nd edit. vol. i. p. 309.—Weismann adds:—"That the chromatophores do not themselves react upon the direct stimulus of light was proved by Lister ('Phil. Trans.' vol. cxlviii. 1858, pp. 627-644), who showed that blind Frogs do not possess the power of altering their colour in correspondence with that of their environment."

(To be continued.)

NOTES AND QUERIES.

AVES.

Abundance of the Song-Thrush near Bradford.—The chief ornithological feature of the year in this district has been the immense number of Song-Thrushes (*Turdus musicus*) which have bred, in marked contrast to the years 1880 and 1881. As a rule, even in mild winters and late autumn, not many are to be seen here; but on the approach of spring, mostly in February, immigrants arrive, many of which withdraw sooner or later, according to the state of the weather, to breed probably in higher latitudes. This year, at the beginning of February, a larger number arrived than usual; most of the fields in the neighbourhood of woods were literally covered, and, contrary to what usually occurs, a large majority remained to breed. Having visited the woods almost daily during the breeding season, one could not fail to be struck with their abundance; indeed, it was a matter of common knowledge even to casual observers, and we hardly ever came into contact with any gamekeeper who did not repeatedly mention this fact. Another peculiarity was that a greater proportion of nests were built on the ground, and had larger clutches of eggs than in average years. If boisterous winds prevail in early spring a greater proportion of nests are built on or nearer the ground, or on more shielded places than would otherwise be the case; but, taking this factor alone into consideration, will not account for the exceptional phenomena of the present year. It is hardly conceivable that this large addition in numbers was bred here last year, and we cannot account for it except on the supposition that for some reason or other these birds remained here to breed, but under more favourable conditions would have bred in more northern latitudes. It would appear that some species of birds are more prolific in the north, and it is not at all unreasonable to suppose that many species of birds would be less strictly arboreal in their habits; but, be this as it may, the fact recorded requires explanation. It would be interesting to ascertain what are the habits of this species in more northern latitudes. Five eggs is the usual clutch in this district, but frequently four is the complement. Six is an exceptional number (one instance only this year has come to our knowledge), but even this latter number is sometimes exceeded. Whilst on this subject it may be said *en passant* how very different are the habits

of some species of birds even within a very limited area. An immense number of Missel-Thrushes' nests have come under our observation, but never one, in this district, has been built in any other situation than either in trees or bushes, very seldom comparatively in the latter. On the other hand, this species breeds not uncommonly in walls on the moors a little to the north of Bolton Woods, in Wharfedale, which are also well wooded—chiefly pine and larch with little or no underwood—and only some twenty miles in a bee-line north of this place. Both the Song- and Missel-Thrush are met with in much more varying numbers during the breeding season than the Blackbird, and in winter—even the severest winters—a much greater number of the latter remain compared with the number which obtains during the breeding season. — E. P. BUTTERFIELD (Wilsden, near Bradford).

Abnormal Nesting Sites of the Willow-Wren.—With reference to Dr. A. G. Butler's note on highly-placed nests of the Chiffchaff, I may mention that I have frequently found them situated as much as four feet from the ground, but never higher; a pair built for several years in succession in the top of a box-tree, a little over four feet, in the garden of a friend of mine. During the last spring and summer I have seen three nests of the Willow-Wren (*Phylloscopus trochilus*) in situations which, in the case of two of them, are unique in my experience. One was placed five feet from the ground in a spruce-fir, surrounded by a wild rose bush, built on a flat bough of the spruce, and entwined in the twigs of the rose. Of the other two, which were within a mile of each other, one was placed in an old Marsh-Titmouse's nesting-hole in the top of an old gate-post, 4 ft. 6 in. from the ground; and with regard to the other, a Robin built early in the year in a large hole in a wall five feet from the ground, and safely reared its young. Shortly after the nest was appropriated by a Willow-Wren, which domed over the old nest, and plentifully lined it with feathers. This bird also safely reared her young. I saw all nests, eggs, and old birds, and a friend took excellent photographs of the bird that built in the Robin's nest, feeding her young, in various positions. — OXLEY GRABHAM (Heworth, York).

"Chiffchaff building on the top of small Yew and Box Trees."—In this district Chiffchaffs rarely, if ever, build on the ground; I have found upwards of thirty nests in a season, but have never seen one quite on the ground, although sometimes it is only raised a few inches in brambles or other low-growing plants. I have many times seen nests in box trees from three to six feet high, but have only once found a Willow-Wren's nest that was not on the ground; in this case I caught the female, and sent it to Mr. Dresser to be quite sure of my identification. It has

always struck me as very curious how the nesting habits of birds change in different localities. With us the Willow-Wren almost always builds its nest on the ground; in fact, in twenty years I have only once known an exception, whereas on the Spey side last year I found as many nests in bushes, &c., off the ground as I found on it. The highest nest I saw was quite twelve feet from the ground in the ivy on a house. The Chiff-chaff with us always breeds on the ground (at least, I know of no exception). Dr. Butler's experience is different. — HEATLY NOBLE (Temple Combe, Henley-on-Thames).

Tree-Creeper nesting in Roof.—During the winter we have often seen a pair of Tree-Creepers (*Certhia familiaris*) on the big trees on the lawn here, and once or twice they were seen running up the side of the house, which is sand-dashed. On May 17th, when on the lawn, I saw one settle on side of house, and run up the wall; there is a greenhouse standing from the house, the top of the wall being covered with sheet lead, and the bird went in under this. I procured a ladder, and found a nest built on top of bricks against the wall of house. It is within four feet of a bedroom window, and close to the top of one of the drawing-room windows: a snug, dry, and warm place, but an unusual one for a Tree-Creeper.—J. WHITAKER (Rainworth, Notts).

Abnormal Nesting Place of Spotted Flycatcher.—Last year (Zool. 1898, p. 429) I recorded the finding of a nest of the Spotted Flycatcher (*Muscicapa grisola*), built inside that of a Swallow's. It may be interesting to readers to know that on May 11th last, in an old cowshed three hundred yards from the gruff-hole, I again found a nest of the Swallow tenanted by Flycatchers; a frail nest was built inside containing three eggs. The sitting bird flying from the nest led to the discovery. It seems remarkable to me that in the same small area, on two occasions, a pair of these birds should occupy a nest of the Swallow for the rearing of their offspring. Of course, I do not know whether they were the same pair of birds. Would this habit be inherited by the offspring? — STANLEY LEWIS (Wells, Somerset).

Hobby in Westmoreland.—I am sorry to say that a poor little Hobby (*Falco subbuteo*), an immature bird, was shot by a keeper in M. Ikinthorpe Wood, Westmoreland, about the 24th of August. The Hobby is of rare occurrence in Lakeland; I do not recall any other specimen as having been killed in Westmoreland, though a few Cumbrian Hobbies exist in local collections. It is possible, nevertheless, that the recent specimen (which I have added to the Carlisle Museum) may have been bred in the district in which it came to its untimely end. Our excellent taxidermist, Mr. Hope, of Penrith, informs me that his father once killed a pair of Hobbies at their

nest in Penrith Beacon, and took the eggs from the nest. The eggs were to be seen in a local collection until quite recently.

May I venture to remind distant friends that after Dec. 31st my address will be the Rectory, Pitlochry, Perthshire? I mention it to obviate the necessity of letters being redirected. I shall continue to work for the Carlisle Museum, and to record notes of Lakeland animals; but I shall no longer be an actual resident *in* Lakeland. — H. A. MACPHERSON (Allonby, near Maryport).

Black-game in Suffolk. — I have been informed by Sir Cuthbert Quilter that a Blackcock (*Tetrao tetrix*), in immature plumage, was killed by his son, Mr. Eley Quilter, during a Partridge drive on the Cliff Farm, near Woodbridge, about two miles south-east of the town, at the end of last October. It would be interesting to know the history of this juvenile wanderer.—E. A. BUTLER (Plumton House, Bury St. Edmunds).

The Moor-hen (*Gallinula chloropus*) nesting in Trees.—During the past breeding season I found three nests of this species in pollard trees from six to ten feet above the water, all containing eggs. Mr. Summer's gamekeeper in this neighbourhood has lately informed me that on Lord Ilchester's estate he has taken the eggs of the Moor-hen from an old Ring-Dove's nest twenty feet high, in a spruce-fir tree.—STANLEY LEWIS (Wells, Somerset).

The Storm-Petrel (*Procellaria pelagica*) flying at Light.—On the night of Nov. 24th, whilst exercising search-lights in Gibraltar Harbour, two Storm-Petrels flew into an officer's cabin through the port. The cabin was situated just beside a search-light, and by it the birds were probably half-blinded, which accounts for their action. The night was dark and stormy. I have never heard of this species behaving in this manner previously, nor have I ever seen it about Gibraltar before.—K. HURLSTONE JONES (H.M.S. 'Repulse,' Channel Squadron).

[I captured a specimen of this species on board the U.S. 'Norman,' when returning from the Cape in 1896, at the commencement of the month of October, near the Cape Verde Islands. It was also probably attracted by the many lights, and was easily caught.—ED.]

Notes from Rainworth.—Late Stay of Fieldfares: We had Fieldfares (*Turdus pilaris*) here at Rainworth till May 15th. Common Scoter: A male of this species (*Ædemia nigra*) was shot on the large piece of water at Lamb Close, near here, in September, by Mr. Barber. Rough-legged Buzzard: One of these fine birds (*Buteo lagopus*) was about here in March for six weeks. I saw it several times near the house over the lake, and admired its beautiful flight. One time two Herons were on the

wing near it, and looked about the same size. — J. WHITAKER (Rainworth, Notts).

PISCES.

Anchovy at Yarmouth. — A very fine example of the Anchovy (*Engraulis encrasicolus*) was taken in a drift-net amongst Herrings, and brought in on Oct. 2nd; length, $7\frac{1}{2}$ in. Dr. Day says it rarely exceeds $6\frac{1}{2}$ in. Another about the same length was brought to me salted on the 31st. Although the numbers of Herrings taken off Yarmouth this season have beaten the record, fewer stranger fishes, *e. g.* Shads, Pilchards, and even Sharks, have been caught or seen than in other years; and a similar remark applies to the Cetacea. — A. PATTERSON (Ibis House, Great Yarmouth).

Food of the Eel. — An excellent observer, Richard Holme, of Rusland, informs me that he has seen an Eel swallow a fresh-water Lamprey, tail first. He has also more than once watched an Eel attempting to catch small Trout (or other young *Salmonidæ*) by snatching at them as they passed by. Once he saw an Eel actually catch one. These notes refer to the stream known as the Rusland Pool. — CHARLES F. ARCHIBALD (Rusland Hall, Ulverston).

[According to Capt. Williamson, an old well-known angling author, "Eels swallow fishes head-foremost." — ED.]

EDITORIAL GLEANINGS.

WE recently (*ante*, p. 478) drew attention to the forthcoming publication of a series of volumes on the Fauna of South Africa, and mentioned that the first volume would be on the Birds, and written by Dr. Stark. News has unfortunately just been received of the violent death of Dr. Stark, caused by a shell at Ladysmith during the Boer bombardment of that British town. Dr. Stark was the eldest son of the late Mr. John Cowell Stark, of Torquay. He was educated at Blundell's School, Tiverton, and at Clifton College, with a view to becoming a civil engineer. Comparatively late in life, however, he determined to become a doctor, and he matriculated at Edinburgh University. For ten or a dozen years he had been prominently identified with life in South Africa. He had a practice at Capetown, and he was well known and respected at the Cape and in Natal. The deceased gentleman had travelled extensively, not only in South Africa, but in Spain, Morocco, Turkey, and other countries. He was an ardent naturalist and accomplished ornithologist, and possessed a splendid collection of birds of prey. Dr. Stark was recently in England, and only returned to South Africa last September. Whilst he was at Durban war was declared, when he volunteered for service in assisting the wounded, and was placed in charge of an ambulance.

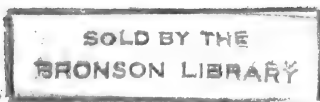
A WELL-KNOWN and highly respected officer will be missed from the entomological library of the British Museum in the person of Mr. John Saunders, who has been connected with that establishment for nearly sixty years. In 1840, Dr. J. E. Gray applied to the schoolmaster at Hounslow for a boy who could "write a good plain hand," and young Saunders, though barely thirteen years of age, was nominated for the post, and entered on his duties in September of that year. The British Museum—then Old Montagu House—much impressed the young assistant by the fine old entrance-gate with its massive iron knocker, and on each side of the gate a sentry-box and a grenadier with fixed bayonet. There was also a gateporter to open and shut the gate during the day, and three watchmen on duty during the night, who alternately every hour from 9 p.m. to 6 a.m. walked round with club and lantern, and called the hour, "All's well." His first occupation was in assisting Dr. Gray in soaking off the Mollusca from old tablets of a very miscellaneous size, and placing them on new ones, previously to their being properly named. In 1847 he was appointed to

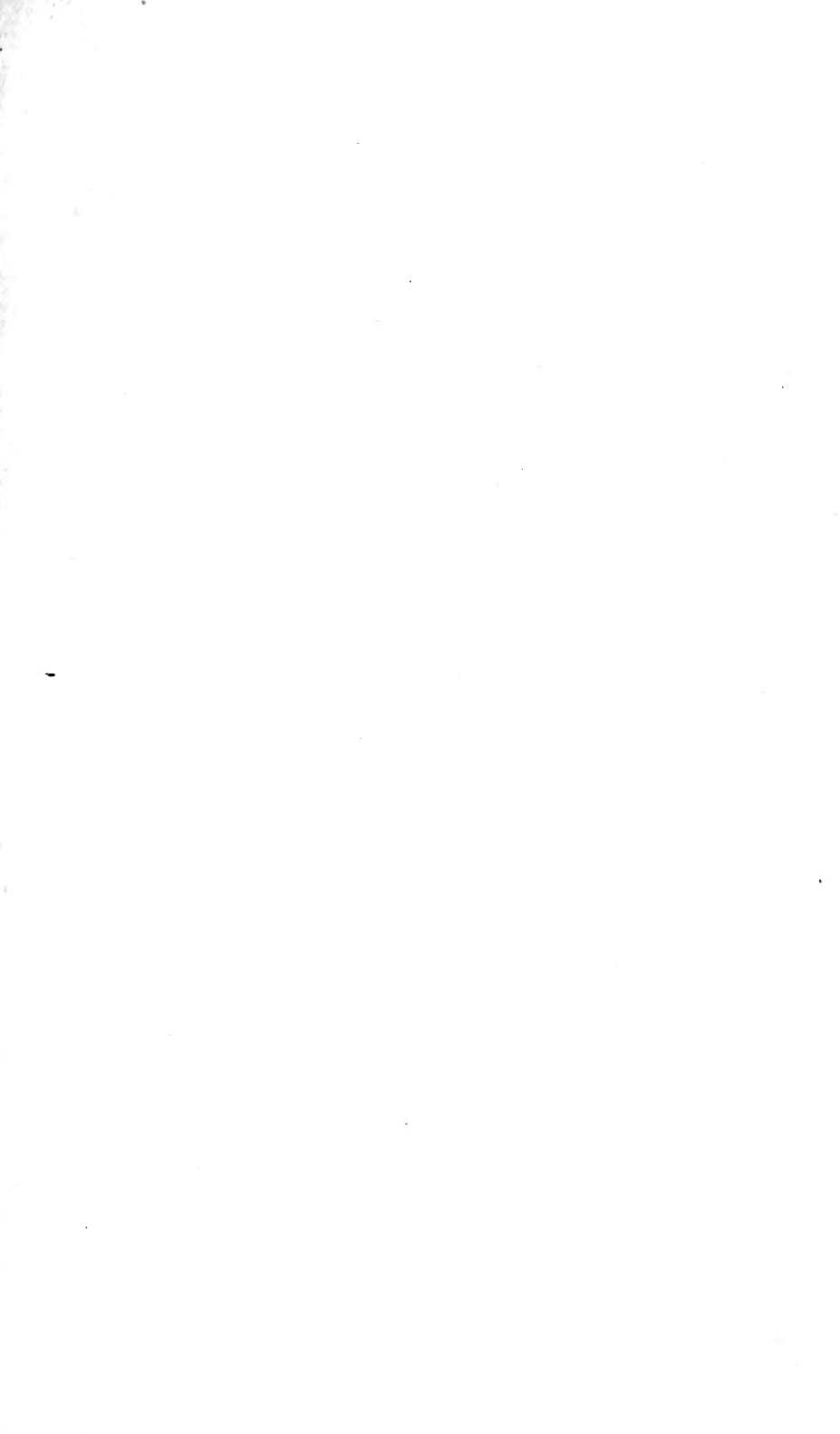
overhaul the osteological collection, registering, &c., till 1857, when he was transferred to the insect room, and took charge of the library, at that time very small compared with its present dimensions. Thus Mr. Saunders has largely witnessed the evolution of our Zoological Museum, and retires on a moderate pension incidental to a never highly paid position. He has always been greatly esteemed, and the Museum staff presented him with a testimonial on his leaving, which was handed over to him in appreciative terms by another veteran of the establishment—Dr. A. Günther.

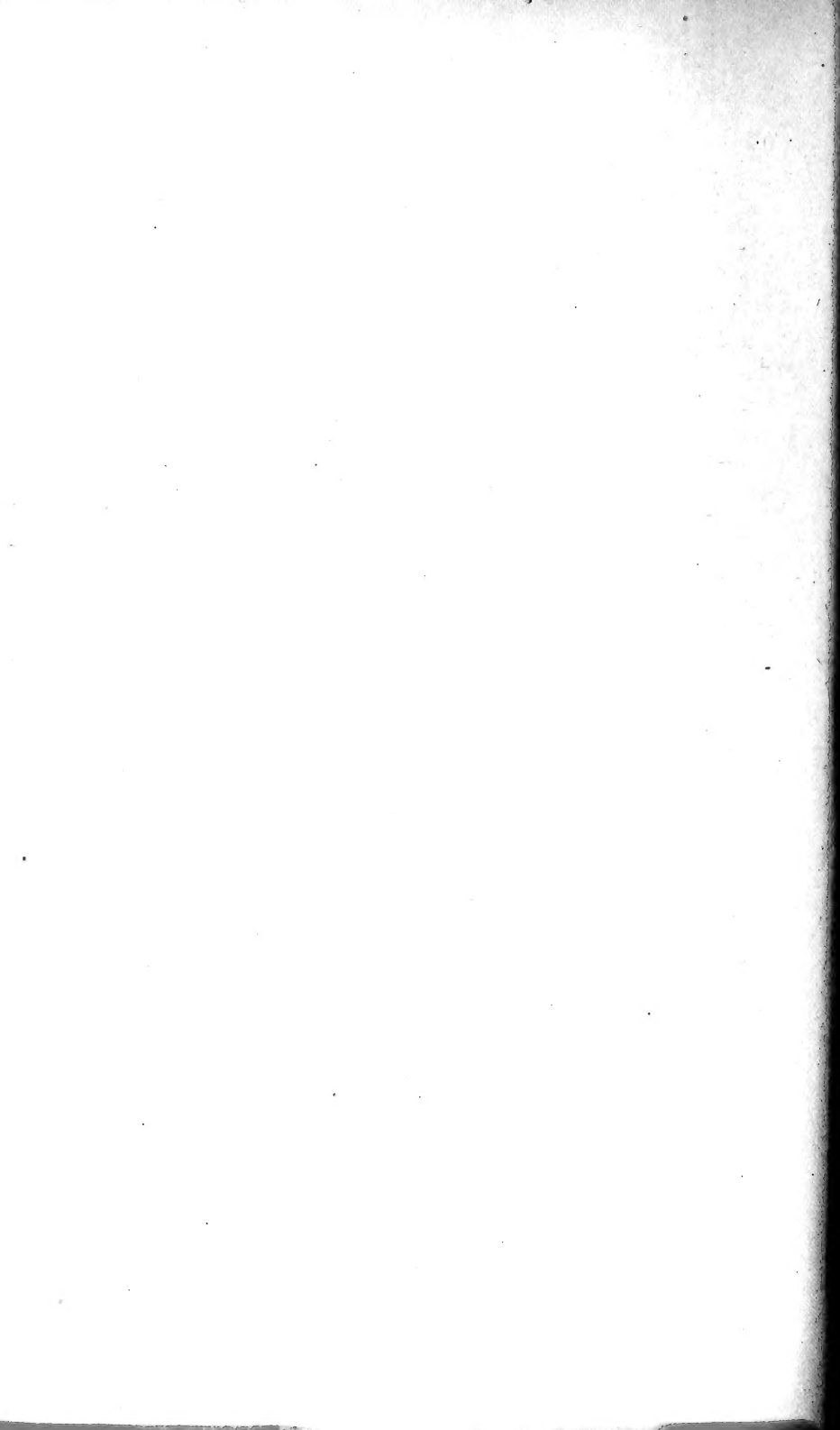
ON the occasion of the unveiling of the monument dedicated to Johannes Müller, which took place on Oct. 7th at Coblenz, the daughter of the celebrated zoologist presented to the Stadtbibliothek fourteen volumes of drawings, containing upwards of nine hundred zoological sketches made by her father in the years 1850–1854 in various countries.

MR. HENRY O. FORBES, the Director of the Liverpool Museums, has issued his Report upon the Scientific Expedition to the Island of Sokotra during 1898–1899, which, under the generous auspices of the Royal and Royal Geographical Societies of London, and of the British Association, in conjunction with Mr. Ogilvie-Grant, representing the British Museum, he undertook at the direction of the Committee for investigating and making collections of the natural history of that island. The Director truly observes, “that among scientific circles, especially among geographers and biologists, there has everywhere been expressed the warmest appreciation of the liberality and public-spirited action of the Liverpool Museum Committee and the Council in taking part in the exploration of Sokotra.”

The share of the results of the expedition which comes to Liverpool may be summarized as follows:—Of mammals, there are examples of one or two species of Rat, of one species of Civet Cat, of one species of Bat, and of the Wild Ass. Of birds, there are some three hundred specimens, out of which seven species have been diagnosed as new to science; a large series of reptiles has been acquired, which contains one genus and eight species new to Herpetology. Numerous Scorpions, Millepedes, and Spiders have been obtained, among which there turn out to be at least one new genus and seven new species; the land-shells number several thousands, of which Mr. Edgar Smith, of the British Museum, has already described eight species as new to his department of Zoology. Of insects—almost the whole of which were collected by Mr. Ogilvie-Grant—there are several thousands, which in butterflies have included a new species of a very beautiful and large *Charaxes*.







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