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## P R E F A C E.

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THE present volume affords practical proof—if such were needed—of the value of the information to be found in our “Notes and Queries.” Such a subject as the well-known and familiar perching of Starlings on the backs of Sheep would strike most of us as a tale that was told and required no repetition, but Mr. Stubbs has raised questions thereon which deal with locality of occurrence and race of the species which follows that habit (?). Other contributors have also made original suggestions, such as to the breed of Sheep thus frequented by the Starling (?), and also as to the object and consequences of the practice (?). With such an experience, who can undervalue the ultimate importance of observations which on their face value often appear trivial and trite? Our pages for 1912 also contain papers and notes on most branches of zoology; perhaps, however, British Mammals have found fewer observers and recorders. If the “proper study of mankind is man,” we still receive no notes on the genus *Homo*, nor records of finds of his ancient weapons or utensils, nor details of discovery of early burials. These subjects are not outside the purview of ‘THE ZOOLOGIST.’ Neither is general palæontology—especially so far as Britain is concerned—foreign to our pages.

Perhaps nothing in the editorial range of duties is more painful than that of annually recording those who have fallen from our ranks, some being personal friends, at least all well known as naturalists. This year three valued contributors

to these pages have passed away : E. A. Fitch, W. F. Kirby, and R. W. C. Shelford. From the ornithological circle, A. O. Hume, J. G. Keulemans, and W. B. Tegetmeier are now absent.

In the literature of 1912 several additions to our British faunistic publications have appeared. Mr. Hugh S. Gladstone has given us 'A Catalogue of the Vertebrate Fauna of Dumfriesshire.' The two volumes on 'Studies in Bird Migration,' by William Eagle Clark, may be said to have more than brought that subject to date. The 'Hand-list of British Birds,' by Messrs. Hartert, Jourdain, Ticehurst, and Witherby, is a publication that denotes a future nomenclature. Mr. G. Bolam has published his welcome 'Birds of Northumberland and the Eastern Borders.' In British entomology we have had two good volumes—'British Plant-galls,' by E. W. Swanton, and the 'Humble-bee,' &c., with descriptions of all the British species of *Bombus* and *Psithyrus*. Major Barrett-Hamilton's 'History of British Mammals,' and Mr. Kirkman's 'British Bird Book' still continue to appear regularly in their now well-known sectional parts; while at the very end of 1911 Mr. Claude Morley published his fourth volume of 'Ichneumonologia Britannica.'

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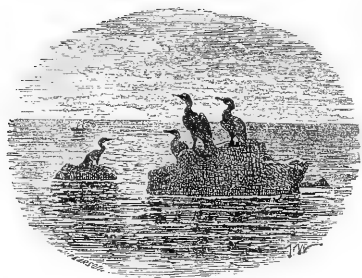


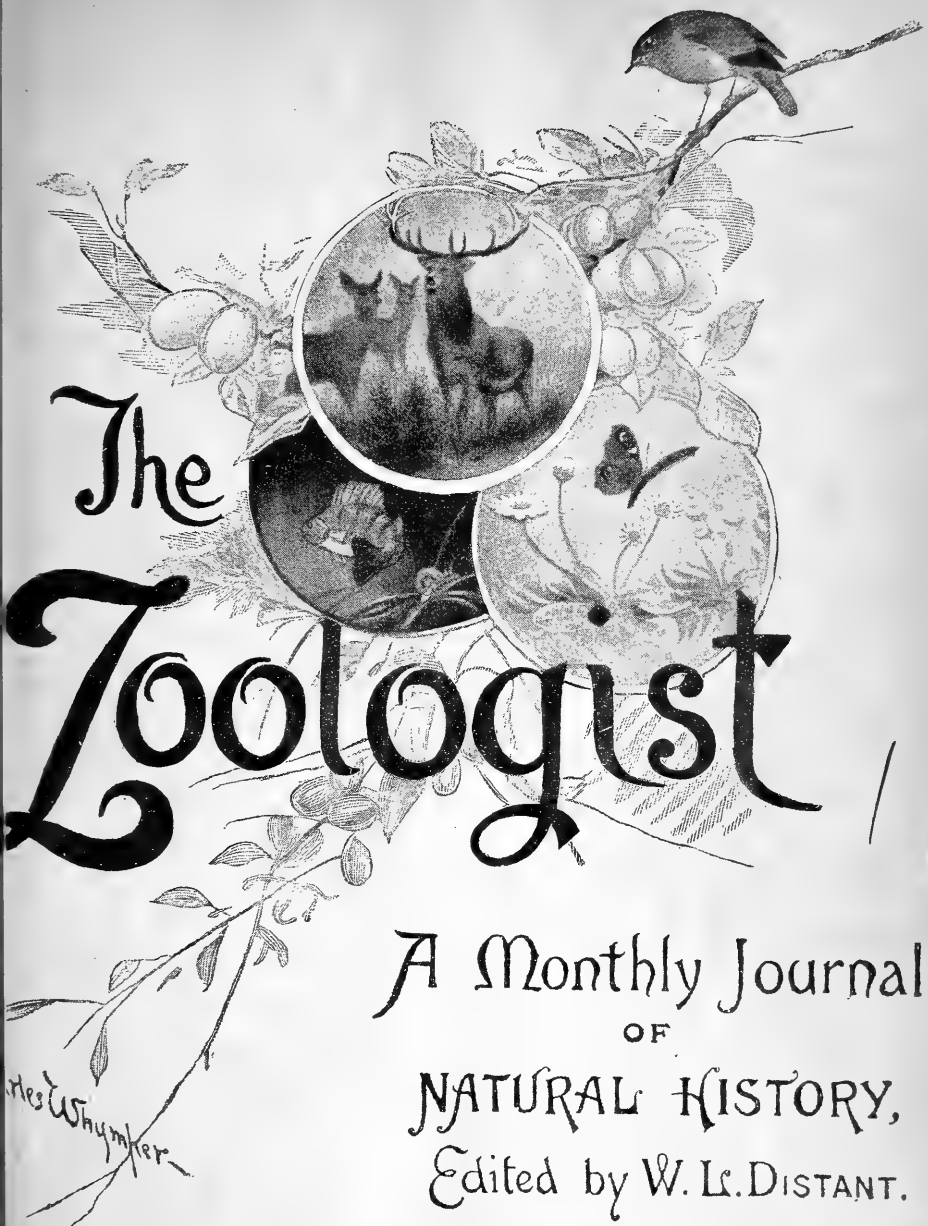
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# THE ZOOLOGIST

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No. 847.—January 15th, 1912.

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## THE PREHISTORIC ORIGIN OF THE COMMON FOWL.\*

BY FREDK. J. STUBBS & A. J. ROWE.

It is a remarkable fact that ornithologists, as a class, are so ignorant of the bird which is beyond doubt of the most importance to the human race. The vast literature relating to the culture of the Common Fowl is seldom scientific in its treatment, and those archæologists who have written on its ancient history, or the anatomists who have analysed its structures, seldom show any wide knowledge of this species generally. Even Professor Newton, in his authoritative 'Dictionary of Birds,' is content to dismiss this important bird by the repetition of certain old phrases that are, in spite of their tenuity, quite misleading to the student.

The vague modern idea is that the home of the Fowl is in and near India, that it reached us *via* Persia, Greece, and Rome, and that it was not known either to the early Mesopotamians or the ancient Egyptians. We desire to present our reasons for differing from most of these opinions, and shall attempt to prove that the bird was well known to the earliest Egyptians and the Mesopotamians, and that the evidence relating to an Indian origin is more than doubtful.

\* Although *Gallus bankiva*, Temminck, is the best known name for this species, the strictly correct one in a matter of priority is *G. gallus* (Linné), and many authors have used *G. ferrugineus*, Blyth. In India it is known as the Red Jungle Fowl, or more often Jungle Fowl; and it is a noteworthy fact that in English-speaking countries it has no common name peculiar to itself, for Fowl, Hen, and Cock are often used in speaking of other birds. The plural Poultry is, of course, fairly definite.

*Zool. 4th ser. vol. XVI., January, 1912.*

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We find ourselves with such a mass of raw material that a full discussion of the distribution in time and space of the Fowl would take up far too much time. We shall therefore start our investigations at or about the fifth century B.C., when the bird was abundant throughout the known world, and work backwards from this date. Ornithologists have for so many years drawn their ideas of the Fowl's history from ancient Greek literature that it seems almost sacrilege to doubt these old authorities. Although the Greek writers have little information that could be used in the present discussion, we insert a few details here. Homer, for instance, mentions a man called "Alektron," and this scanty note appears to carry the history of the bird back a long way.\* Aristophanes, who lived about B.C. 450, mentions the Cock once or twice, and refers to it (l. 833) as of "Persian parentage" (ἄρνις ἀφ' ἡμῶν τοῦ γένους τοῦ Περσικοῦ), and as an ancient ruler of that country (l. 483). He mentions also the τετραο (l. 882), and in a note to Rogers's edition of 'The Birds' reference is made to a passage in the Ninth Book of Athenæus (58), in which this *tetrao* is described as "about the size of a Rook (? — σπερμολόγω is the word), of a brick colour, mottled with divers spots and large stripes; it feeds on fruits, and when it lays an egg it cackles." Laurentius (who in Athenæus quotes the above description from the second work on winged creatures by Alexander the Myndian) calls this the "small *tetrao*"; he has a specimen of the "large *tetrao*" outside, and brings it in for his guests to admire. It is "like the Porphyryon . . . and from its ears it had wattles hanging . . . and a harsh voice."

Quite clearly we have here descriptions of the male and female of the Fowl passing as two distinct birds, and this example serves to demonstrate the unreliability of Greek ornithology. Laurentius, it may be added, is quite sure his *tetrao* is *not* the Persian bird of Aristophanes! Of course, every naturalist will know that the wattles and the curious habit of cackling after oviposition do not belong to any member of the present family *Tetraonidæ*.

\* Dr. Leaf, in his important edition of the 'Iliad' (1900), gives reasons for holding this word *Electryon* (Book xvii. 602) to be unconnected with the Cock (cf. vol. ii. 256, and also i. 294).

Although ancient literature is so disappointing, ancient art abounds with reliable contemporary information of the Fowl, and it is hard to explain the ignorance of such authors as the one quoted above. The British Museum collections of Greek, Roman, Phœnician, and other antiquities are very rich in portraits of the cock. We see admirable groups of cocks fighting; cock and boy playing together; cocks and hens feeding; cocks being pursued by Panthers (surely this suggests that they were more or less wild); cocks being offered as sacrifices, or carried in the hands of the old gods. The student unable to examine the British Museum collections will find many excellent illustrations in such books as H. B. Walters's 'Terracottas in the British Museum,' and 'Catalogue of Bronzes in the British Museum'; B. V. Head's 'Coins of the Ancients,' &c.

It is a curious fact that the figure of the Cock does not make its appearance in Greek art until the seventh century B.C.—at least, we have not been able to find undoubted portraits of the bird. In the earliest Mycænæan pottery (from about B.C. 3200 onwards) animal forms are unusual, and generally too crude to be identified. When the Cock appears in the art of the Eastern Mediterranean it does so in company with traces of Oriental influence. This might suggest that the bird was introduced from the East at the same time, but there is more reason to believe that the art and not the subject-matter of the art was imported. It must be remembered that these early portraits of the bird are undoubtedly drawn from life (as in fig. 5 on p. 9, which is copied from a vase found near Athens), and the variety of compositions in which we find it pictured, and especially its connection with religious and mythological subjects, hardly agree with the possibility of the creature being a novel introduction.

We have not been able to measure the full importance of the Cock in Persian history. Aristophanes makes one of his characters say ('Birds,' l. 506):—"There is proof that in former days birds were the kings of men; first I will produce the Cock, who ruled Persia before the days of Darius or Megabazus, and still from that archaic rule he is called the Persian Bird." It seems likely, indeed, that the appearance of the Cock in western art had some connection with the influence of Persia. Aristo-

phanes never refers to it as actually introduced from Persia, but only as being of Persian parentage, and that it was abundant in his day is proved by the familiar manner in which he connects it with "tradesfolk of every kind who jump up at daybreak and commence work when they hear its voice."

The material at our disposal enables us to say that about the seventh century B.C. (when for all we know to the contrary India was not in direct communication with other nations) the Common Fowl was well known from the Atlantic through Sardinia, Italy, Sicily, the whole of Northern Africa, Phœnicia, Mesopotamia, Persia, China (it first reached China in B.C. 1400), and Japan.\*

Care must be taken not to misunderstand the words Fowl and Hen appearing so often in the Old Testament, for these may be but translations of the Greek *ὄρνις*. The Talmud (dating from about B.C. 200 onwards) has several most curious references to our bird, and, as the work is a repository of still older traditions, it possesses some value to the student of ancient history. It is the authority for the translation of the Hebrew *Burburim abusim* (1 Kings v. 3) into "fattened hens"—that is, the Common Fowl. In another place (Shab. 35 b.) it says that as the hen sleeps in elevated places, usually over chimneys, the lower eyelid overlaps the upper, in order to protect the eyes against smoke! But for further information the reader must turn to Dr. Ginzberg's article in the 'Jewish Encyclopædia,' iv. p. 138.

Some commentators have held that Nergal, the idol of the men of Cush (2 Kings xvii. 30), had the form of a Cock, but the probability is that a well-known Eagle-headed Assyrian deity has been confounded with this idol.

It is, however, to ancient Egypt that we must turn for our best knowledge of the ancestry of the Fowl. Some of the Grecian and Roman written history, as that which tells us that in Egypt "Yellow Cocks" were sacrificed to the jackal god Anubis, is not worth very much, for as a matter of fact there were no such sacrifices ever made. A little more attention can be

\* After carefully examining the statements for the occurrence of the Cock in ancient Mexican art, we do not hesitate in saying that a mistake has been made. A bird figured in Le Noir's great work has so changed under the pencil of the lithographer that it certainly resembles a Cock, but in the original French text it is called an Eagle.



given to the historian Diodorus Siculus, who has left us a long account of Egypt, in which he mentions (Biblio. bk. i. vi.) the methods of artificial incubation in use in the country during his own times (circa B.C. 60). He says they "keep poultry and geese, but, not content with the ordinary way of breeding, . . . force the young out with their hands with so much art and skill that it is done as effectually as by Nature herself." Sir J. G. Wilkinson, in his charming but absonant 'Ancient Egyptians,' accepts Diodorus without any hesitation, and he discusses at some length this business of artificial incubation, which is still flourishing in Egypt to-day. Both Greeks and Romans were peculiarly careless observers of biological subjects, and, although no doubt the old Sicilian was correct in the main, we do not wish to build on this evidence alone, more especially as he gives us no facts whatever concerning times before those in which he lived.

In later times, when Egypt became more under the influence of the nations towards the north, the Cock becomes a frequent figure in the alien art of the Delta, and we have seen many examples dating from about the sixth or seventh centuries B.C. Yet, on the other hand, Egypt must have influenced Europe in return, for in the Gem Room of the British Museum there is a small jasper seal (taken from a seventh century B.C. grave at Tharros, in Sardinia, then a Phœnician colony) bearing the figures of two men in Egyptian costume, a lotus plant, and a Cock. About 500 B.C. a boy playing with a Cock was a favourite subject with the artists in terracotta of the Greek and Phœnician colonies around the mouths of the Nile, but it is impossible to learn the exact root of the bird in these countries, for they were obviously open to the influence of many nations.

The ancient hieroglyphic writing of the Egyptians consists of pictures of animals, plants, and other objects; their number is very large, and at least five hundred were in constant use. During the very earliest times these signs were nearly all quite recognizable portraits, but at last they became conventionalized characters, and finally lost their first significance. There was also an alphabet, and in this the sound of U or W was represented by the figure of a chicken (*cf.* figs. 3 and 4). Heinrich Brugsch in his great work on this ancient language

(‘Hieroglyphisch-demotisches Wörterbuch,’ i. 238) distinctly terms this figure to be that of the young of the Fowl—“*das Hühnchen.*” Brugsch was certainly one of the very highest Egyptological authorities who has ever lived, but he was no ornithologist, and we think it will be wise to strengthen his opinion by evidence gathered from other sources.

We have examined carefully a vast number of the original signs, drawn or carved by scribes and sculptors from the earliest dynasties (B.C. 4400) to the time when the figure became a mere convention and finally disappeared (about the end of the Roman Period). Two typical examples have been figured for the benefit of those who have no acquaintance with the hieroglyphic writings. Now, it is impossible for any ornithologist to believe that the bird is not the young of some member or other of the Order *Gallinæ*, or Game-birds, and we cannot do better, after being settled on this point, than take the likely species in detail. There can be no question that the bird-life of the Nile Valley of to-day is far different from that of five or even two thousand years ago, but, with the exception of the status of one or two species that have nothing to do with the present question, we have no knowledge of the extent or the nature of these changes, and there are reasons for believing that certain kinds have remained stable.\*

Of existing Game-birds in Egypt, the Sand-Grouse—known to the ancient Egyptians as “The Skulking One”—comes first on our lists. One species (*Pterocles exustus*) is to-day a common bird, and was probably as common in the ancient times, for we see its portrait frequently on the monuments. The young of the Sand-Grouse, however, differs very considerably from the figures of our chicken, and can be passed over at once. The Francolin has been recorded for the Delta, but on doubtful authority, and we have no trace of it on the monuments. The same can apply to the Seese Partridge (*Ammoperdix heyi*), and the Andalusian Hemipode, both of which, however, have occurred in modern Egypt as rare stragglers. The only other Game-bird known in a wild state in the Nile Valley (of course, we confine

\* Cf. Shelley’s ‘Birds of Egypt’ for details of the ornithology of the Nile Valley of to-day.

ourselves to those parts of Africa inhabited by the dynastic Egyptians) is the Common Quail (*Coturnix communis*).

Unless the U sign be the figure of some bird that is now extinct—and we have not the slightest reason for thinking this to be the case—we are safe in ascribing it to the young of one of two species, the Quail or the Common Fowl. There are many reasons for dismissing the first-named bird. Although common in Egypt in winter, and on migration in spring and autumn, the great majority of the birds cross the Mediterranean to breed; few remain in the Nile Valley during the nesting season, and most of these are found towards the north of the country. It is quite clear that the figures of the earliest dynasties must have been made by scribes who were familiar with the originals. The chicken was one of the commonest signs, and is always wonderfully true to nature, but it is hard to imagine how the scribe could get his knowledge from so skulking a creature as the young of the Quail, especially when we remember that the nesting period of wild birds is limited, and that the space of two or three days would spoil the young bird for the use of the artist desirous of drawing a down-covered chicken. The Quail does not (so far as our experience carries us) appear on the monuments of Egypt, nor have we met with it in the literature, and we think it need not be considered in connection with the U.

Personally, we have not met with any portrait of either sex of the adult Fowl in the hieroglyphics. A doubtful sign that is a variant of the U may perhaps be intended for a hen, but this solitary occurrence is too vague to be useful. Wilkinson ('Ancient Egyptians,' i. 153) has described amongst the tribute paid by the people of Kufa, from the countries around Palestine, to Thothmes III. in B.C. 1550, a Rhyton, or drinking cup, fashioned in the form of a Cock's head; and the cautious way in which he approached the identity of another bird described and figured on the previous page leads us to take his authority for this early and important example.

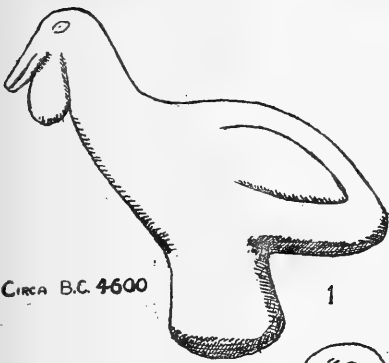
We have not been able to learn of more than two figures of the adult Fowl in the most ancient Egyptian art; both these are of the pre-Dynastic Period, and are rather doubtful creatures, but we append careful copies taken from photographs, and hope to show that we are not mistaken. The omissions of

common birds from the monuments are most peculiar. Even so striking a species as the Flamingo has only a very few times come to our notice, and the adult Pigeon has not been seen at all. There is a common sign—TCHA—that shows a nestling bird sprawling on its breast, beating its naked wings, and clamouring with wide-open mouth. We now suggest this is a young Pigeon. (A writer on the Egyptian origin of the alphabet actually called this bird a Duck!—'Recueil de Travaux,' tom. 23, p. 154.) Adolf Erman certainly called the UR sign—meaning "great," "old," and the like—the Dove; other Egyptologists have thought that it was a Sparrow, and the general opinion seems to lean towards the Swallow, but after comparing a good many examples we are inclined to believe that it cannot be anything else than the Pratincole (*Glareola pratincola*), still a common bird in Egypt.

Our first figure was held by its discoverer to be that of a Pelican, a finding with which few ornithologists are likely to agree. It was found at Hierakonpolis, and belongs to a period termed by Prof. Petrie "Dynasty O"—that is, the one previous to the so-called First Dynasty. The date would thus be before B.C. 4400. The figure (fig. 1) is a sort of "statuette" of green glazed ware, and is figured photographically and in line in Quibell's 'Hierakonpolis,' vol. i. pls. xxi. and xxii. Many other birds possess crests, but as the Common Fowl was peculiar in the possession of wattles, it is easy to understand how the artist insisted on figuring these to give character to his model, and we cannot be far wrong in thinking that this old artist or potter was inspired by the Common Fowl and by no other bird. In passing we may say that all the pre-dynastic remains found in Egypt are made after Asiatic archetypes.

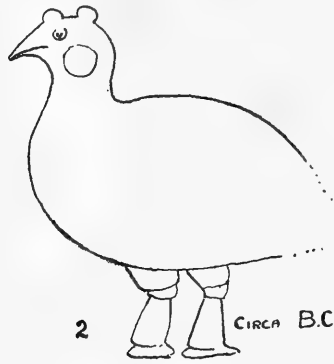
The second example belongs, curiously enough, to much the same period and to the same neighbourhood—Abydos, on the west side of the Nile, opposite Thebes. Some years ago there was a find of several "slates," with pictures relating to battles fought at or before the united monarchy under Menes in B.C. 4400. The known examples were described and well figured by Mr. F. Legge in the 'Proceedings' of the Society of Biblical Archæology, vol. 22, pp. 125-39 and 270. Reference may be made to the accessible 'History of Egypt,' by Dr. E. A. Wallis Budge

(vol. i. pls. 36 and 37), where one of these curious objects is figured and described. The bird now presented (fig. 2) has been



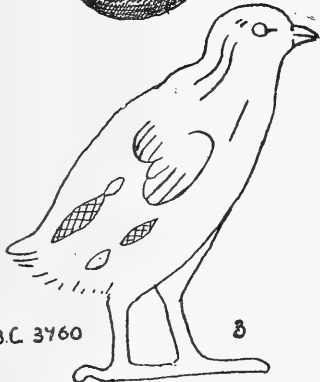
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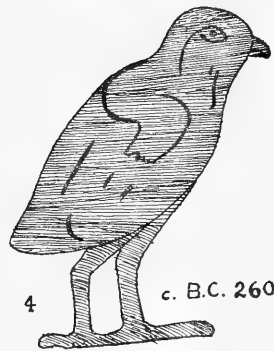
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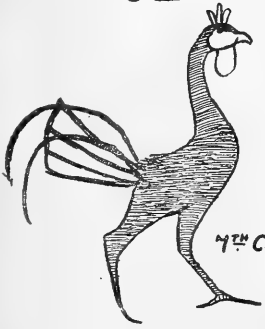
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4

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7<sup>th</sup> CENT. B.C.

5



6

5<sup>th</sup> CENT. B.C.

F.J. Stubbs del

carefully drawn from one of the excellent photographs accompanying Legge's article. As an ornithological illustration it

does not earn a high place, but we can draw attention to, first, its feathered feet; secondly, the presence of what is surely a wattle under the ear; and, finally, the suggestion of a comb on the head. When we have considered the other animals depicted on these "slates" (the Giraffe is one), and when we know how the "slate" would influence the treatment of the subject by the artist, we feel pretty confident in ascribing this nameless bird to *Gallus bankiva*. It must be remembered that the chicken sign occurs frequently on these pre-dynastic remains.

At this point we may review our position. The evidence relating to the first seven hundred years B.C. around the Mediterranean needs no discussion. In Egypt we have the sign of the chicken from the earliest known times. We give our reasons for thinking that the bird is the young of the Fowl, and not that of the Quail; we know the bird was present in Egypt in later times, a few centuries B.C.; and we have the evidence from pre-dynastic remains that the adult bird was then in existence. Having thus carried the history of the Fowl baëk prior to B.C. 4400, the next step is to inquire how it reached Egypt.

Egyptologists have long since proved that the dynastic Egyptians were not autochthones, but invaders from Western Asia. The subject has been discussed in an erudite and interesting manner by Dr. E. A. Wallis Budge in his 'History of Egypt.' The date of the invasion was about B.C. 4400, and, if we allow a couple of centuries for the migration, we get back to the date B.C. 4600 as that in which the invaders left Mesopotamia. They carried their language with them and (what is more to the present study) carried also several Asiatic plants and animals. The Camel, Horse, and Sheep offer one or two puzzling points. A figure of the Camel was found in a pre-dynastic grave, but no mention is made of the animal in the hieroglyphics until the Eighteenth Dynasty (B.C. 1300), when it is referred to under the Semitic name of *Kamaal* in an ancient Egyptian work entitled 'Travels of an Egyptian.' The writer of this papyrus records seeing the animal during his visit to the land we now know as Palestine. The Horse also appears for the first time in the hieroglyphics of the Eighteenth Dynasty, during which period it was brought from Mesopotamia.

The Sheep appears to be identical with the "Ram of Khenmu," which appears in the writings for 2500 years, long after the animal itself had died out. Some authors have considered it to be a species of native Sheep long since extinct, but it is more reasonable to suppose that it was but an introduction from Asia, for we have no evidence pointing to the existence of any species of Sheep in Africa other than the anomalous case of the Barbary Sheep in the north-west of the continent.

Both wheat and barley are unquestionably of Asiatic origin, and these were unknown in Egypt until the time of the invasion of six thousand years ago. Prof. Schweinfurth and M. de Morgan have placed this matter beyond doubt, and De Candolle (*Hist. Cult. Plants*) thinks that the flax was introduced also. Apart from this biological evidence we may use the fact that peculiarly formed mace-heads are found in the early dynastic tombs. Now, these implements are not to be distinguished in any way from those found in similar situations throughout Babylonia. In Budge's 'History,' vol. i. there is a figure of one of these weapons, and amongst the details of the carving we get the sign of the Chicken.

Although it is quite certain that the ancient Egyptians came from Babylonia, we are not so certain as to the original home of the great parent race, although we have every reason to believe it was in some part of Central Asia. They are said to have settled in the country surrounding the Tigris and the Euphrates so far back as B.C. 8000, and are said also to have come from the north. Perhaps the true home of the Fowl was in Central Asia, but the present writers' knowledge of Mesopotamian language and history is too slight to enable them to trace the Fowl beyond B.C. 5000, and at this date we may leave it as being under domestication in the vicinity of the Tigris and the Euphrates.\*

We know absolutely nothing of India at this period. It is certain that it was peopled by immigrants from Western and Central Asia, but the date is not even approximately known. The earliest history of the commerce between India and the western nations has been carefully gathered by Mr. J. Kennedy ('Journal' of the Royal Asiatic Society, 1898, pp. 231-288);

\* Layard's 'Nineveh,' ii. 395, includes a figure that must be either Cock or Pheasant. The original work, if available, would be well worth close examination.

this writer brings evidence to *suggest* that traffic between Babylonia and India was in existence between B.C. 700 and B.C. 300. It is true he remarks that for all we know to the contrary it commenced centuries before this date, and, again, it may not have begun until B.C. 300 at the earliest. About the seventh century B.C. we find a marked Oriental influence in Greek art. The purely eastern *Swatsika* design (a sort of cross with the end of each arm bent at right angles) now appears on such objects as vases, and the figure of the Cock becomes very common. It is just possible that this artistic change marks the date of the commencement of intercourse between India and the western nations, but the whole question is extremely vague.

One thing is clear, however: seven thousand years ago the Fowl was known in Mesopotamia, yet it did not reach China until four thousand seven hundred years after this date, and is not known in India until many centuries afterwards. We think this huge gap of time disposes at once of the theory of an Indian origin for the bird. The actual evidence for the ornithological view of to-day that the Fowl originated in India is extraordinarily flimsy, and, on analysis, in no way convincing. The main point seems to be that it is found in Eastern India in a thoroughly wild state, but so far as we can learn, the question of it being feral in these places has not been even mentioned by ornithologists. It is a matter of common knowledge that perfectly wild *Gallus bankiva* exist in many tropical and subtropical parts of the world, where their origin can be traced back to recent introduction. After a few generations of liberty the bird becomes perfectly indistinguishable from the Jungle Fowl of India. Some naturalists have laid undue stress on the different voices of these feral birds, but it would be unwise to build too much on this, for many years ago Captain W. Allen (Narr. Niger Ex. ii. p. 42) described how the birds introduced by shipwreck to an island off the West Coast of Africa, and become quite wild, had "a cry quite different to that of the domestic fowl." It is most unfortunate that ornithologists have been so unready to include feral species in the compilations of faunas; in England we find that such birds as the Canada Goose, common and perfectly wild in a county, almost or quite ignored because they are not indigenous, and we see the same thing in searching the literature



of *Gallus bankiva*. It is thus difficult to learn its exact status as a wild bird, but we have records for every continent except Europe, and should be not in the least surprised to hear of feral colonies even here. As a rule, however, it becomes best established on subtropical islands.

Irwin, in his "Memoir of Afghanistan" (J. A. S. B. viii. p. 1007), says that "the Common Fowl is found in its wild state in the whole of Turkestan, especially Balkh." Blyth ('Ibis,' 1867, p. 156) commented that "surely this is a mistake"—because, of course, he believed that the bird could hardly be wild except in what, after the manner of all other ornithologists, he held to be its native home. The present writers have strong reasons for believing that the Fowl was carried to Mesopotamia from Central Asia, and although the evidence is as yet too scattered for publication, the opinion may be given in connection with Irwin's interesting note.\*

It may be well to give the present distribution of *Gallus bankiva* from an ornithological point of view (Ogilvie Grant, Cat. Birds Brit. Mus. vol. xxii. p. 346):—"The jungles of North-eastern and parts of Central India, ranging south through the Malay Peninsula, east through Siam to Cochin China and Hainan; it also occurs in a wild state in Sumatra, Java, Lombok, Timor, Celebes, Palawan, and the Philippines." In 'Game Birds,' a subsequent work by the same author, it is suggested that the Fowl may be feral in the last-mentioned localities. As we have said, it occurs also, and equally wild, in many other parts of the world. We cannot find any records for the west coasts of India. Here we get the Grey Jungle Fowl (*Gallus sonnerati*) that is apparently quite wild, and seems never to have been domesticated; it differs very much from *G. bankiva*. The present distribution of the Common Fowl, together with our knowledge of Indian commerce with western nations, certainly assists in dismissing all ideas of an Indian origin.

As is usual in such researches as the present, geology gives us but little assistance. We find some mention of bones being taken from the *Terramare* beds of Italy (cf. Keller, 'Lake Dwellings of Europe,' i. 389), but Prof. Rutimeyer, with greater

\* Darwin, in his 'Variation under Domestication,' i. 249 ff., has much to say on the origin of the Fowl.

zoological knowledge, after examining nearly all the available material, thought that the species did not occur. In Europe truly fossil remains have been recorded by good authorities from the following localities and formations:—Puy-de-Dome, France (Upper Pliocene); Pikermi, Attica (Lower Pliocene); and from the Cavern Deposits of the Lahn Valley in Germany (*cf.* Lydekker, 'Fossil Birds,' p. 142). None of these remains of *Gallus* were actually ascribed to the species *bankiva*. We have not learned of any fossil remains of the bird from India, or, in fact, from any part of Asia; but this is negative evidence of little value.

We conclude by repeating that we have not been able to find the slightest scrap of proof that the Common Fowl originated in India, and we bring evidence to show that it was present in Babylonia in the fiftieth century B.C., that it was introduced to Egypt about B.C. 4600, and to the Mediterranean countries from Mesopotamia at some unknown but very early date. The evidence appears to indicate that the bird was introduced to India by invaders—a race known as Dravidians—from the north-west at an unknown date, and that the species is now feral there, exactly as it is in many other parts of the world.

We are safe in assuming that the original wild stock is long extinct, as we know is the case with the Horse, Camel, wheat, cherry, and many other forms of life. Yet we know that both the Horse and the Camel are to be found perfectly wild in countries to which they are certainly not indigenous. The Horse is wild in Australia and America, descended from animals escaped from European colonists, and, as Mr. Abel Chapman has described (in his 'Wild Spain'), the Camel may even be found wild in Europe on the marismas of Spain.

The figures illustrate several of the more important forms in which the Fowl appears in ancient art. Numbers 3, 4 (Egyptian art) and 5 (Grecian art) are drawn direct from actual specimens in the British Museum; 1 and 2 are from photographs of the pre-dynastic Egyptian objects described in the text, and 6 is copied from an illustration of a Phœnician sarcophagus in Rawlinson's 'Phœnicia' (p. 195). In every case great care has been taken not to distort or exaggerate the critical points in each figure.

## NOTES FROM THE MILLPORT MARINE BIOLOGICAL STATION.

BY RICHARD ELMHIRST, F.L.S.

### OBSERVATIONS ON THE BEHAVIOUR OF FISH.

WHEN fish are caught and brought into captivity they are very wild and shy and their behaviour is very different from that of tame fish which have lived in aquaria for several months; it is interesting to trace the fish's behaviour between these two extremes. Most fish have an instinctive\* fear of all moving objects above a few inches in size other than members of their own shoal. Saithe (*Gadus virens*) often gather in dense shoals among and around the piles of Keppel and other piers in this district, yet massed together as they are they detect and avoid anyone creeping on the cross-piles, and are not easily caught by means of a landing-net. The reason for their fear of strange objects, both in and out of the water, is not far to seek. Anything coming in among them may be a diving Shag, Cormorant, or Guillemot, a Porpoise, Whale, or some large predatory fish. Shags account for a great number of fish—for instance, one which had been feeding near this station for about an hour and a half when shot contained seven *Gasterosteus spinachius*, forty-one *Gobius flavescens*, half one *Labrus bergylta*, seven inches long, one *Ctenolabrus rupestris*, and half a five-inch Saithe; another specimen, shot some weeks later, contained six *Pholis gunnellus*, two *Labrus*, species unrecognizable, seventeen *Gobius*, and some Gadoid remains. When small shoals of Saithe or Lythe (*G. pollachius*) are playing at the surface, a Gull passing close over them causes the shoal to break up and go down, often with considerable splashing in their endeavours to get away quickly;

\* "The discrimination between reflex and instinctive actions is chiefly conventional. In both cases we have to deal with reactions to external stimuli or conditions. But while we speak of reflex actions when only a single organ or group of organs react to an external stimulus, we generally speak of instincts when the animal as a whole reacts. In such cases the reactions of the animal, although unconscious, seem often to be directed towards a certain end."—Loeb, 'Comparative Physiology of the Brain,' p. 177.

such a shoal avoiding a bird may give alarm to a neighbouring shoal some twenty or thirty yards away, which could not possibly have been frightened by the shadow or have seen the bird itself. This fear of birds and other objects overhead is probably due to the habits of Gannets.

Similarly, a Porpoise coming in among a shoal of fish may cause many of them to jump right out of the water in their efforts to escape; I have seen Saithe about fourteen inches long jump three to four feet out of the water when frightened by a Bottle-nosed Whale. So, being naturally afraid of strange moving objects and shadows, newly caught fishes avoid people in front of the tanks, dash wildly about, and often knock themselves against the rock-work or glass front in their efforts to escape from these strange objects, and finally settle in the darkest corner available, or, in the case of a white glazed earthenware tank, at the bottom.

In a few days the fish find that the presence of people is not connected with any danger to themselves, and begin to come out into the better lighted parts of their tank, and soon lose all fear of them, but a dipping-net or stick in the water will cause them to dash about wildly, and sometimes even to leap right out of the water. This habit of leaping out of the water to escape pursuit is very common among fishes, but is generally a very indefinite effort, and I have failed to notice any marked attempt to dodge by leaping to one side except in the case of the Whale and Saithe mentioned above. During this stage of losing their shyness the fish are greatly alarmed by any sudden movement, such as putting one's hand quickly up to the front of the tank, or waving a handkerchief before them, but they soon get used to such tricks. During the first few days of their captivity they do not touch any food, and when they see shelled mussels or other such food falling through the water, they dart away from it, and it falls to the bottom, where some of them may find it later; or possibly in avoiding one piece a fish may touch another piece with its nose, detect that it is edible, take it and begin to look for more. Sometimes a week or two may pass before hunger overcomes their natural fear of falling objects. Now nearly all of our Gadoids are caught on white flies, and so cannot connect the smell of mussel, &c., with their late experi-

ence of a hook and the subsequent ordeal of being landed, handled, and brought into the aquaria. Besides which, fish do not learn readily from a single experience; for example, Day records a Perch being taken with its own eye as bait,\* and many similar instances are known. Pike† or other fishes take a long time and many knocks to realize a glass division across the tank in which they live. Fish, if hungry, will repeatedly try inedible or nauseous objects before finally refusing them; I have watched wild 3-spined Sticklebacks take bits of water-logged wood, &c., several times before giving them up. In experiments on feeding captive fish with Nudibranchs at Port Erin ‡ and elsewhere, it was found that the same fish would try distasteful things time and time again. I have found the egg-masses of *Loligo* particularly distasteful to fishes. In experiments of this kind with tame fish, it is necessary to make considerable allowance for the fact that they feed by sight, and have learnt to take everything that is thrown in to them; because, after several weeks in the tanks they learn to recognize the action of putting food into the water, and can even associate the probability of food with the presence of a tray in one's hand, so that one has only to appear with the food-tray and the fish all come towards one, move about excitedly, knocking their noses against the glass, and making snapping movements with their jaws. If they are very hungry, they will behave similarly when one is only passing the front of the tank. Later they can associate the presence of somebody working by the mussel-tank, at the opposite side of the tank-room, with the probable occurrence of feeding, and one has only to go there for a few minutes for them to show their usual interest in what one is doing. By this time some of the fish will come up to the surface of the tank when anyone of those who usually feeds them gets up to regulate the circulation of the water, and will feed from one's hand or bite one's fingers. Some of them become so tame that they will come to one's hand, apparently without desiring or expecting food, and lie in it, particularly if tickled or stroked gently. An easy method of removing tame Saithe from a shallow tank is by "guddling,"

\* 'Fishes of Great Britain and Ireland,' by F. Day, vol. i. p. 5.

† 'Mind under Water,' by R. Jeffries.

‡ 'Fauna of Liverpool Bay,' Report iii., pp. 150-163.

that is, passing one's hand slowly under them and forward, tickling gently, until a good grip can be obtained round the shoulder. When fish are as tame as this they have lost, at any rate temporarily, their instinctive fear of many things, and acquired new habits. The main factor in bringing about this change is their inordinate love of food, for fishes will gorge themselves to a state of helplessness if opportunity occurs. It is sometimes said that performing seals, horses, &c., are trained by absolute hunger and thirst. I doubt that, and do not think that such extremes are necessary when one considers how much a well-fed dog can be taught to do for the sake of tit-bits. In many of these cases with the higher vertebrates there is surely some telepathic or similar influence at work between the trainer and the animals.

The case of such fish as Wrasses (*Labrus*) is rather different; they do not live in shoals, but hunt singly over the larger seaweeds\* for molluscs, or attack even fairly large crabs which come about their own special area of rocks. The food of the Ballan Wrasse (*L. bergylta*) consists chiefly of *Littorina*, *Lacuna*, *Gammarus*, *Idotea*, and larger crustaceans, such as *Hyas* and *Carcinus*. Such fish, after a few days in a tank, naturally dash at the mussel, &c., falling through the water just as they will at fishes† or other intruders. They like their food alive, or at any rate moving, and will often circle round a piece of mussel and not touch it until a stray current causes it to move slightly. Flat-fish at first are afraid of food falling through the water, and will dart away from it and bury themselves in the sand, allowing the food to lie until night. However, after a few months in captivity they, too, will dart up at food thrown into the water, and in time rise and become excited when one is working by the mussel supply tank. These fish—Saithe, Lythe, Wrasses, Flat-fish, &c.—can then detect one's actions outside the tanks at a distance of twenty-five feet, which inclines one to think that they are not so short-sighted as is generally supposed.‡

Newly captured fish, if put into a tank with tame ones, become tame much sooner than a batch of wild fish kept by themselves. Fish can show considerable emotion by their

\* 'Journal of the Marine Biological Association,' vol. i. p. 242.

† 'Zoologist,' 1909, p. 202.

‡ 'Journal of the Marine Biological Association,' vol. i. p. 242.

expressions, despite having "immovable eyes and a fixed osseous face."\* When expecting food, they display considerable vivacity; when being chased by larger fish, their whole appearance and actions are suggestive of fear. I have seen a Cobbler (*Cottus scorpius*), of a bright red colour to match *Melobesia*, jumping, quivering with excitement, erecting and spreading his magnificently spotted fins before a more sombre-coloured female, his colour alternately growing dull and bright meanwhile; some of this change of colour was probably due to alterations in the incident angle of light or vision.

During the end of August, September, and often later, there are large shoals of small Herring, about two and a half inches long, all over this district; their presence is generally indicated by a screaming flock of Gulls and their allies, who destroy the fish by thousands. If one rows out to such a place one finds the water glistening with the scales of the young Herring. Besides the birds, Whales, Porpoises, and other fish are continually decimating these shoals. The Bottle-nosed Whale follows them, rises right through them, and must catch hundreds at a time; I am told that incidentally they sometimes catch a Gull or two as well, but the Gulls are wary, and detect the Whale very quickly, and rise screaming just before him. These young Herring are often packed in dense, almost solid, masses. Four years ago I caught with two dips of a net eight inches wide and four deep one hundred and sixty-one young Herring from one of these packed shoals.

The colours of fishes vary, generally according to their surroundings, becoming light on a light background, and dark against dark. I find that fish kept in the dark become pale, whatever the nature of the background; Saithe, Cobblers (*Cottus*), and Gunnells (*Pholis gunnellus*) gave marked results, but Wrasses (*Ctenolabrus* and *Labrus*) did not make such an obvious change. On examining the fishes in the tank-room at night I then found that these species regularly became paler at night; the Pogge (*Agonus*) and the 3-spined Stickleback also showing the same change. Wrasses again showed less change, and I could not detect any change in Conger. This agrees with

\* 'Journal of the Linnean Society,' vol. xv. F. Day on "Instincts and Emotions in Fish."

the well-known fact that Salmon, &c., from dirty water are often pale and very silvery. One would rather expect that darkness would give rise to the same stimulus as a dark background, and the reflex would be an expansion of the chromatophores, or colour-cells, and so a darkening of the body. Perhaps in darkness there is no colour suggestion and the chromatophores receive no stimulus, and their contraction indicates a state of rest. This paleness at night or in the dark agrees well with the general rule of dull colours for nocturnal animals. Fishes which have died from suffocation, due to foulness or lack of oxygen in the water, are nearly always very pale; fishes which die at night are paler than those which die in daylight. On the side on which a freshly killed fish is laid the chromatophores contract and it may become almost white. If a freshly killed fish is laid on a grating, the lower side, after a while, will be found to be banded—pale where the bars of the grating pressed and dark elsewhere. If too long a time is not allowed to elapse and the fish is moved, so that the dark bands lie on the bars and the pale ones between them, then the chromatophores will react and the pale areas will darken, and *vice versa*, though not to such a marked extent as at first. This second reaction may be possible about forty minutes after death in a Cod.

Mr. Cunningham has made similar observations, and has shown that this paleness at places of contact with other objects, which explains the marbled appearance of fish which have been packed for market, is due to pressure, and not to the exclusion of light, for on laying a glass slip on a piece of fresh fish "the chromatophores under the cover-glass contracted, while those in the uncovered skin remain expanded."\* The chromatophores, then, may remain alive after the death of the fish to which they belong, and retain their ability to respond to physical irritation; they also respond to chemical irritation. In December, 1911, I took some pieces from the side of a Cod, three hours after it was caught, where the chromatophores were contracted owing to pressure, and bathed them with .5-1 per cent. formalin, and found the chromatophores expanded considerably in less than three minutes. Physical irritation produced practically no result, and light none.

\* 'Philosophical Transactions,' 1894, "On the Coloration of the Skin of Fishes, especially of Pleuronectidæ," Cunningham and MacMunn.



THE BIRDS OF THAT PORTION OF THE NORTH-EAST COAST BETWEEN TYNEMOUTH AND SEATON SLUICE, NORTHUMBERLAND.

BY J. M. CHARLTON.

(Continued from vol. xv. p. 380.)

PINK-FOOTED GOOSE (*Anser brachyrhynchus*).—Flocks of this species are seen and heard passing over, making parallel to the coast, in winter; but they have been well out of shot. As far as I am aware, all the grey Geese obtained here have been of this species.

BRENT GOOSE (*Bernicla brenta*).—Occasionally they pass over in small numbers during winter, but were formerly much oftener seen. A mature male was shot on Jan. 1st, 1894, and is now in the Hancock Museum. On Oct. 26th, 1909, an adult female was shot by a pitman at St. Mary's Island, and was procured from him by my brother. It is now in our collection. This is a very early date for this species to be seen on the Northumberland coast. This specimen seemed in a very poor condition, due no doubt to its being in the moult. It was making its way north when shot, and had evidently been blown out of its course by the rough weather prevailing at that time, and separated from its companions. The manner in which this specimen came into our possession is rather interesting. In the morning of the same day my uncle observed a Brent Goose flying slowly north close to the shore and informed my brother, who straightway set out for St. Mary's, in the hope of seeing others. When he arrived, a Brent was immediately shown him, which had been shot half-an-hour before from some butts formed in the sand-banks opposite the island. There seems every reason to suspect that this was the same bird as that observed at Cullercoats.

[MUTE SWAN (*Cygnus olor*)].—About fifteen years ago a bird of this species escaped from Shields Park, and was observed for some time near St. Mary's Island. Eventually it was captured

by a fisherman and taken back to the park. Although this was not a wild bird, yet it is as well to mention it, in order to prevent any misunderstanding as to its true history.

WHOOPEE SWAN (*Cygnus musicus*).—A flock occasionally passes on migration in autumn and winter. Mr. C. M. Adamson says: "On Jan. 22nd, 1838, whilst at Hartley with Mr. Hancock, during a very long and severe storm, eight of these magnificent birds came over our heads flying north; when shot at they commenced to make their peculiar cry, probably in derision. They were all white birds." My father shot an adult male in December, 1892.

SHELD-DUCK (*Tadorna cornuta*).—A not uncommon visitant, generally in autumn and winter. Flocks of from twenty to forty birds have occasionally been seen. I am informed by Mr. H. Hodgson that he once saw one hiding among some seaweed with its head buried beneath it. It had been shot at by him and had evidently been wounded, and was trying to hide from its pursuers. In Turner's 'Pliny and Aristotle on Birds' there is mention made, in the commentaries, of a certain island of Tina, probably on the Northumberland coast, and it is stated that Sheld-Duck bred there. The first edition was published in 1544; there have been two editions of this book since, the last by A. H. Evans in 1902 at the Cambridge University Press. The editor of this last states in a footnote with reference to this "Tina": "Possibly St. Mary's or even Coquet Island." I have had communication with Mr. W. W. Tomlinson, one of the best authorities on this district, and he says that at that time there was a small church on the island, by name St. Mary's, the origin of the island's name, and also that it was then very probably not an island at all but connected with the mainland, since it is only disconnected now at high tide. As I do not know what authority Mr. Evans has for referring Tina to St. Mary's Island, other than that the name evidently refers to an island situated near the River Tina (Tyne), I can make no definite statement; but I should doubt that Turner meant St. Mary's Island. Turner was well acquainted with this coast; however, as is shown in his mention of the Cormorant nesting at the mouth of the Tyne.

MALLARD (*Anas boscas*).—Occasionally seen; commonest in

January, when I have observed as many as twenty or thirty in a flock. Soon after the lighthouse was installed at St. Mary's Island, two of these birds were killed by striking the tower during the night.

SHOVELER (*Spatula clypeata*).—A very rare winter visitor, of which I have but two records—an immature male shot at St. Mary's Island on September 12th, 1882, by Mr. R. Duncan, and a female shot at the mouth of Seaton burn in 1900. The latter was termed a "Spoonbill" in the neighbourhood.

TEAL (*Nettion crecca*).—Formerly common in winter, at which time Mr. Duncan informs me he has seen large flocks. Now but seldom seen. The first record is a young male shot on Oct. 16th, 1834, at St. Mary's Island.

PINTAIL (*Dafla acuta*).—The only record I have of this species is an adult male shot between the island and Seaton Sluice, about Dec. 10th, 1909.

WIGEON (*Mareca penelope*).—A winter visitant, formerly of regular occurrence but now seldom seen. Large numbers occasionally resorted to the reservoir at Whitley Dene in former years.

POCHARD (*Fuligula ferina*).—A very rare winter visitant. It has occurred twice on Whitley Old Reservoir, once in 1903 and again in 1904.

TUFTED DUCK (*F. cristata*).—A winter visitant of uncommon occurrence. I have observed it feeding in the lake in Tynemouth Park near the tame ducks.

SCAUP-DUCK (*F. marila*).—Formerly a regular and fairly common winter visitor, now of irregular occurrence. The first record is dated winter of 1838 (Hancock Museum); and Mr. C. M. Adamson, referring to this species, says: "The winter of 1837 and 1838 was a great year for Scaups on this coast. On Jan. 22nd, when with Mr. Hancock, we saw a great quantity at St. Mary's Island. The old drakes seemed to keep in small flocks by themselves, perhaps three or four together. The young birds appeared to be in large flocks." At the beginning of March, 1911, a male arrived on Whitley Reservoir, and remained there until April 9th, 1911. It was usually to be seen swimming up and down in the centre of the water, which is about one hundred and twenty yards in breadth and two hundred and

thirty yards long. It was in splendid plumage, and as far as could be discerned had no physical ailment. I watched it closely for ten days through glasses. At irregular periods of the day it dived for food, giving a kind of shoulder thrust as it did so, and remaining under exactly thirty seconds every time. It was particularly jealous of the too close approach of the other feathered inhabitants of the water—four Dabchicks, a female Mallard, and two Waterhens—and when they approached, it swam up and chased them away. Occasionally it went on shore and sat on some half-submerged grass-banks. On April 9th a dark bird, undoubtedly a female, arrived from the south at about 1.30 p.m., and settled beside the male. They swam about for some time, then the female rose, the male following, and they circled round several times, the former ultimately departing in a northerly direction; the male, however, returned to the water. The following morning he, too, had departed.

**GOLDEN-EYE** (*Clangula glaucion*).—An occasional winter visitor. On Jan. 2nd, 1906, a large flock was observed at St. Mary's Island, all the birds being immature or females. Males in adult dress are very rare; my brother observed one on Oct. 26th, 1909.

**LONG-TAILED DUCK** (*Harelda glacialis*).—A very rare visitor in winter. I can find but three records. An immature male changing to summer plumage was shot off Seaton Sluice on Jan. 15th, 1894, and is in the Hancock Museum. Mr. R. Duncan informs me that he saw the second specimen shot when it was coming through the passage at St. Mary's; it was a female. Two birds shot by a Mr. Marshall off Cullercoats, and set up by Mr. Taylor, are now in the possession of Mr. Gascoyne of that village.

**EIDER DUCK** (*Somateria mollissima*).—Although its nesting-haunts are so close—the Farne Islands—yet but few specimens have occurred, and these immatures, and from this we may gather that this species does not shift its quarters much. The following are the only authentic occurrences. An immature male shot at St. Mary's, and now in the Hancock Museum. From Jan. 29th to Feb. 14th, 1908, I observed an immature female swimming in Cullercoats Bay during heavy storms. It frequently dived and brought seaweed to the surface, which it

sifted with its bill; subsequently it was shot and found to be lacking of an eye, which accounted for its prolonged stay, and also for our observing it being knocked over by the waves. Another was shot at St. Mary's in January, 1911.

COMMON SCOTER (*Edemia nigra*).—A fairly common visitor in winter. My brother observed an enormous flock of Scoters in October, 1909; they were swimming north, and all dived simultaneously, rising some thirty yards ahead and swimming for some distance, then diving again. They seemed to be following a shoal of small fry. A favourite haunt is opposite the mouth of the Seaton Burn, where sometimes several small flocks can be seen. Here they feed on the food washed down by the stream, and also on the large variety of the crustacean fauna which is, according to various authorities, particularly abundant here, owing, as one writer states, to the quantity of algæ on the rocks ('Transactions of Northumberland and Durham Natural History Society').

VELVET SCOTER (*Æ. fusca*).—A winter visitant of rare occurrence. I have only two records: Mr. Taylor informs me that one was shot at Whitley in 1905; four birds were observed by my brother and I near the mouth of the Seaton at Holywell Burn on Dec. 14th, 1910; several flocks of Common Scoters were also present, but the rarer species kept apart from them and were very wild.

RED-BREASTED MERGANSER (*Mergus serrator*).—An occasional visitor in winter. A male was shot at Hartley on Jan. 25th, 1838. My father procured an adult female from a fisherman who had shot it in October, 1892; and another, also a female, was shot in November, 1909, and purchased by my uncle. Both of these are in our possession.

GOOSANDER (*M. merganser*).—An exceedingly rare visitor in winter. I have been informed by several observers that specimens have been shot at St. Mary's Island, but have not examined any of them, and think that they very probably were of the former species. There is, however, one definite record, an adult male in summer plumage, in the early spring of 1880, which was shot by Mr. J. Ewen at St. Mary's Island, and considered by him to be a Hooded Merganser (*M. cucullatus*), being recorded as such by W. W. Tomlinson, Esq., in his history of this district.

I have interrogated Mr. Ewen on the subject, and there is no room for doubt that the bird in question belonged to this species, namely, *M. merganser*.

WOOD-PIGEON (*Columba palumbus*).—An uncommon resident, breeding sparingly in Holywell Dene. In autumn numbers of foreign birds arrive on the coast and pass inland.

STOCK-DOVE (*C. ænas*).—I am informed by Mr. Hodgson that a bird of this species was shot near the Convalescent Home at Whitley Bay in 1906 and examined by him.

ROCK-DOVE (*C. livia*).—Authentic specimens have occasionally been obtained on migration, but much confusion is apt to arise owing to the fact that numbers of domesticated Pigeons frequent the coast.

TURTLE-DOVE (*Turtur communis*).—A very rare spring visitant. Mr. H. Coxon has in his collection an adult male shot on Seaton Burn (Holywell) on May 19th, 1888, which is the only record.

PALLAS'S SAND-GROUSE (*Syrhaptes paradoxus*).—During the great irruption of Sand-Grouse in the spring of 1888, a small flock of some seven or eight birds were observed on the sand-hills near St. Mary's Island. This was on May 20th, and shortly before, about 10th, a party had arrived at Holy Island, further north, being the foremost of the great movement south along the coast. Mr. J. Ewen, who was then in residence on the island, went out and procured two males, which were afterwards very finely set up by Mr. R. Duncan. This flock remained for several days, but eventually passed on south. In the 'Newcastle Weekly Chronicle' for June 23rd, 1888, Mr. R. Duncan recorded a female which was captured during a storm on board the steam-trawling boat 'St. Oswin' when at sea about forty miles off Tynemouth. This was early in June, and the bird lived for some time in an aviary in the Northumberland Park, North Shields. (The above is recorded by George Bolam in an excellent paper on the "Irruption of Sand-Grouse in 1888 in Northumberland," 'Berwickshire Naturalists' Club Transactions'). This bird laid two eggs in confinement shortly after its capture, one of which is in the collection of Herbert Coxon, Esq.

PHEASANT (*Phasianus colchicus*).—Sometimes one strays into

Holywell Dene, but only very occasionally. One was shot in the winter of 1909 by F. Wilson, Esq., on his farm, Marden, Cullercoats. Many of the pitmen have specimens set up, obtained at Holywell.

COMMON PARTRIDGE (*Perdix cinerea*).—Formerly a common resident. Mr. R. Duncan informs me that about thirty years ago he saw a very large covey leave the mainland and fly round the island. Now they are very uncommon. A stray pair or two may breed, but a certain notice-board I know of in the district which says, "The shooting rights on this land are let, anyone found disturbing the game and trespassing will be prosecuted," seems rather ironical. My uncle, Mr. S. G. Charlton, informs me that a covey once flew from the mainland, being forced by the violence of a west wind, and, alighting on the sea, were drowned and washed to shore, where they were picked up by the fishermen. This took place about ten years ago along Whitley Sands. Mrs. Leeson tells me that several times in the summers of the last three or four years she has heard Partridges calling in the fields close behind her house in Beverley Gardens, Cullercoats, where they doubtless nest.

QUAIL (*Coturnix communis*).—Formerly a summer resident; J. Hancock says that it has nested at Cullercoats, among other places in Northumberland. The only occurrence I know of in recent years is one which was shot near Holywell by Mr. Richardson in June, 1906.

LAND-RAIL (*Crex pratensis*).—A regular spring visitor, but only in small numbers. Mr. Monk informs me that one was caught by him which had flown against the plate-glass of the lighthouse on St. Mary's. Mr. Richardson tells me that formerly the pitmen of Holywell made up small parties on the arrival of the Corn-Crakes, and sallying forth with guns and an instrument for imitating the bird's calls, went in search of them. When the "sportsmen" came to a field in which they heard the Corn-Crakes calling they entered it, and two or more standing ready with their guns, the remaining man worked the decoy. Very soon the real calls ceased, and the gunners waited; then suddenly a small brown form darted from the grass and all the guns were let off simultaneously at it. Sometimes they got as many as four or five out of one field, which

of course depended upon the time of year, for they are only to be seen in numbers like this either directly on their arrival in spring or preparatory to their departure in autumn.

**WATER-RAIL** (*Rallus aquaticus*).—An uncommon winter visitor. I have established proof of four specimens, but probably others have occurred. One, a male, shot on Nov. 12th, 1895, near Tynemouth; a second, of the same sex, a remarkably plump bird, caught by my fox terrier "Tiney" at Briar Dene on Jan. 4th, 1906; a third, shot at St. Mary's Island by a Mr. Watts during stormy weather in the autumn of 1907; the fourth and last was picked up at the same time as the second, near Cullercoats Station; it was lying beneath the telegraph-wires, against which it had killed itself.

**MOOR-HEN** (*Gallinula chloropus*).—A fairly common resident. It breeds at Whitley, Briar, and Holywell Denes.

**COOT** (*Fulica atra*).—A very occasional visitant in winter. Mr. W. G. Monk, sometime lightkeeper on the island, informs me that during his stay there, which was between 1898 and 1905, he caught two Coots on the lighthouse. They had probably been driven to the coast by hard weather and the freezing of ponds and marshes inland. Another was shot in about 1904 at St. Mary's, and was set up by Mr. Richardson; the last record is of one shot at Whitley Bay in December, 1910.

**DOTTEREL** (*Endromias morinellus*).—One was shot in the fields at Cullercoats in 1896.

(To be continued.)



## SUPPLEMENTARY FISH-NOTES FROM GREAT YARMOUTH.

BY ARTHUR H. PATTERSON.

SINCE the publication of my Annual Report in the December 'Zoologist' (1911, p. 441), I have received one or two other items of piscine interest.

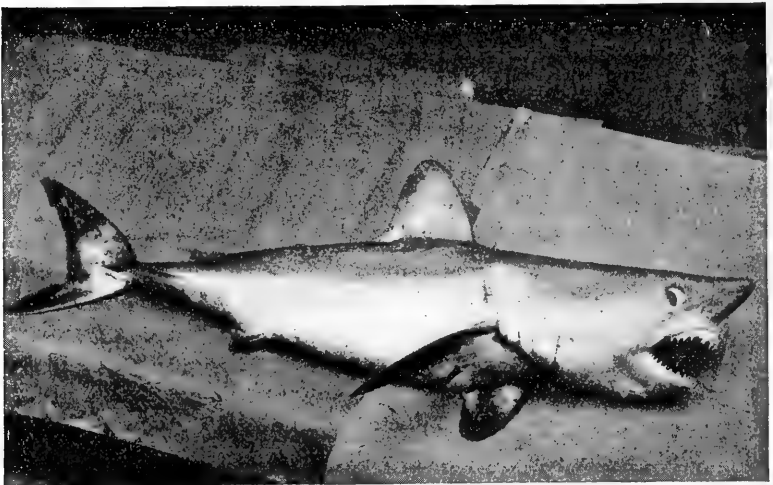
SUNFISH AT SHERINGHAM.—Thanks to the good offices of a Sheringham gentleman, Mr. R. Funnell, I have received a description of the stranding of a short Sunfish (*Orthogoriscus mola*) off the north-east Norfolk coast. It was washed ashore on Nov. 26th, having undoubtedly succumbed to the buffetings of the severe gales prevailing at that time. The length was 5 ft., the extended dorsal and anal fins measuring 6 ft. 2 in. from tip to tip, each fin being 22 in. long. What became of it my correspondent did not state.

PORBEAGLE GAFFED.—Two sea-anglers, when fishing from a boat in the roadstead off Yarmouth on Nov. 29th, observed what they at first thought to be a log floating on the surface of the sea, but when it turned and came against the tide they at once concluded it must be something alive. They hastily pulled up their anchors and gave chase, their movements being apparently unnoticed by the fish, which had evidently been in grief either by stress of weather or by contact with fishing-nets. With a quick jerk a gaff-hook was made fast to the fish, and a lively ten minutes followed. They eventually got it into the boat, and to their surprise they found it a young Shark, with a goodly array of vicious-looking teeth. I afterwards saw it, and found it to be a Porbeagle Shark (*Lamna cornubica*) about 4 ft. in length. (See illustration, p. 30.)

HALF ALBINO PLAICE.—On Dec. 5th I saw exhibited on a fishmonger's slab a very attractive-looking Plaice, some 16 in. in length. The anterior half of the upper side was of the normal colour, with the usual orange spottings, the posterior

portion being white, with a peculiarly porcelain-like appearance. Half of both the dorsal and the anal fin was white also, with an inclination to pinkiness here and there; a spot like an ink-blot was observable at the base of the caudal fin.

DEFORMED CODLING.—Late in November a sea-angler hooked a codling of some 3 lb. weight. The huge head covered exactly a third of the entire length, the body being stunted and twisted in a remarkable manner. Viewed from above, the fish had a lateral twist behind the dorsal fin, suggesting the letter "S," and when examined in profile the body from the dorsal fin



PORBEAGLE SHARK (*Lamna cornubica*).

followed a half-circular bending, the tail-end being in a line with the anterior portion, the tail itself taking half a right angle bend downwards. The third dorsal and the second anal fin most conveniently fitted into the angles. I made an incision in the side of the fish, finding the vertebræ much pushed together or coalesced, forming almost a solid mass of bone. The creature was in good condition and thoroughly healthy, but I could not muster up sufficient courage to have it cooked for the table. From what I have seen of deformities among fish I have observed that the Codfish is more susceptible to malformation than any other species.

THE HERRING HARVEST.—The Herring fishing of 1911 will be remembered as a very heavy one, the catches brought into the harbour and at Lowestoft beating all previous records; what it would have reached had not there been such frequent spells of stormy weather can only be conjectured. Some great gluts occurred; on one occasion salt ran out, and the fisher-folk were put to great inconvenience. Southwold had a season that was decidedly discouraging. Practically the Herring season came to an end by Dec. 9th, although a few fish from odd boats had been landed for some days after. During the week ending Dec. 16th only about 800 crans, roughly, came in. Seven boats arrived on the 13th with thirty crans (three lasts) between them, which realized £2 7s. per cran. The total delivery of Herrings at the fish-wharf for the fishing up to Wednesday (13th) was 492,860 crans; on the Gorleston side of the river some 52,882 crans were landed—a total of 545,742 crans, as compared with 347,240 crans at the same date of last year, and 439,580 crans in 1909. At the time of writing the shipment of pickled Herrings had not yet ceased. Up to this date (Dec. 16th) no fewer than 394,598 barrels and 126,879 half-barrels had been despatched by steamers, both British and foreign, some one hundred and one vessels in all, without counting many freights of salted and iced Herrings taken to the Continent by sailing craft, and huge train-loads despatched by rail. It has been well said that “of all the fishes in the sea, Herring is King!” The fishermen generally have taken up good shares for the voyage, but owners have sustained heavy losses of nets.

GLUT OF MACKEREL.—Some remarkable catches of Mackerel were landed in November, the breezy weather absolutely suiting this frolicsome fish. I was much interested, when visiting the wharf on Sunday afternoon (November 26th), at seeing a Lowestoft drifter, the ‘John Alfred’ (fishing with Mackerel-nets), lying there with no fewer than six lasts of Mackerel aboard her (sixty thousand fish!). The crew were making all snug (the nets being stowed on deck for want of room below), with a view to starting for Billingsgate Market at dusk. I understand the fish there realized a large figure, certainly much more than they would have done had they been sold next day at Yar-

mouth. During the following week, and on to early December, huge hauls were made, and on more than one occasion the wharf was practically "choked" with Mackerel.

I do not know whether I am correct, but I have an opinion that we have two races of Mackerel visiting the coast in the late autumn, one of them being a shortish and more compact fish, approaching in build to the Bonitos. Its colourings are the same as the typical Mackerel. I noticed these from time to time washed up on certain tides, and surmised that from their more triangular head, broader at the base, they were more prone to fall from the meshes of the nets. I give this opinion for what it is worth, and intend next year to make measurements and other observations.

PILCHARDS LANDED.—On Dec. 12th the steam drifter 'Bono,' which had gone south and been fishing in the Channel, brought in twenty-four crans of "bloater stuff"; she also landed between six and seven crans of Pilchards, which sold for 22s. 6d. a cran. Prior to that catch she had shot seventy-seven nets for seven hours, the result of the haul being a solitary Pilchard. The arrival of the Pilchards made some excitement on the wharf, this species coming but rarely nowadays into the Herring area, whereas in years gone by it was by no means uncommonly caught. The Pagets, in their 'Sketch of the Natural History of Yarmouth' (1834), wrote:—"Some few generally taken every year in the Herring-nets; in some years they have been abundant, as in 1780 and 1790, and in 1799, when so many were taken, that one 'tower' [a hand on board the boat] received upwards of a last as his perquisite." Sir Thomas Browne remarked that, "though the sea aboundeth not with Pilchards, yet they are comonly taken among Herrings, but few esteeme thereof or eat them."

I did not ascertain to what destination or process the Pilchards above referred to were assigned; they are so tender and oily that they make indifferent "smokers," the head and body having a tendency to separate when on a "spit" curing. Nevertheless, I was given one which had been with others slightly smoked as a novelty. I found it very fat but palatable, with a suggestion of piquancy that is not noticed in a Herring. I should say that for the purposes of preserving in olive oil it is better adapted.

## NOTES AND QUERIES.

## MAMMALIA.

**Habits of Dormouse.**—If any reader of 'The Zoologist' keeps tame British Dormice, I should be very grateful for notes on several points in their economy, in regard to which I need information for completion of my article on this species in my 'History of British Mammals.' In particular, I want a description of the first pelage of the young and the date at which it is cast; also I want, for the wild animals, records of midsummer births, *e. g.* in July and early August, and details as to the usual position of the winter or hibernatory nests. There are other questions in regard to which I should much like to correspond with anyone sufficiently interested. — G. E. H. BARRETT-HAMILTON (Kilmanock House, Campile, Ireland).

## AVES.

**Nesting of the Tree-Creeper (*Certhia familiaris*).**—I have this year (1911) succeeded in attracting this bird to nest behind a piece of virgin cork nailed against a depression in the bark of a lime-tree about five feet from the ground. I can also recommend a piece of virgin cork nailed against a tree or wall in the form of a cup as an attractive nesting-place for the Spotted Flycatcher. The Tree-Creeper makes up the number of nesting species of birds in my grounds to forty-six, which I think is a good average, considering I have no pool or stream here.

List of forty-six species of birds that have nested at Rosehill, Cheadle, Staffordshire:—Mistle-Thrush, Song-Thrush, Blackbird, Redstart, Redbreast, Whitethroat, Blackcap, Garden-Warbler, Goldcrest, Chiffchaff, Willow-Wren, Wood-Wren, Hedge-Sparrow, Great Titmouse, Coal Tit, Wren, Tree-Creeper, Pied Wagtail, Tree-Pipit, Meadow-Pipit, Spotted Flycatcher, Swallow, House-Martin, Sand-Martin, Greenfinch, House-Sparrow, Tree-Sparrow, Chaffinch, Linnet, Bullfinch, Yellow Bunting, Starling, Jay, Magpie, Jackdaw, Rook, Green Woodpecker, Cuckoo, Tawny Owl, Sparrow-Hawk, Kestrel, Wood-Pigeon, Pheasant, Partridge, Corn-Crake.—JOHN R. B. MASEFIELD.

**Nutcracker (*Nucifraga caryocatactes*) in Suffolk.**—A female Nutcracker was shot at Beyton on Nov. 10th, 1911, and brought to me the same day. It is one of the slender-billed race which is believed to inhabit Siberia, and was in good condition. The gizzard was full of what appeared to be acorns bitten into small fragments. I cannot find any reference to the curious tongue of this bird, which is bifurcated, exactly fitting into a small knob in the lower mandible, dark in colour, and rather like a turnip-seed. At least two others have been obtained in East Anglia, which will doubtless be duly recorded in this Journal.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

**Golden Eagle (*Aquila chrysaëtus*).**—*Re* Mr. Robert Warren's note (Zool. 1911, p. 391), the enclosed cutting from the 'Essex County Chronicle,' Nov. 17th, 1911, and the 'Maldon Advertiser' may be of interest:—"A splendid specimen of the Golden Eagle, now very rare in the British Isles, has died this week in captivity at Rayleigh Mill, Maldon. The bird, a hen, was the property of Mr. Porter Garratt. It is known to have been at least sixty-seven years old, and it was with the family of Mr. Garratt for the greater part of this period. The bird was most ferocious, and would not allow anyone to enter its aviary, and when it was removed from its previous home at Woodham Walter to Maldon it had to be caught in a pig-net. It laid two eggs each year, and these (after each member of the family had preserved a specimen) were sold and eagerly sought after by a London dealer at twenty-five shillings each. After the eggs were laid they were replaced by hen's eggs, and some of these were hatched by the Eagle, but many of the chicks met an early death by being trampled on by the Eagle. A pair of chickens, however, were reared on one occasion, and were treated by the foster-mother in a most affectionate manner, although one of the birds, a cockerel, was a very fierce fellow. For these birds the Eagle would readily leave its food, and allow itself to be driven away by the cockerel. The Eagle has been sent to a taxidermist to be preserved."

I knew the Eagle well for the last thirty years, and blew the first lot of eggs—ten or a dozen—that had been kept in a drawing-room cabinet; she laid one the first year, and then three or four a year, so some of my eggs were pretty old, and somewhat of a trouble to wash out clean. Altogether she laid about twenty-five eggs, all at Hoe Mill, Woodham Walter; none since she has been moved to Maldon. Mr. Porter Garratt sold six eggs to Mr. H. M. Wallis, of Reading (a contributor to 'The Zoologist'), for twenty shillings each. The

chickens were hatched in 1895, and the hen kept with her till the next spring, when both would sit on the same nest, and the underneath one (hen) had to be taken away. The cockerel that was let out was terribly fierce, and his sister (Miss Garratt) told me that after it (the cock) had killed all the rats at the mill it then killed the cats that used to help catch them, but I cannot further confirm. The Eagle belonged to Mr. Garratt, miller, of Hertford, then to his brother, Samuel Garratt, of Hoe Mill, and then his son Porter. Was believed to be bought at Leadenhall Market sixty-seven years ago.—EDWARD A. FITCH (Brick House, Maldon, Essex).

**Long-tailed Duck breeding in Orkney.**—I read this record in 'The Zoologist' (1911, p. 432) with much interest, and I sincerely hope that Mr. O. V. Aplin will come forward with *definite* proof that *Harelda glacialis* has really bred in Orkney during the summer of 1911. Such a statement as Mr. Aplin makes is valueless without definite proof. For the last three years, to my certain knowledge, a few Long-tails have remained behind on Loch Stennis during the whole of the summer, but I never dared to assume that they bred there, thinking them rather "pricked" birds unable to perform the spring migration north. Again, I would urge Mr. Aplin to give definite proof, and so establish the fact that the Long-tail does breed in Orkney, because it has been suspected of breeding there for many years, and to have the matter definitely settled would be extremely satisfactory. Should no more proof be forthcoming than what at present is before us, I am afraid the record cannot be accepted.—F. W. SMALLEY (Challan Hall, Silverdale, Lancashire).

**Habits of the Coot.**—Referring to the reported *early* migration of the Coot (*Fulica atra*) (Zool. 1911, p. 433), the fact should not be overlooked that this is a very prolific bird. Its breeding period covers several months, although it is perhaps difficult to say how many broods a pair of Coots would actually bring up in the season. Given sufficient cover early in the spring, the Coot appears to be an early breeder, and it certainly may be found breeding quite late in the summer, though whether the same individuals would go on breeding all through the season I have not sufficient information to say. There is a record of three nests (eight, seven, and six eggs, the first considerably incubated) on March 24th, 1890; a nest of nine eggs, incubated, on March 31st, 1891; and a nest of two eggs on March 21st, 1893 (Zool. 1893, p. 191). In the 'Field' of April 25th, 1891, there is a record of a brood of young seen on April 10th; and

young could fly by April 26th, 1902 (Zool. 1903, p. 127). To turn to the other end of the season: on July 6th, 1900, I found a nest of five eggs slightly sat upon, and another containing one fresh egg; on July 2nd, 1903, four nests, each with five eggs; and on July 16th, 1906, a nest with four fresh eggs, and another with six slightly incubated. As late as July 19th in 1885 a Coot was sitting on her nest, and on Aug. 11th, 1883, there were young Coots of all ages, including at least one small downy young one with the reddish head. The Coot is said to lay from seven to ten eggs, although my experience has been that in some places at all events five is a common clutch. If we put the average clutch at six and suppose (I can only suppose) that the Coot rears three broods in a season, ten pairs of Coots in a favourable locality (where their eggs were safe from Crows and their young from Pike) would increase enormously by the end of September.—O. V. APLIN (Bloxham, Oxon).

**Wood-Sandpiper (*Totanus glareola*).**—Mr. George Bolam's reference to Wood-Sandpipers in his note (Zool. 1911, p. 432) is interesting to me, because I am responsible for putting on record (subject to correction) a party of five at a reservoir near Hebden Bridge (Yorkshire, West Riding) on Aug. 12th, twelve days before Mr. Bolam saw his birds. Though my mind was made up before leaving the reservoir, to make assurance doubly sure, my friend Wm. Nowell, who also saw the birds, inspected mounted examples and also a large number of skins of this species at South Kensington a day or two afterwards, and informs me that he saw nothing to lead him to think that I have made a mistake. I find great difficulty in persuading Yorkshire ornithologists (admittedly with more experience than I) to accept my record, presumably on the ground Mr. Bolam mentions, *i. e.* the close resemblance of Wood and Green Sandpipers. Personally, I believe the similarity to be exaggerated. At any rate, Green Sandpipers our birds were certainly *not*. I should be glad if somebody well acquainted with the Wood-Sandpiper would describe the appearance of the back and wings as the bird is flying away from an observer. A very striking effect was produced by the flight of our birds, which, of course, cannot be seen by examining an unrelaxed skin.—WALTER GREAVES (Hebden Bridge).

**Glaucous Gull in Co. Mayo.**—On the 23rd of last December my friend Mr. Claud Kirkwood, of Bartragh House, shot an immature specimen of *Larus glaucus* in its first year's plumage. It had been observed for some days haunting the island. — ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).



**Gulls hawking for Insects.**—With regard to Mr. Collingwood Ingram's note (Zool. 1911, p. 433), it may interest him to know that what he saw on Sept. 12th is also seen here in North Lancashire every year. When the male (flying) ants come out in August in their millions, the Black-headed Gulls and Starlings hawk for them just as Mr. Ingram describes. How the Gulls know the ants are about I cannot say, but as soon as the ants appear we have the Gulls also flying round in great numbers and feeding on the insects. I may say, in conclusion, that when the ants come out they do so in incredible numbers. I have known the windows of the houses to have to be kept shut, otherwise it was a case of taking a sweeping-brush and sweeping out the dead and dying ants from the rooms. I have seen the lake here literally covered with dead ants, and the air full of Gulls, Starlings, Swallows, Swifts, and Martins feeding on those still flying about. I consider it is no unusual method of feeding on the part of the Black-headed Gull, and I am certain they frequently not only "hawk" for flying ants, but for moths and other insects as well.—F. W. SMALLEY (Challan Hall, Silverdale, Lancashire).

**Causes of our Rare breeding Birds disappearing.**—In 'The Zoologist' (1911, p. 435), Mr. F. C. R. Jourdain, commenting on my statements (*loc. cit.* p. 391), says "he holds no brief on behalf of the trading collector, and, without knowing anything of Mr. Warren's correspondent, will *undertake* to say that there is not a single British-taken egg among the fifty duplicate Ospreys' eggs of which he writes." This is a bold statement to make of unknown dealers. What evidence can he produce that enables him to give such a sweeping undertaking? He also states:—"In the first place, it is a well-known fact that the Golden Eagles of Scotland have enormously increased in numbers, in spite of a certain amount of egg-taking, because the old birds are not shot down now on many of the deer forests. On the other hand, the Osprey is on the verge of extinction, but, as Mr. Warren must be aware, this is due to the wanton slaughter of the birds on migration through Ireland, and not to egg-collecting at all. How many clutches of British Ospreys have been taken of late years? Yet eyrie after eyrie is deserted in spite of strict protection, and simply because one or both of the birds have been barbarously murdered, either on their way south after the nesting season, or moving north in the spring, to be finally recorded in the pages of the 'Irish Naturalist.'" Now, I should like to hear the evidence that enables Mr. Jourdain so positively to state that the decrease of the Osprey is caused by their slaughter when on migra-

tion through Ireland. What evidence can he produce that the Ospreys shot in Ireland were of Scotch origin, while those shot in England were Scandinavian-bred birds? Can he say with equal confidence that the near extermination of the Kite in Wales is not caused by the action of egg-dealers and collectors? With regard to the alleged slaughter of the Ospreys on their passage through Ireland, and recorded in the pages of the 'Irish Naturalist,' I have taken a period of eleven years, from 1900 up to the past year (1911), and, having taken the trouble to examine the pages of that journal for the period named, can only find *two* references to Ospreys—one in the index for 1908; but, although the words, "Osprey in Co. Sligo in November," occur, I can find *no notes* connected with the index in any of that year's numbers. The second reference to the Osprey is in the year 1909, when a Mr. Henderson writes that, when fishing on Lough Arron, he and his friend "saw an Osprey hovering over the lake for some time, and then disappeared." So for the *eleven years* there is no record in the 'Irish Naturalist' of any slaughter of Ospreys! No one can regret and reprobate the destruction of our rare breeding birds more than I do, but while the dealer's and collector's trade flourishes, what can be done? A few days ago I received a letter from an English dealer, asking me to exchange duplicate eggs, especially those of the *Falconidæ*. I gave him my usual reply, and forwarded the letter to the Royal Society for the Protection of Birds, London, so that they might keep this dealer under observation.—ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

#### REPTILIA.

**Occurrence of Small Red Viper in North Devon.**—In June, 1908, I captured a specimen of *Vipera berus* (var. *rubra*), which Dr. Leighton regards ('British Serpents,' p. 206) as a valid species. I was walking in the Valley of Rocks, Lynton, at the time, and noticed the Viper sunning itself. I put my foot on it, and then passed a piece of string around its tail. At the end of the string's length the reptile was easily swung against a stone wall and apparently killed; but, on pulling it out from my pocket some time later on returning home, I was frightened to observe that the animal was very much alive, coiling itself up on the floor and hissing furiously. Luckily, the string was still attached, and the snake was finally despatched with a penknife. It measured  $10\frac{3}{8}$  in. in total length, the tail being  $1\frac{1}{4}$  in. Stomach empty. The zigzag marking was of a beautiful brick-red colour. Not much, apparently, is known regarding the distribution of this snake.—BRUCE F. CUMMINGS (Barnstaple).

## PISCES.

**Flight of the Flying-fish.**—For the last three months I have been crossing and recrossing the various areas of ocean where Flying-fish are seen, in many places in countless thousands. After most carefully watching their flight, both with the unaided eye and also with a pair of Zeiss binoculars, I have come to the conclusion that the impetus which makes a long and sustained flight possible is the initial beating of the wings, which move so rapidly that, except by the splash they make upon the surface as they gradually rise clear, these cannot be made out. When they are vol-planing, as they often do for long distances, then the opalescent sheen of the wings which are held horizontally are most noticeable, and have given many people the impression that the elongated membranous fins are only used as the planes of a motor-driven aeroplane. Another point was lately impressed upon me whilst closely watching them, and this was the great effect the movements of the tail have upon the flight, aided no doubt by the smaller posterior wing-like fins acting as a guiding rudder. Before they fall clumsily into the water, it is often to be seen that their wings, *i. e.* the large anterior pair, are raised forty-five degrees from their previous horizontal plane. I can testify to the fact that they are nice eating. Those seen off Madagascar seemed much larger than those I saw off the Island of Socotra. One rose high enough to land on the hurricane-deck of a P. & O. steamer I was on board, twenty-five feet above the water; they often hurl themselves on to the well-deck of vessels, and electric light on board seems to have a fatal fascination for them at night. The popular idea seems sound, that they mistake a ship for some gigantic dolphin, whose favourite food they appear to be.—PERCY RENDALL (Blackheath).

## CRUSTACEA.

**The Brine Shrimp (*Artemia salina*) bred from Tidman's Sea-salt.**—With reference to Dr. Calman's exhibit at the meeting of the Zoological Society of London, held on June 27th last, mentioned in 'The Zoologist' (1911, p. 280), perhaps I may be allowed to state that specimens of the Brine Shrimp, bred from Tidman's sea-salt, were exhibited by me at a meeting of the Royal Physical Society of Edinburgh on Feb. 28th, 1910. Of three boxes of the salt examined only one yielded *Artemia* eggs. It would be interesting to know where this salt comes from. Perhaps some reader of 'The Zoologist' can tell us.—WILLIAM EVANS (Morningside Park, Edinburgh).

IN reply to an enquiry, Messrs. Tidman & Son informed me some time ago that their salt is "made abroad, direct from the sea, entirely by solar evaporation, without the application of any artificial heat." I have also heard that salt manufactured at Trepani, Italy, and imported into Norway for the purpose of fish-curing, has been found to contain living eggs of *Artemia*. The occurrence of the crustacean in the "salterns" or brine-pans of salt-works is, of course, well known.—W. T. CALMAN.

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### EDITORIAL GLEANINGS.

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"PLATO'S story about the submerged continent of Atlantis has again cropped up, this time with some scientific evidence in its support. M. Louis Germain, in a recent communication to the French Academy of Sciences, draws attention to the existence in Quaternary strata in Morocco of many fossil molluscs, including the *Helix graveli*, Germain, of the same species as are still extant in the Azores, the Canaries, Madeira, and the islands of the Cape Verd archipelago. From this and other evidence of the same nature he deduces the sinking under the sea of a continent once extending from these islands to Morocco, and gives reasons for thinking that the submersion took place in late Pliocene times. It may be so; but from the Pliocene Age to that of Plato is a long time, and by whom was the tradition handed down?"—('The Athenæum,' January 13th, 1912.)

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THE Second International Congress of Entomology will be held at Oxford from August 5th to 10th, 1912, and not as previously announced. The President of the Congress is Prof. E. B. Poulton, D.Sc., F.R.S. All communications and enquiries should be addressed to the General Secretary of the Executive Committee, Dr. Malcolm Burr, c/o Entomological Society of London, 11, Chandos Street, Cavendish Square, London, W.

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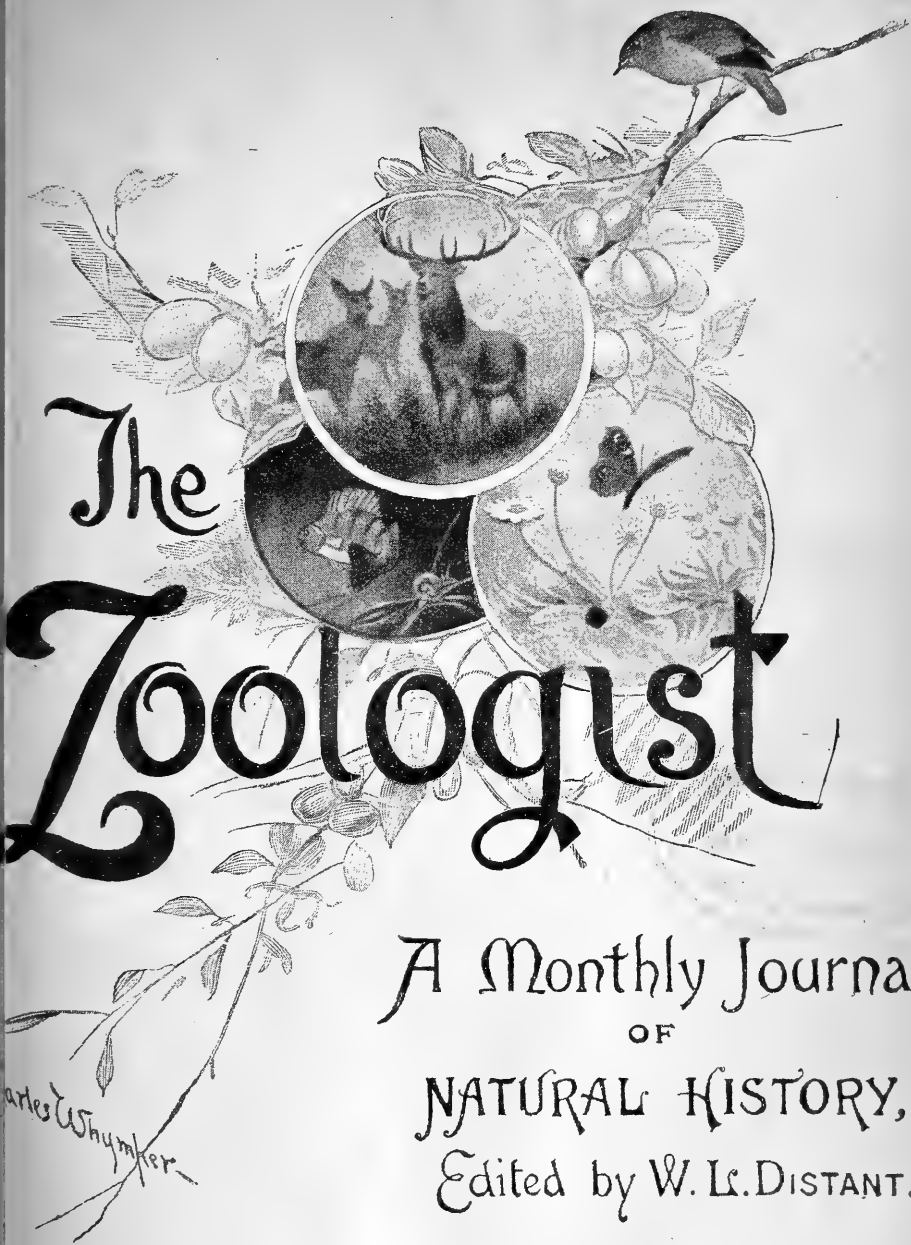
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# THE ZOOLOGIST

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No. 848.—*February 15th, 1912.*

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## THE BIRDS OF LOWER EGYPT.

BY C. B. TICEHURST, M.A., M.R.C.S., M.B.O.U.

MANY people have been to Lower Egypt, and have noted the ornithology of that interesting place, and yet it has struck me that really not a great deal is known at any rate about the breeding birds there, since most Englishmen who have studied the avifauna at all have done so either in the winter or early spring. As Mr. Nicoll has begun, in the 'Ibis,' a series of admirable papers on the ornithology of various parts of the Delta, in the hope, as he says, that they may be of some use to anyone who, at some future date, may collect all the material obtainable for a revised work on the Birds of Egypt, I have thought that perhaps my few notes also should be recorded for the same purpose, especially as my visit occurred after the beginning of the breeding season. Unfortunately, I was only in Egypt a very short time, *viz.* April 28th to May 19th, 1909, the first fortnight of which I was staying at the Giza Gardens, the last week on the shores of Lake Mariotis, at Alexandria. Perhaps the fact that I devoted the whole three weeks entirely to birds made up to some extent for the shortness of my stay.

From the following notes it must not be inferred that, because I have not recorded any one species, it was not there; most of the spring migration had passed through when I arrived, and so I missed many species, some by only a few days, and, as time was very limited, there are naturally many resident birds which I did not happen to come across.

My best thanks are due to Capt. Flower and M. J. Nicoll, Esq., of the Giza Gardens, and Raymond Clarke, Esq., of  
*Zool. 4th ser. vol. XVI., February, 1912.*

Alexandria, for the kind help they gave me in every way, and for making my visit a most enjoyable one.

For convenience sake, I have used the *same nomenclature* as Mr. Nicoll has used in his papers on Egyptian ornithology in the 'Ibis.'

1. *Monticola saxatilis* (Linn.).—One pair and a male seen in some palm-trees on the edge of the desert near the Great Pyramids on April 30th. A male shot had the testes slightly enlarged, and its gizzard contained beetles. These birds were, I believe, on migration.

2. *Saxicola œnanthe* (Linn.).—A few were seen on the edge of the desert near the Great Pyramids on April 30th, and a single bird on the shore of Lake Mariotis on May 15th. None appeared to be breeding, and they were evidently on migration.

3. *S. isabellina*, Cretzschm.—Two or three seen and one obtained on April 30th near the Great Pyramids. From the state of the organs I should say they were not breeding. One seen at Inchas on May 2nd.

4. *S. lugens*, Licht.—A fair number of pairs seen in the Wadi Hof, near Helouan, on May 5th and 7th, where it is the commonest Chat. Females obtained had evidently laid and were sitting. The plumages of the sexes appeared to be similar. The gizzards contained beetles.

5. *S. leucopyga* (Brehm).—This was the next commonest of the Chats breeding in the Wadi Hof. A female obtained was of the white-crowned form, and had an enlarged ovary and oviduct, and a well-marked incubation patch. This species seemed to keep to the highest sides of the Wadi, where this is very rocky and steep, and it is a good deal wilder than the other species. One bird I evidently flushed off its nest amongst the rocks, but unfortunately I had no time to look for the nest.

6. *S. monacha*, Temm.—Two females and a male were seen in the Wadi Hof on May 5th. The females were collecting food, but whether they were feeding young or otherwise could not be ascertained.

7. *Pratincola rubetra* (Linn.).—Three or four scattered birds seen near the Great Pyramids on April 30th were evidently on migration, and this was the only time I met with this species.

8. *Ruticilla phœnicurus* (Linn.).—A few seen in the Giza Gardens on April 28th and 29th, and some of both sexes on the edge of the desert on the 30th and May 2nd; the last was seen on May 9th. The ovary of a bird obtained was not enlarged.

9. *Daulias luscinia* (Linn.).—Few seen in the Giza Gardens on April 29th. These did not stop long, and no song was heard. The ovary of a bird obtained was not enlarged.

10. *Sylvia cinerea*, Bechst.—One seen on the edge of the desert near the Great Pyramids on April 30th.

11. *S. curruca* (Linn.).—One seen in the Giza Gardens on April 29th, and two in the cultivation on May 2nd. A single bird was seen near Giza on May 11th.

12. *Aëdon galactodes* (Temm.).—Common in the Giza Gardens and in the cultivation round Cairo up to the edge of the desert in suitable places. A nest, nearly finished, was found on April 30th in a short palm; it was placed between the leaves and the trunk, about four feet from the ground. The nest was loosely constructed of dried "grasses," and large for the size of the bird. Another nest built in a hedge in the Gardens contained three eggs on May 12th.

13. *Phylloscopus sibilatrix erlangeri*, Hartert.—Quite a number in the Giza Gardens on April 28th and 29th, and a few on the 30th and May 1st. One or two seen at Alexandria on May 13th, and the last on the 15th. This subspecies is noticeably greyer-green on the upper parts than *P. s. sibilatrix* is. Like other migrant Warblers, they were quite silent. The specimens obtained, which I believe had arrived a day or so before, were very fat, a condition I have noticed in other migrants; whether the birds are fat when they arrive, or whether they halt to put on fat lost before migrating again further, I know not. In marked contrast I found nearly all *breeding* birds to have little or no fat.

14. *P. rufus*, ? subsp.—One seen in the Giza Gardens on May 13th, a very late migrant. It was silent.

15. *Scotocerca inquieta inquieta* (Cretzschm.).—Seen only in the Wadi Hof, where it was breeding; a male and female obtained both had incubation patches. Like other birds in the desert, many more are seen in the late afternoon than in the heat of the day. The food consists of small insects. When sitting on a stone the tail is "cocked up" over the back.

16. *Drymæca gracilis delta* (Rehw.).—Very common in the cultivation round Cairo, Inchas, and Alexandria, and also in the Giza Gardens. Two nests found were about three feet off the ground, one in a small "bushy" palm on May 9th, the other in some reeds cut four feet from the ground on May 15th; they contained four eggs and three eggs respectively, just hatching. The eggs were of a pinkish ground colour, with small spots of light brownish red; in one clutch the spots were aggregated together into a zone round the greatest circumference. The young are devoid of down. The nests, which were made of dry bents and lined with white "cotton-seed," are domed, and have the entrance in the same position as the Long-tailed Tit's has.

17. *Cisticola cisticola* (Temm.).—Common in the cultivation both at Inchas and near the Great Pyramids, where I found a pair building on May 9th on a grassy bank. The female had an incubation patch, so that either one brood had already been reared, or the first nest had been destroyed in the harvesting.

18. *Hypolais pallida* (Hempr. & Ehr.).—Common in the Giza Gardens, and also noted in the palm-groves near the Great Pyramids, and in the tamarisks round Lake Mariotis. The song is remarkably like that of *Acrocephalus streperus*, but it struck me as being more warbling and not so harsh in tone. A very neat cup-shaped nest made of dry grasses and lined with white "cotton-seed" was ready for eggs on May 9th.

19. *Acrocephalus phragmitis* (Bechst.).—Single birds were seen at Inchas on May 2nd, and several on Lake Mariotis on May 15th; the sexual organs were not enlarged, the birds were quite silent, and had a considerable amount of fat.

20. *A. stentoreus* (Hempr. & Ehr.).—Common at Inchas and round Lake Mariotis. They seem to choose the tall "feather-head" reed-beds, where the water is deepest, for nesting. A nest found on May 13th was placed within three inches of the water's surface, and contained four young, which were devoid of down. The song appeared to me to be like that of *A. turdoides*. The tarsi are lead-coloured.

21. *Motacilla flava pygmæa* (Brehm.).—Very common in the cultivation round Cairo, and near the Great Pyramids, where they were breeding. Some had young on the wing by May 9th.

The note and song appeared to me to be rather different to those of *M. rayi*. I also met with this form at Inchas, near the Sakkara Pyramids, and round Alexandria. In the Bull. B. O. C. vol. xxi. p. 29, I resuscitated this subspecies, which, since A. E. Brehm described it, had apparently been lost sight of, and pointed out the well-marked distinguishing points. At that time even adults appeared to be rare in collections, and it seems probable that the nestling plumage was practically unknown; so perhaps a few words on this stage of plumage may not be out of place. Such a bird, shot on May 9th, 1909, at Abu Roash, differs from a *M. flava flava* in similar plumage (Gooiland, Holland) in having a very slightly marked dull-coloured superciliary, and the black line surmounting this duller and much narrower, the longitudinal lines on the throat and the pectoral collar much less marked; this, however, and the browner edgings to the feathers of the upper part may be an individual variation.

22. *Anthus trivialis* (Linn.).—Three seen and one shot on some marshy ground round the edge of Lake Mariotis on May 18th. No song or note heard; the ovary was not enlarged. These birds' actions were like those of a Meadow-Pipit's—quite different to the soaring flights seen in the nesting-time.

23. *Oriolus galbula*, Linn.—A good many seen in the Giza Gardens on migration, April 28th to May 2nd. They seemed very partial to mulberry-trees, on the fruit of which they were feeding. Old adult males seemed to be in the minority. Unlike many other migrants, this species was occasionally heard singing.

24. *Lanius excubitor elegans*, Swains.—A bird, which has been referred to this species by Dr. Hartert, was obtained in the Wadi Hof on May 5th. It was an incubating female, and from the state of the organs had recently laid. The breeding quarters of this species, which were said to be in Algiers, Tunis, and Tripoli (Hartert, Vög. Pal. Fauna, p. 428), must now be extended to the Egyptian Delta.

25. *L. pomeranus pomeranus*, Sparr.—A female obtained on the edge of the cultivation near the Great Pyramids on April 30th was the only one seen. The two central tail-feathers of this bird show only a trace of white at the base, whereas *L. pomeranus niloticus* has fully 3 cm. of white. The ovary was

not enlarged, and the gizzard contained beetles. Mr. Nicoll tells me that *L. p. niloticus* is much the commoner species in Giza Province, and he has apparently not met with the typical form himself.

26. *L. nubicus*, Licht.—One seen near the Great Pyramids on April 30th, and one in the Giza Gardens a few days later.

27. *Muscicapa grisola*, Linn.—One or two seen near Giza nearly every day; the last was seen on May 15th at Lake Mariotis. The sexual organs were not enlarged. A rather tired and out-of-place migrant was shot in the rocky valley of Wadi Hof on May 5th; it was not at all fat.

28. *M. atricapilla atricapilla*, Linn.—One seen in the palms near the Great Pyramids on April 30th, and one female obtained at Inchas on May 2nd; its ovary was not enlarged.

29. *Hirundo rustica savignii*, Steph.—Common round the Great Pyramids, the Pyramids of Sakkara, and at Inchas; a female shot at the latter place on May 2nd had a soft-shelled egg in the oviduct. Young on the wing were noted on May 9th. Only one seen at Alexandria, possibly because the native villages, the mud houses of which seem to be their favourite breeding quarters, were not visited.

30. *H. rustica rustica*, Linn.—Common round Cairo until May 13th, when I left. From May 14th to 18th great numbers were passing Lake Mariotis in a north-east direction. Numbers increased towards evening every day, when flock after flock went by, together with Sand-Martins and House-Martins. Mr. Raymond Clarke, of Alexandria, informs me (*in litt.*) that this Swallow was still passing through that place up to June 6th, when his opportunities for observing ceased.

31. *Chelidon urbica* (Linn.).—A flock seen near Giza on April 30th, and single birds on May 7th near Helouan. At Lake Mariotis, on May 14th to 18th, this species was migrating in small numbers with the last species.

32. *Cotile riparia riparia* (Linn.).—Large flocks near the Great Pyramids on April 30th, and large numbers flying north-east in the evenings of May 14th and 15th at Lake Mariotis, together with Swallows and Martins.

33. *C. riparia shelleyi*, Sharpe.—Common on the edge of the cultivation near the Great Pyramids, and at Inchas, where on

May 2nd I found a large colony breeding in the sandy sides of a canal-bank three feet high. The nests, which were merely a scanty collection of small bents with no lining, were situated about three feet in, and contained fresh or slightly incubated eggs; four seemed to be the full number. The eggs are pure white, and measure (average of eight)  $17.8 \times 12.5$  mm. Several of the nesting-holes were also tenanted by a small toad!

34. *C. rupestris obsoleta*, Cab.—A few seen only in the Wadi Hof on May 5th and 7th. A female obtained had a large incubation patch.

35. *Passer domesticus*, subsp. ?—The Sparrow round Cairo is distinctly greyer on the upper parts than in *P. domesticus domesticus*, though it does not appear to be quite so grey or bright as the Sparrow of the Fayoum, *P. d. niloticus* of Nicoll and Bonhote (Bull. B. O. C. vol. xxiii. pp. 101–2). I cannot, however, agree with Mr. Nicoll ('Ibis,' July, 1909, p. 476) in considering that the House-Sparrow found in the Delta is nearest to *P. d. indicus*, since in the former the ear-coverts are not pure white, and the chestnut stripes on the head do not meet to form a nuchal band as in the majority of *indicus*. The Delta Sparrow appears to me to be nearest *P. d. niloticus*. Dr. Madarasz has lately (Ann. Mus. Nat. Hungary, 1911, p. 340) described the Sparrow of Alexandria as *P. alexandrinus*; as I have not been able to see the type of this race, I am unable to say whether the Cairo birds belong to it or not, but it seems likely.

36. *Erythrospiza githaginea* (Licht.).—Single birds seen at the Wadi Hof on May 5th and 7th; on the latter day Mr. Nicoll secured an adult ('Ibis,' July, 1909, p. 477). These birds seemed rather wild, and, like many desert birds, are adepts at disappearing into space! The pink at the base of the tail is noticeable in flight.

37. *Galerida cristata nigricans*, Brehm.—A very typical specimen (a female) of this race was obtained in the cultivated land at Inchas, in the Delta, on May 2nd. It had the ovary much enlarged. Crested Larks obtained at the Abu Roash, near the Great Pyramid, which in May were nesting, however, present difficulties. They differ from typical *nigricans* in being less dark on the upper surface, and compared with a series of *G. c. maritica* of Nicoll and Bonhote (Bull. B. O. C. vol. xxiii. p. 101), from

Fayoum, individuals cannot with certainty be distinguished. On the average, the Fayoum birds are a trifle greyer on the upper surface, and it seems to me at present doubtful whether *mæritica* is sufficiently distinct to warrant separation as a separate race. On May 15th I obtained a female Crested Lark on an island in Lake Mariotis, near Alexandria, which appears to Mr. Bonhote and myself to be identical with specimens of *mæritica* from the Fayoum. This bird was feeding young together with its mate, a much paler bird with a longer bill, which bird appears to be identical with the type of *G. cristata caroli* of Hartert (from the Wadi-el-Natrûn), except that it has rather a shorter wing. *Galerida cristata altirostris* of Brehm, which was described from Upper Egypt (exact locality unknown), I did not meet with. From examining a series of these birds in the Tring Museum, including the type, it appears to me to be a perfectly good race, and differing from the Fayoum birds and Abu Roash birds in the much more yellowish upper parts.

38. *G. cristata caroli*, Hartert.—As mentioned above, I obtained a specimen of this subspecies at Lake Mariotis, feeding young and paired with a much paler bird. This race hitherto has only been found in the Wadi-el-Natrûn, about 100 kilometres S.S.E. from Lake Mariotis. On comparing a series of these birds with a series of *altirostris* (including the types of both), there seems to be a considerable amount of intergrading both in colour and measurements. As *caroli* is said to have a longer bill than has *altirostris*, and a longer wing than the other forms of Egyptian Crested Larks, I give the measurements of the males I have examined:—

Six specimens, *Galerida cristata caroli*. Wing, 100–108 mm.; bill,\* 12·5–15 mm.

Seven specimens, *G. c. altirostris*. Wing, 100–107·5 mm.; bill, 11·5–14 mm.

Eight specimens, *G. c. mæritica*. Wing, 102–109·5 mm.; bill, 12·25–14·25 mm.

Three specimens, *G. c. nigricans*. Wing, 100–102·5 mm.; bill, 12·5–13 mm.

\* The bill measurement is taken from the anterior part of the external nares to the tip—the only way in which I consider accuracy and uniformity of measurement can be obtained.



From the above it seems obvious that the wing and bill measurements alone of individuals are of little use in determining the race. It seems to me that there is much to be learnt about the Crested Larks of the Egyptian Delta. Until recent years the various races have been more or less "lumped" together—to my mind, not a very scientific procedure, though undoubtedly the simplest—and little attempt has been made to work out the races and their distribution; so that it is to be hoped that future workers will pay more attention to these birds, and elucidate the very interesting problem as to why in Egypt there are found three or four recognizable races of Crested Larks. So far it seems to me certain that *caroli* is not confined to the Wadi-el-Natrûn, and that *mæritica* (if it be distinct) is not found only in the Fayoum, and it seems more than likely that the race of Crested Lark of any one area is correlated to the nature of the soil in that area, and that on the border-line interbreeding takes place. The food of Crested Larks obtained consisted of corn, other seeds, and beetles. The notes of the various forms did not appear to me to differ from those of *G. cristatâ cristata*.

39. *Ammomanes deserti isabellina* (Temm.).—Several pairs were met with in the desert near Helouan; judging from the actions of the birds and the state of their sexual organs they were breeding. The song, which is pretty and warbling, is uttered hovering, but also when on the ground. Food consists of vegetable-matter, seeds, and stray grains of corn—the latter probably dropped from some passing cavalcade, as there was no cultivation for some miles distant. With the sun on them these birds look almost pink in colour.

40. *Calandrella brachydactyla longipennis* (Eversm). — A small flock seen on the edge of the desert, near the Great Pyramids, on April 30th. On May 9th a single one only was seen and obtained; an old shot-wound had evidently delayed its migration. A small flock, which was very wild, was seen at Inchas on May 2nd. The specimen obtained had the testes only very slightly enlarged, and in the gizzard were some seeds and corn. Whether all birds seen belonged to this form one cannot say; when the plumage is worn it is not always easy to differentiate this race from the typical race.

41. *C. minor nicolli*, Hartert.—This form I found on the semi-

cultivated desert on the northern shore of Lake Mariotis, and on an island in the lake on May 15th and 18th. The males were in full song and soaring, but neither the song nor the flight was so sustained as in *Alauda arvensis*. From the state of the sexual organs and the incubation patches on the females obtained I infer that this subspecies was breeding there. Dr. Hartert described this form from birds obtained by Mr. M. J. Nicoll in January, 1908, at Damietta (Bull. B.O.C. vol. xxv. p. 9), and he there describes the bill as "a dark horn-grey, almost blackish in the skin." This may be so in winter plumage, but the birds I obtained in the breeding season all had the bill orange-yellow, with a blackish tip; in the dried skin the colour is pale horn, there being no trace of orange-yellow left. The breeding range of this subspecies is as yet undefined, but the birds I obtained are the first to be recorded from a breeding quarter.

42. *Sturnus vulgaris*, subsp. ?—Starlings had evidently left Egypt by the end of April. I only saw two birds on an island in Lake Mariotis; they were quite unapproachable.

43. *Corvus cornix cornix*, Linn.—Exceedingly common round Cairo, and young were on the wing early in May. In the Giza Gardens it is too numerous. I agree with Mr. M. J. Nicoll ('Ibis,' July, 1909, p. 481) that the Egyptian Hooded Crow is not separable from the Northern European form. The distribution of this species in Egypt wants further investigation. In going by rail from Cairo to Alexandria one sees "Hoodies" in quantities at first, but the number soon falls off, and after passing Teh-el-Barud none were seen. This apparent limitation of the range northwards is very curious, as the character of the country does not seem to alter, though it is worth noting that Teh-el-Barud is near where the railway line leaves the Nile, and it is possible that the river has some influence on the distribution. Capt. Flower tells me he has independently noticed this curious distribution. Round Alexandria this species was not seen. Mr. Cavendish Taylor ('Ibis,' 1891, p. 473) also remarks on its absence there, and in the 'Ibis,' 1867, he says that, since there are no trees at Suez, there are no Hooded Crows; this explanation, however, would not apply to Alexandria.

44. *C. corax umbrinus*, Sund. — Seen in the desert near Helouan on May 7th, on which date young were on the wing.

There was an old nest on a ledge of a precipitous part of the Wadi Hof, which, according to the Bedouins, had been resorted to year after year.

45. *Cypselus apus murinus*, Brehm.—The Pallid Swift was seen in the desert near Helouan on May 5th and 7th, and at the Sakkara Pyramids on May 12th. This species appears to be much paler than *C. apus* when one has a fairly close view of it.

*C. apus apus* (Linn.) was not identified for certain, though some birds seen flying over the cultivated land near the Great Pyramids, on April 30th, I thought belonged to this species. There were quite a number of them flying high to the north, suggestive of a migratory movement. Most of the Pallid Swifts I saw were in pairs or single birds.

46. *Caprimulgus europæus*, Linn.—One or two birds seen in the Giza Gardens on several occasions between April 30th and May 13th seemed to me to be too dark for *C. ægyptius*.

47. *C. ægyptius*, Licht. — The only occasion on which I was out on the desert at dusk I saw a Nightjar, which may have belonged to this species, viz. on May 7th at Helouan.

48. *Ceryle rudis* (Linn.).—One seen at Inchas, in the Delta, on May 2nd. Several used to visit the ponds in the Giza Gardens during my stay, and were to be seen sitting on the railings round one of the ponds, especially early in the morning.

49. *Coracias garrulus*, Linn.—One seen sitting in a date-palm on the edge of the cultivation near Abu Roash on April 30th. I did not hear it utter any note.

50. *Merops apiaster*, Linn.—Many seen in flocks during the last few days of April and the beginning of May round Cairo, and during my stay it was a frequent visitor to the Giza Gardens. One shot on the edge of the cultivation near Abu Roash had bees in its gizzard, and the feathers of the abdomen smeared with honey. The ovary was not enlarged.

51. *M. persicus*, Pall.—I came across a small colony of these birds on some semi-cultivated ground at Inchas, in the Delta, on May 2nd. They were in pairs, and several were hawking over and sitting on a bare piece of ground; that they were nesting there I feel sure, and a female obtained had, judging by the condition of the ovary and oviduct, recently laid; moreover, it had a large incubation patch.

52. *M. viridis cleopatra*, Nicoll.—One seen in the date-palms near Abu Roash on April 30th; it was very wild. Mr. Nicoll has lately (Bull. B.O.C. vol. xxvii. p. 11) separated the Egyptian Green Bee-eater from the Sudanese form.

53. *Upupa epops epops*, Linn.—Many seen on April 30th on the edge of the cultivation near the Great Pyramids; one obtained had long yellow larvæ in its gizzard. On visiting the same place on May 9th I only saw one. I did not meet with the larger-billed form—*Upupa epops major* of Brehm—so far as I could determine.

54. *Cuculus canorus*, Linn.—I only saw one Cuckoo, on May 2nd, in a "bag" of a European "sportsman"; he had shot it, together with Turtle-Doves, Common Bee-eaters, and Hoopoes, between Inchas and Cairo. He discoursed to me on the gastro-nomic properties of his spoils!

55. *Strix flammea kirchhoffi* (Brehm).—Frequently seen in the Giza Gardens during my visit.

56. *Athene noctua glaux* (Savigny).—Frequently seen in the Giza Gardens, and also met with near the Sakkara Pyramids.

57. *Neophron percnopterus* (Linn.).—Both young and adults seen in the distance over the cultivation near the Great Pyramids on May 9th.

58. *Circus*, ? sp.—I saw a pale-coloured Harrier in the distance at Inchas on May 2nd, which may have been a Pallid Harrier (*Circus swainsoni*); it certainly was not a Montagu's Harrier.

59. *C. æruginosus*, Linn.—Two or three adult birds seen on May 15th to 18th hawking over the swampy reed-beds on Lake Mariotis, where they were probably breeding. I was surprised not to find this bird more common there.

60. *Buteo* sp. ?—A pair of Buzzards which were seen in the distance in the Wadi Hof, near Helouan, on May 5th, apparently had an eyrie in the neighbourhood. I fancy they were *B. v. desertorum*, but could not be sure.

61. *Aquila imperialis*, Bechst.—One seen over the desert near Helouan on May 7th.

62. *Milvus migrans ægyptius* (Gm.).—Numerous everywhere round Cairo, nesting commonly in the Giza Gardens, and even in the trees in some of the principal streets of Cairo. In a part

of the suburbs of the city I estimated one evening that there were several hundreds on the wing at once. On my arrival in Cairo (April 28th) young were flying; one adult with enlarged ovary, obtained in the Giza Gardens, had the bill dark horn-colour instead of yellow, though plenty were seen in the same place with the bill the latter colour. Mr. Nicoll has suggested ('Ibis,' October, 1909, p. 630) that these specimens are in ill-health, but it seems to me that, as the chief distinguishing character between *M. migrans ægyptius* and *M. migrans migrans* is the colour of the bill and iris, it is possible that both forms occur in Egypt; and, indeed, A. L. Adams ('Ibis,' 1864, pp. 9-10) noted that both forms were found there, and he thought that *migrans* was the commoner up as far as the First Cataract, while at Edfoo he saw both. With this distribution S. S. Allen ('Ibis,' 1864, pp. 234-5) did not agree, and he considered *M. migrans (ater)* to be the commoner species in the Nile Valley above Cairo; but in the Delta the reverse to be the case, and here he could not find one *migrans*, while round Cairo the numbers were equally divided. Both agree that young of both species are easily confounded. Cavendish Taylor ('Ibis,' 1867, p. 53) records that he never saw an adult *migrans*, and all birds which he considered to be adult were *ægyptius*, but he did not seem certain as to which species immature birds belonged. Shelley, too ('Ibis,' 1871), did not meet with *migrans* for certain. So it seems to me still a doubtful question as to whether there are—at all events, round Cairo—two closely allied forms, *M. m. migrans* and *M. m. ægyptius*, breeding side by side, and whether the real explanation of these differences of opinion is not to be found in the suggestion that *ægyptius* does not get the yellow bill until the bird is two years old; I am certain, at least, that the bird I obtained was at least one year old, and had bred. Observations on captivity birds of known age might throw some light on the question.

The distribution of the Kite in Egypt, too, wants carefully working out. For some reason there appears to be a limitation northwards of its range, such as noticed in the case of the Hooded Crow, for going from Cairo to Alexandria by rail I saw no Kites after leaving Choubri-el-Maruba, nor did I see any round Alexandria, though I believe it is said to be found very

rarely there, and yet the conditions in that locality would appear to be much the same as those round Cairo. Cavendish Taylor ('Ibis,' 1891, p. 473) records that no Kites were to be seen in Alexandria, and Mr. W. L. S. Loat did not meet with any in the Wadi-el-Natrûn, and recorded it (*p. c.* 1906, p. 120) as uncommon at Lake Menzaleh.

63. *Falco tinnunculus*, Linn.—Single birds were seen over the cultivated land on several occasions near the Great Pyramids, and at Inchas; one obtained on May 9th near the former locality was a young male of the previous year in full moult. Judging by the state of the testes it certainly was not breeding. Its gizzard contained a Lizard (*A. sentilata*) and a Mole-Cricket.

64. *Ardea cinerea*, Linn.—Several seen in the distance on Lake Mariotis on May 15th.

65. *A. bubulcus*, Audouin.—A bird seen from the railway in some marshy ground a few miles south of Alexandria I believe belonged to this species. The Buff-backed Heron seems to be a rarer bird in the Delta than formerly, as Mr. J. H. Gurney tells me he met with it abundantly almost everywhere in the Delta in 1875.

66. *A. ralloides*, Scopoli.—In a large tamarisk swamp in an island in Lake Mariotis I met with about fifty of these birds together on May 15th. These birds were very wild. During flight the neck is bent back as in the case of the other Herons, the beak is very prominent, and, compared with the rest of the plumage, the back looks very dark, almost black, in bright sunlight. After much stalking one was shot for me by an Arab. The ovary was much enlarged, and from the state of the oviduct it was evident that an egg had been recently laid; moreover, there was a well-defined incubation patch. The gizzard contained a small fish, locally known as "Baultee" (as near as I can get it). On questioning the local Arabs, they informed me that these birds nested in a tamarisk swamp about three miles away on the other end of the island.

67. *Ardetta minuta* (Linn.).—Many birds of this species were met with in the swampy reed-beds round Lake Mariotis and on the above-mentioned island during my visit, May 15th to 18th. Birds obtained had the same species of fish in its gizzard as found in the Squacco. Females had incubation patches, and from the

state of the organs had quite recently laid ; one male, with very large testes, was very fat, a condition which, in my experience, is not at all common in *breeding* birds of any species. When disturbed during the day the flight is slow and flopping, and, as a rule, not long ; in fact, one when flushed flew into some tall reeds near by, and settled near the top of the stems, about twelve feet above the water, where it assimilated well with its surroundings as it sat "sideways" on the stem and "drew itself up." At dusk this species "flights" apparently to its feeding-grounds, and it then flies quite quick and straight, the beak being prominent and the neck bent. At no time did I hear any sound uttered. This species was also met with at Inchas, in the Delta, on May 2nd.

68. *Nycticorax griseus* (Linn.).—I only saw this bird in the Giza Gardens where a well-known flock of varying numbers are to be seen resting by day on some bushes in the Pelican Pond. At dusk the flock "flights" out to its feeding-grounds ; for a few minutes the air seems full of them and their noisy "squawks." Their numbers seemed to diminish during my stay, for on May 13th I only saw ten to twelve. They are nearly all immature birds in spotted plumage, and out of forty individuals counted there was only one adult, but Mr. Bonhote tells me that there are plenty of adults there in winter. This "fighting" of Night Herons was noticed by Cavendish Taylor at the same spot many years ago ('Ibis,' 1896, p. 481).

69. *Ciconia alba*, Bechst. — Four seen at Inchas, on the edge of the Arabian desert, on May 2nd, and seven were seen passing high over the Sakkara Pyramids, going north, on May 12th.

70. *Phanicopterus roseus*, Pallas.—A flock of about a hundred were seen flying over Lake Mariotis on May 14th, and some Arabs, from whom I bought three freshly shot immature birds, assured me that they breed on the lake, and described accurately the nest and egg ; however, I had no time to investigate the breeding-ground. I saw five adults feeding by the northern shore of the lake on May 18th. They were some little distance from land, but as the lake is nowhere deep there must be few places within half a mile of land where this bird could not stand. These immature birds, which I think are twelve months old,

had not the sexual organs enlarged, and they were excessively fat. The gizzards were empty.

71. *Anas boschas*, Linn.—Several seen on Lake Mariotis on May 15th to 18th.

72. *Spatula clypeata* (Linn.).—A flock of about thirty only were to be seen on the Pelican Pond in the Giza Gardens during my stay; the flock gradually diminished in numbers, and the last were noted on May 8th. Some of the males were not quite yet in full adult breeding plumage.

73. *Querquedula crecea* (Linn.).—With the Shovelers on the Pelican Pond in the Giza Gardens were a fair number of Teal, but their numbers gradually diminished during May, and when I left on the 13th there were only about a dozen to be seen. At dusk they used to "flight" with the Shovelers soon after the Night Herons had gone.

74. *Turtur communis communis*, Selby.—Common round Cairo, and especially in the Giza Gardens, during my visit. This species was still passing through when I left on May 13th. *T. communis isabellinus* was not identified for certain.

75. *T. senegalensis ægyptiacus*, Bp.—Very numerous round Cairo and Alexandria, and many nest in the Giza Gardens, &c., and most private gardens on the outskirts of Alexandria seemed to be tenanted by a pair or more. Young were noted on the wing on my arrival on April 29th, while others were still sitting.

76. *Caccabis chukar* (?), Gray.—Birds heard in the Wadi Hof, near Helouan, were ascribed to this species.

77. *Ammoperdix heyi heyi*, Temm.—I met with a pair of this species in the Wadi Hof, near Helouan, where Mr. Nicoll had already located it. They seemed to keep to the rocky sides of the Wadi where I first saw them running, and up which they ran considerably faster than I could! On being close pressed or surprised they took short flights, and worked back to the same spot. From their actions I think there was a nest near by.

78. *Coturnix communis*, Bonnaterre.—Being rather late for the migration, and also not caring to walk through the crops, I only met with a single bird of this species in a rough marshy ground on the outskirts of Alexandria, on May 17th. It showed no sign of having a nest at hand.

79. *Gallinula chloropus* (Linn.).—On Lake Mariotis on May



15th to 18th I caught glimpses on several occasions of Moorhens skulking amongst the reeds; I saw no young, nor did I find a nest. Mr. Raymond Clarke tells me they are very numerous there in winter.

80. *Cedicnemus senegalensis*, Sw. — Mr. Nicoll thinks that most, if not all, the Stone Curlews seen round the Giza Gardens belong to this species. I only met with it in or near the Gardens. Several "roost" by day on the top of the ruined palace close by, and "flight" into the Gardens at night. I saw some young ones which had been caught near by early in May.

81. *Glareola pratincola* (Linn.).—I met with this species on the bare fields round some pools in the cultivation at Inchas on May 2nd. They were mostly in pairs, and from the state of the organs they were doubtless going to nest there. Their flight reminded me of the buoyant flight of a Tern.

82. *Ægialitis cantiana* (Latham).—Several large colonies were found on an island and on the northern shores of Lake Mariotis on May 15th to 18th. They were breeding on the sand and dry mud, and a nest with three eggs found was a mere depression in the sand. I can find no constant difference between specimens from Egypt and those from England.

83. *Æ. hiaticola* (Linn.).—A pair were seen round a pool near the Sakkara Pyramids on May 12th, and another pair on the northern shore of Lake Mariotis on May 18th. They gave no indication of nesting, and to which form of Ringed Plover they belonged it is impossible to say. Gurney ('Rambles of a Naturalist,' p. 196) and Nicoll ('Ibis,' 1909, p. 644) only met with *Æ. intermedius* (Ménétr).

84. *Hoplopterus spinosus* (Linn.).—Some were seen from the train fifty miles north of Cairo on April 28th, and a few were met with at Inchas on May 2nd. Judging from the ovary of a female obtained there they were doubtless nesting. The flight was very like a Lapwing's, but the note quite different.

85. *Himantopus candidus*, Bonnaterre.—One seen on some pools below the Sakkara Pyramids on May 12th.

86. *Gallinago caelestis* (Frenzel).—One seen on Lake Mariotis on May 13th showed no sign of nesting.

87. *Tringa alpina*, Linn.—One seen on Lake Mariotis on May 16th; it was in full breeding plumage.

88. *T. minuta*, Leisler.—Three or four seen on Lake Mariotis on May 15th and 18th. Birds obtained were in fresh fully moulted breeding dress, and the organs were not enlarged.

89. *T. temmincki*, Leisler.—Small flock seen by some pools at Inchas on May 2nd. Two individuals secured were in full body moult, and were very fat. Sexual organs not enlarged. Legs and feet yellowish green.

90. *T. canutus*, Linn.—Flock of about eight seen on Lake Mariotis on May 14th. This species has only previously been recorded in Egypt by Mr. Nicoll ('Ibis,' 1909, pp. 646-647).

91. *Machetes pugnax* (Linn.).—Small flock at Inchas on May 2nd were very wild, but no males with ruffs were seen.

92. *Calidris arenaria* (Linn.).—Three seen on Lake Mariotis on May 18th appeared to be in full summer dress.

93. *Totanus hypoleucus* (Linn.).—One at Inchas on May 2nd, and many were seen on migration at Lake Mariotis from May 14th to 18th.

94. *T. ochropus* (Linn.).—A passing migrant seen near the Great Pyramids on April 30th.

95. *T. glareola* (J. F. Gmelin).—Several seen at Inchas on May 2nd, and one at Alexandria on May 17th.

96. *T. canescens* (J. F. Gmelin).—One at Inchas on May 2nd.

97. *Limosa lapponica* (Linn.).—A small flock seen on some flooded fields near Alexandria on April 28th I am pretty sure belonged to this species, which was added to the Egyptian list by Cavendish Taylor from birds obtained in the Cairo Market in February, 1896 ('Ibis,' 1896, p. 481).

98. *Sterna*, ? sp.—A Tern seen in Cairo passing down the Nile looked like *S. fluviatilis*.

99. *S. minuta*, Linn.—A flock seen on May 15th on Lake Mariotis. One obtained had got the testes slightly enlarged. The natives knew it well, and said that it passes through every May, but none stop to breed.

100. *Hydrochelidon hybrida* (Pallas).—Several seen on Lake Mariotis on May 15th. The natives, who knew the birds well, say many arrive there towards the end of the month and breed in the reed-beds.

101. *Larus fuscus*, Linn.—Many adult birds seen in Alexandria Harbour and on Lake Mariotis on May 15th to 19th;

only one immature bird seen. Everyone who has studied birds in Egypt seems to have noted the occurrence of this species in the breeding season, but as yet no one has found it nesting there. I suspect that a good search along the shores of Lake Mariotis might be productive. Cavendish Taylor, in the 'Ibis,' 1891, p. 473, notes that these birds at Alexandria have the mantle darker than northern birds have, and that they have no winter plumage!

102. *Alca torda*, Linn.—The claims of this species as an addition to the Egyptian avifauna rests with a specimen picked up on the shore at Ramleh in the winter of 1908-9 by Mr. Raymond Clarke. He told me the bird was not very fresh. He kept the beak for identification, and gave it to me. I can find no record of the Razorbill in Shelley's 'Birds of Egypt' or in Von Heuglin's book on the birds of North-east Africa. This specimen may of course have drifted some way, but it seems unlikely that when alive it could have been very far from the Egyptian coast.

## THE BIRDS OF LINCOLNSHIRE: ADDITIONS TO THE COUNTY LIST.

BY THE REV. F. L. BLATHWAYT, M.A., M.B.O.U.

THE writer knows of no published list of the birds of Lincolnshire as a whole. The excellent works on the birds of the Humber District, completed by the late John Cordeaux in 1872 and 1899, are by far the best published works dealing with the birds of Lincolnshire. But these works take no notice of large portions of the southern and western parts of the county, and also, during the last twelve or thirteen years, new species have been added to the list of the birds of that part of Cordeaux's clearly defined "Humber District" which falls within the boundaries of the county of Lincolnshire. The following notices, taken in connection with the Lincolnshire records in Cordeaux's revised list of the birds of the Humber District (1899), will make up a tolerably complete list of the species of birds which have occurred in Lincolnshire.

Cordeaux's list includes three hundred and twenty-two species, but of these it appears that fifty-two occurred only in Yorkshire, so his Lincolnshire list is reduced to two hundred and seventy. The following seventeen species, some of which appear in the above-mentioned list as having occurred in Yorkshire, may now be added to the Lincolnshire list, while ten others have been here included within brackets to signify that such records are not entirely satisfactory.

Mr. G. H. Caton Haigh, of Grainsby Hall, near Grimsby, prepared, some ten years ago, a list, which he has kindly allowed me to see, of the birds of Lincolnshire for the Victoria County History series, but this, I believe, has not yet been published. Many of the following records have already been noticed in such periodicals as 'The Zoologist,' 'British Birds,' and 'The Naturalist.' The initials G. H. C. H. after a record show that the authority is Mr. Caton Haigh, a gentleman who is well known among ornithologists for his systematic studies of the migratory movements of birds on the north-east coast of Lincolnshire.

1. FIRE-CRESTED WREN (*Regulus ignicapillus*).—One was shot at North Cotes (Lincolnshire coast) on November 9th, 1901 (G. H. C. H.). The species is described as a "very rare autumn migrant to north-west Lindsey," but no record is given; see 'Naturalist,' 1902, p. 202.

2. LANCEOLATED WARBLER (*Locustella lanceolata*).—One shot at North Cotes, November 18th, 1909 (G. H. C. H.). The first recorded British example.

3. BEARDED TITMOUSE (*Panurus biarmicus*).—Formerly an inhabitant of the Lincolnshire fens. No recent records. A specimen shot in north-west of county in 1840; 'Naturalist,' 1902, p. 203.

4. WILLOW TIT (*Parus kleinschmidti*).—Seven specimens were procured near Grainsby in winter between the years 1894–1899 (G. H. C. H.). These were thought to be Marsh Tits (*P. palustris*), but were recognized as the above in 1911; see 'British Birds,' vol. iv. p. 284.

The Marsh Tit occurs commonly near Lincoln, and specimens have been examined by competent authorities. The distribution of these two species in the county requires working out. It is possible that the Willow Tit is only a migrant to the coast districts, and it is not certain that the Marsh Tit occurs in these districts at all. The latter is certainly a resident in the woods around Lincoln.

5. RED-BREASTED FLYCATCHER (*Musicapa parva*).—One shot at North Cotes on September 16th, 1909 (G. H. C. H.).

[RUSTIC BUNTING (*Emberiza rustica*).—A female seen six yards away through glasses by J. Whitaker on September 22nd, 1906, at Chapel St. Leonards, Lincolnshire coast; see 'Zoologist,' 1906, p. 392.]

6. SNOWY OWL (*Nyctea scandiaca*).—Occurred at Bottesford, north-west Lindsey, in the winter of 1868–1869; 'Naturalist,' 1908, p. 399.

7. EAGLE OWL (*Bubo ignavus*).—One shot near Stamford, April 12th, 1879; 'Zoologist,' 1879, p. 306.

8. MONTAGU'S HARRIER (*Circus cineraceus*).—Almost certainly a former inhabitant of the Lincolnshire fens, but definite records are scarce. A female and eggs taken in N.W. Lincolnshire "many years ago"; 'Naturalist,' 1908, p. 399.

9. ICELAND FALCON (*Falco islandus*).—A young female said to be of this species was shot near Lincoln, December, 1900; see 'Naturalist,' 1901, p. 42. The writer has seen this specimen, and it appears to have been correctly identified. It will shortly be in the Lincoln Museum.

10. AMERICAN PEREGRINE FALCON (*F. anatum*).—One obtained, Humberstone, Lincolnshire coast, September 28th, 1910. The first recognized capture of this species in Europe (G. H. C. H.); see 'British Birds,' vol. v. p. 219.

11. RED-FOOTED FALCON (*F. vespertinus*).—One was shot by a keeper at Panton, near Wragby, on May 15th, 1902 (G. H. C. H.).

[LITTLE EGRET (*Ardea garzetta*), BUFF-BACKED HERON (*A. bubulcus*).—An example of each of these species is in the Lincoln Museum. They were formerly bought by Mr. F. Baines, of Gainsborough, at a sale in Boston about 1865, and were said to have been captured a few years previously in the fens near that town. The history, however, of the specimens is not satisfactory, and perhaps both are Continental specimens. There is an unsatisfactory notice of the capture of a Great White Heron (*A. alba*) in Lincolnshire in Yarrell's 'British Birds,' ed. 4, vol. iv. p. 179. An undoubted example of the Squacco Heron (*A. ralloides*) was shot on the Humber Bank, Great Cotes, on Sept. 29th, 1910 (G. H. C. H.). This is the second record of this species for the county, the first example having been procured about fifty years ago.]

12. RED-CRESTED POCHARD (*Fuligula rufina*).—Specimens were shot near Boston in the years 1826 and 1854; see Yarrell's 'British Birds,' ed. 4, vol. iv. p. 408.

13. PRATINCOLE (*Glareola pratincola*).—One shot near Brantston Hall, Lincoln, August 15th, 1827; see Yarrell's 'British Birds,' ed. 4, vol. iii. p. 233. Another is said to have been killed on Brumby Common in the north-west of the county some years ago (Peacock).

[LITTLE RINGED PLOVER (*Ægialitis curonica*).—One obtained, Holbeach Marsh, September, 1894; see 'The Naturalist,' 1900, p. 27. In the absence of confirmation of this record, it is perhaps safer to assume that the specimen was an example of the small Continental form of the Ringed Plover (*A. hiaticola*).]

14. BLACK-WINGED STILT (*Himantopus candidus*).—The figure

in Yarrell's 'British Birds,' ed. 4, is from a specimen obtained in Lincolnshire in July, 1824.

[PECTORAL SANDPIPER (*Tringa maculata*).—Messrs. Fieldsend and Nash, lately birdstuffers in Lincoln, informed the writer that they received two examples of this species to preserve, shot in August about the year 1895 near Wyberton, Boston.]

15. BUFF-BREADED SANDPIPER (*Tringites rufescens*).—One shot at North Cotes, September 20th, 1906 (G. H. C. H.).

[BARTRAM'S SANDPIPER (*Bartramia longicauda*).—A freshly killed specimen, purchased in Leadenhall Market, and said to come from Lincolnshire, was identified by Mr. J. E. Harting on October 27th, 1880; see 'Zoologist,' 1880, p. 508.]

[WHITE-WINGED BLACK TERN (*Hydrochelidon leucoptera*).—H. Nash, lately a birdstuffer in Lincoln, informed the writer that he saw this species when fishing off Gibraltar Point, Lincolnshire, a few years ago. He also saw the species there some twenty-five years ago. It seems unlikely that so striking a species could be mistaken for any other, and there is no reason why it should not occasionally visit the Lincolnshire coast, as eight were seen on Breydon Water, Norfolk, on April 22nd, 1901; see 'Zoologist,' 1902, p. 88.]

16. CASPIAN TERN (*Sterna caspia*).—One was shot at Caythorpe, near the Notts border, May 17th, 1851; Yarrell's 'British Birds,' ed. 4, vol. iii. p. 537.

[GREAT SKUA (*Megalestris catarrhactes*).—Mr. Caton Haigh thought he saw one at sea off Donna Nook, September 21st, 1901; 'Zoologist,' 1902, p. 132.]

17. GREAT SHEARWATER (*Puffinus gravis*).—Probably often occurs at sea off the coast, but there seem very few records. One was shot near the mouth of the River Welland, November, 1902; see 'Zoologist,' 1903, p. 30.

[SOOTY SHEARWATER (*P. griseus*).—Cordeaux thought that this species was more frequent off Flamborough Head, Yorks, than *P. gravis*. On September 15th, 1911, during a gale from the north, Mr. Caton Haigh saw four or five large black Shearwaters close to land off the north-east Lincolnshire coast, which he thought were examples of *P. griseus*.]

NOTES ON THE WHIRLIGIG BEETLE  
(*GYRINUS NATATOR*).

BY GORDON DALGLIESH.

BEING one of the commonest of British aquatic beetles, the Whirligig is in consequence easy to study in its wild state. There is hardly any pond where it may not be found, provided the conditions are favourable for its mode of life. Swift running water it shuns for reasons which are obvious, but a stream with a gentle flow, especially where a back eddy causes pools of clear water, it occasionally favours with its presence, though its haunt *par excellence* is a pond free from much surface-covering weed, where it can have full scope for its play. Prof. Miall's delineation in comparing its movements to those of Swallows and Bats is a happy one, for this exactly portrays its whirling performances—those delightful mazy, intricate dances that cannot fail to have charmed those who take an interest in water "beasts." To my mind, a number of Whirligigs always bear a fanciful resemblance to a flotilla of torpedo-boats, and the torpedo shape of *Gyrinus* fits it exactly for its manner of life. If a single Whirligig be picked out and carefully watched, it will be seen that it progresses by a series of jerks. This is not so noticeable when viewed *en masse*. Each beetle, too, is surrounded by a circular depression about the size of a shilling, owing to the tension of its weight on the surface-film. Swimming is seldom performed in a straight line, but in that of serpentine curves, and the beetle frequently rotates, so to speak, on its own axis. Now and again a pair will waltz round each other without coming into actual contact. They frequently chase each other, the pursued keeping about its own length ahead of the pursuer until finally overtaken, when both execute a *tête-à-tête* circle. This proceeding is sometimes, though not always, the prelude to an amorous embrace. I have seen pairing take place as early as the middle of March, which is but of



brief duration, reminding one of similar actions on the part of the house-fly. *Gyrinus* always descends to the depths in a spiral curve. They frequently lie motionless on the surface from three to five minutes at a time. The heat of the sun always tends to make them more lively, but sunlight is not essential to them as to some insects, being frequently seen gyrating on cloudy and even cold days, but then only singly or in pairs. They are never seen in any large numbers until early summer is well advanced.

For some reason which it is difficult to explain, in 1909 the Whirligig Beetle was missing in some of its accustomed haunts, where previous to this I had never failed to find it. Though of small size—quarter of an inch in length—its surface-clinging propensity renders it easier of observation than those insects which habitually live beneath the water; for these can never be studied with any degree of confidence except in confinement, which even under the most favourable conditions cannot compare with that of their wild lives. *Gyrinus* does not take well to confinement, all attempts to keep these interesting little beetles in captivity always ending in failure. When thus kept they either “sulk,” lying motionless on the top of the water, or swim round and round beneath. Also they will not execute their characteristic whirl to charm their captor, but make all possible speed to quit their prison by climbing up the sides of the vessel they are placed in. This, disappointing as it is, is what would be naturally expected when we learn more of their mode of life. Let anyone who would wish to make them prisoners go for half an hour or so and watch them in their natural haunts, and he will soon become convinced of the futility of such an attempt. One might as well confine a Swallow in a large cage, and expect it to show there its powers of flight. Watch the widening and ever-widening circles, curves, turns, and twists of a number of Whirligigs; then it will be understood that room, and plenty of it, is what these insects desire. By rough calculation, I have determined that *Gyrinus* measures while swimming, in less than the space of one minute, seven hundred and twenty times its own length; so that some small idea can be formed of the enormous area it would cover in the space of a few hours. And this calculation could only be

gained, providing the insect kept straight on its way without any curves, twists, or gyrations; these being counted in would add considerably to the total just quoted. It seems strange that insects with such fully developed wings should, comparatively speaking, use them so little. Some captives I had made no attempt at flight, but endeavoured to leave their prison by



Diagrammatic sketch of swimming actions of *Gyrynus*. The dotted lines represent the various turns and twists executed while gyrating. The arrow-heads denote the direction taken. When two beetles meet (as they frequently do) at A, a chase ensues, and the route then taken is indicated at B, C, D, and E, which ends in the characteristic twist, a complete circle, at F.

crawling up the glass sides; nor do they attempt to fly when taken in the net and placed on dry ground, but run with far greater speed than one would expect of an insect gifted with such

curiously modified limbs. Prof. Miall states\* that *Gyrinus* is unable to fly from the surface of the water direct, but must needs first climb the stem of a plant. I think I am correct in stating that the sensory organs of most insects lie in the antennæ, but *Gyrinus* depends not alone on these for the detection of its sustenance; † eyesight here plays no small part. The compound eyes of the Whirligig are well known to those who are acquainted with these insects, but I may be here allowed, for the benefit of the uninitiated, to briefly dwell upon their peculiarities. They consist of two separate portions interposed by the socket of the antennæ. Some writers have thought that the facets of one portion are for vision alone, and the other portion for vision below the water. Referring to this, Prof. Miall says † :—“ I once endeavoured to determine by direct observation whether the lower patch is actually submerged or not, but found that the capillary curves above the head and body render it very difficult to decide where the water-line curves. These curves must greatly obscure, or at least limit, vision by the lower lenses.” The large Water-beetle (*Dytiscus marginalis*), I have found, depends—at any rate, to very great extent—on its antennæ for food. A captive *Dytiscus*, when at rest, took no notice of small pieces of raw meat dropped just in front of it, but not close enough to come in actual touch with the antennæ; but a piece of meat held between forceps and gently lowered into the water, and made to come in contact with the antennæ, was at once seized. On one occasion I threw a dead fly on to the surface of the water in a vessel containing some captive Whirligigs. At once two or three of the beetles clustered round it, and, after toying with it for a moment, left it. Here sight must have been the leading factor that drew them to the fly.

It may not be out of place here to say a few words about the sense of fear in insects. This is rather a complex subject which others more qualified than myself are better able to study, so I will but briefly touch upon it. In the full meaning of the word, as the higher animals know it, insects have no fear, or, if they

\* ‘Aquatic Insects.’

† I have here purposely not made use of the word “prey,” for, as far as my own observations go, *Gyrinus* is a scavenger.

‡ ‘Aquatic Insects.’

have, it is but momentary. A Dragonfly (*Libellula depressa*) will return again and again to the strike of the net—nay, more, if, when caught and held captive by the wings, will take flies greedily from the hand of its captor. All feeling of fear in insects seems to be swallowed up in the insatiable desire for food. In the summer of 1909 I confined a Newt about a quarter grown in a small bottle of water, together with a Water-boatman (*Notonecta glauca*), for the purpose of taking home alive. I knew well the voracity of *Notonecta*, but thought the cramped confinement, added to the darkness of my pocket, and the inevitable shaking that must of necessity ensue, would have the desired effect, namely, of preventing the "Boatman" from attacking the Newt. Not so, however, for on my return home nothing remained of the Newt but a lifeless sucked skin. The captive Whirligigs mentioned above had been subjected to the same treatment as *Notonecta*, and had hardly been in captivity more than a few minutes before the fly was offered to them, yet they seized upon it at once. Here, again, the ever-present desire to feed conquering (if any) all sense of fear. The eyesight of *Gyrinus* is remarkably keen, much more so than in a number of other insects, and nearly rivalling that of dragonflies. The shadow of an observer falling on the water, or a too near approach, is quite sufficient to send a party of them scattering in all directions.

The expanding paddle-legs of the Whirligig are beautifully adapted for the functions they have to perform. Unfortunately, owing to the small size of the insect and its extreme rapidity of motion, these cannot be studied satisfactorily in the living insect, though every now and then something of their actions can be made out by watching the insect in a glass of water. Prof. Miall, in his delightful little book, 'The Natural History of Aquatic Insects,' has likened the structure of these paddle-legs to those "ivory tablets used for memoranda, which are held together by a pin, so that they can either be opened fanwise or closed in a moment." It is these short paddle-legs that give so great an impetus to the swimming powers of *Gyrinus*. *Dytiscus*, with its "feathered" rowing-legs, though it *may* (but I doubt this) swim as fast as *Gyrinus*, has not the same facility of turning, twisting, or rotating. Take, for example, two men,

each in small light boats. One has long oars for rowing, the other is provided with a short paddle. The one with the paddle will make greater progress than the one with the oars. The man with the paddle, too, will have more control over his boat as regards turning or stopping dead than the man with oars. So it is with *Gyrinus* versus *Dytiscus*. A well-prepared microscope slide of an expanding paddle of *Gyrinus* reveals at once its marvellous structure, when viewed under a low power; it is, moreover, one of the most beautiful objects that fall to the lot of the microscopist. The paddles, too, are aided in their work by long, stiff hairs which fringe them. The second or middle pair of legs are expanded as well, though in a less degree. The first pair of legs are in a way no less wonderful than the paddles. They are prehensile, and when not in use are kept tucked away out of sight. In the male the tarsal joint bears sucker-like organs, which are thought by some writers to be of use in the detention of the female, and probably this theory is the correct one.

Whirligigs possess a certain amount of curiosity, and will stop in their peregrinations to examine any object that lies in their path. I noticed once, when watching these insects, a piece of lichen fall from a tree near by into the water. This immediately attracted two or three beetles, which stopped to see what it was, and if they examined this once they did so a score of times during the brief space of time I watched them. A Whirligig beetle taken on March 24th, 1910, I confined in a glass of clear water. This particular specimen, contrary to the others mentioned above, made no attempt to leave the glass, but swam round and round beneath the water, hardly stopping a moment, for the space of three hours or so, greatly upsetting the equilibrium of a number of a species of gnat larvæ confined in the same vessel. It made no attempt, however, to prey upon its fellow-prisoners, and at sunset became inactive, almost sluggish in its movements, at length sinking to rest tightly clinging to a piece of weed which, in spite of severe shaking of the glass, it refused to quit. As the cold of evening advanced, it seemed to sink into a state of coma. The following day being cold it remained in the same state.

*Gyrinus* is in a singularly happy condition to bid defiance to

most of its foes. The milky, evil-smelling fluid that exudes from all its joints would, I imagine, render it an exceedingly nasty morsel to any other animal that would prey on it. Its convex shape makes it difficult to hold, and in attempting to do this many a Whirligig has slipped through my fingers. The only pond-insects that would be likely to prey on it are *Dytiscus*, *Notonecta*, *Naucoris*, and possibly *Nepa*. The jaws of *Dytiscus* and the grasping legs of *Naucoris* and *Nepa* would experience some difficulty in holding such a slippery little object. Fish would no doubt swallow it with impunity, but *Gyrinus* generally inhabits waters from which fish of any size are absent. The pugnacious Stickleback doubtless attacks it, but the small mouth of this fish would not admit an insect the size of *Gyrinus*. Moreover, its keen sense of vision, added to its celerity of movement, aids it considerably from most attacks. Kingfishers I suspect of occasionally preying on it, as I once watched one plunge several times into a small pond devoid of all fish-life, only being inhabited by Whirligigs and a few Newts. I wondered at the time what it was feeding on, and came to the conclusion it must have been these beetles, but, being afraid of driving away the shy bird, could not verify my suspicions.

The early life of *Gyrinus* appears to be shrouded in a certain amount of mystery. Schiödte, in 1862, seems to have been the first naturalist to figure and describe the larva. Scherren says regarding it:—"The larva is not well known, and not often met with by collectors. I have taken examples in the River Ant, not far from North Walsham. When collecting there I was fortunate enough to find a couple, but one was damaged in putting it into a bottle. Both were found in pipe-weed (*Enteromorpha intestinalis*), and it may be that this is the usual habitat. If so, it would quite account for the larva not being more frequently met with."\* I have never been fortunate so far as to find a specimen, but a very good figure and description of it will be found in Miall's 'Aquatic Insects,' referred to more than once in these pages. I can find nothing of importance on record regarding the breeding of *Gyrinus*, this doubtless being due to difficulty experienced in keeping the beetles in confinement; but it is certain, from the observations of trustworthy observers,

\* 'A Popular Natural History of the Lower Animals.'

that it is, at any rate, double-brooded. I have very good reasons for assuming that oviposition begins as early as March, as I am certain a captive specimen was in the act of ovipositing, but, owing to an unfortunate accident, I was unable to verify this. The attitude this specimen adopted was exactly similar to that of *Dytiscus* when ovipositing. A stem of weed was grasped firmly by the front pair of legs, the insect lying lengthways on it. The abdomen was constantly in motion in an up and down direction. Finally, the extreme tip of the abdomen was fixed to the weed. At this juncture important business called me away, and I had not another opportunity of watching the insect. The pupa of *Gyrinus* has seldom been found, but Miall says:—"At the beginning of August the larva creeps out of the water by climbing up the water-plants, and then spins a greyish cocoon pointed at both ends."\* The ova apparently has not been described.

Some naturalists have said that *Gyrinus* is capable of making a squeaking noise by means of its wing-covers against the end of the body, and this has been thought to be a call to others of its own species.

\* 'Aquatic Insects.'

## NOTES AND QUERIES.

## MAMMALIA.

**Mus rattus at Yarmouth.**—Recently I have met with a few examples of *Mus rattus* (the Black Rat), several of them, owing to the closing of some adjacent dilapidated houses, having found their way to a sail-loft, where the fat used in making the sails supple for sewing has been the attraction. This same loft is invaded at intervals from some adjoining maltings. On the afternoon of Dec. 30th, 1911, I was asked to call in at a smithy in the heart of the town to see a Rat unusually marked. The specimen, a three-quarter grown *M. rattus*, was distinguished by what looked to me, in the rather dim light, and by artificial light, a pure white line running from the nape of the neck to the slope of the posterior; all four legs and the belly were also white. I noticed the poor beast, in its endeavours to escape, had chafed the skin off its nose. Filling an iron bath at the tap, I plunged the cage under water, when the unhappy creature was speedily drowned. I dispatched the carcase, still wet, to Dr. Ticehurst, of Lowestoft, who assures me that what I assumed to be white was really a pale lemon, very like the "white" on a discoloured Ermine.—A. H. PATTERSON (Ibis House, Yarmouth).

## AVES.

**Nocturnal Redwings.**—Perhaps I may be permitted to reply now to one or two comments on my Redwing paper in the last volume of 'The Zoologist.' Mr. Warren's note (p. 429) is too obviously valuable to need much comment; unfortunately, I can see no present use for it, and must be content to file it for further use. I think I must refer Mr. Booth back to my first note; we are still lacking proof that these calling birds *are* migrants in the usual sense of the word. Of course the word "migrant" is most inconveniently vague. From the Sparrow-Hawk beating its daily round with clockwork regularity, the Gull returning to sleep each night on its lake, or the Cormorant on its tower or cliff; from the punctual autumnal migration of the Grouse from heather to barley, or the irregular movements of frozen-out Grebes—from all these, to the Grey Plover or the Cuckoo, the



same word "migrant" is applied. Now, if we do get enough evidence (and I am yet seeking it) to prove beyond doubt that these voices are nothing but the calls of normal winter migrants, we are faced with another and a stiffer problem: Why, of all our Oscines, is the Redwing the only one that does not change its quarters silently? We have Thrush, Robin, Blackbird, Rook, Lark, Fieldfare, Chaffinch, and many others all amove throughout the year, and our ears are deaf to them.

In the middle of January the North of England was deep in snow; the Sky-Larks vanished to a bird from the fields. Presumably the Redwings moved also—I am not sure. In the South of England the weather was abnormally mild, and we *seem* to have had an influx of various birds. Night after night I stood out listening for the Redwings, and did not hear a solitary note. Does this mean that they were not on passage? Why do they call most during the first week in November, when, if I am to believe the evidence of my eyes, the immigration is in full force in the previous month? Why are they comparatively silent during the spring migration? Why are they always at or about the same altitude, following (from the evidence of our ears) all the contours of the highest hills and the deepest valleys?

Observant friends and correspondents think, and some are positive, that they recognize the admittedly similar notes of Thrush and Blackbird amongst these night calls. This will not do for an instant, for it leaves us waiting for some explanation of the silence of these two birds during July, August, and September—months when one or both species are under weigh. Notes heard when we had reason to believe there were no Redwings in the country would be worth chronicling.

In answer to the second part of Mr. Power's note (p. 481), I must say that I cannot think the song of the Redwing a very beautiful one. Possibly it gets polished up a bit in the memory of the tourist who has listened to it in Scandinavia. When I wrote my note I said it only sang in fine weather, but on Dec. 26th, 1911, an abominably wet and cold day, Mr. P. W. Horn and I noticed many in full song near Theydon Bois. The best way to learn the song is to make a point of examining the hedgerow or other trees every time the chorus from a small flock of Starlings is heard. Very soon, with a little fortune, and by the exercise of sufficient woodcraft to keep from alarming this strangely timid songster, the observer may trace the apparent chorus to a single Redwing, and, when he has achieved this, it is a simple

matter to notice the difference between the two sounds, and to remark also that, instead of the "Thrush-like single notes" described by some writers, the interjected clear calls are more like the *monosyllables* used by the nesting Common Sandpiper against an intruder. The song is a common feature of the winter chorus of our fields, but as most people only make its acquaintance by the rarest of accidents, it has the reputation of being a rare phenomenon. When the birds sing in concert, as is frequently the case, a near approach is a difficult business; but in the bare tree-tops it is easy to see from a distance by the help of a good glass whether Starlings are present or not, and one can generally detect an odd bird with the characteristic gestures of a songster.—FREDK. J. STUBBS.

**Nutcracker: Structure of Tongue.**—Mr. Tuck (*ante*, p. 34) will find in 'Zoographia Rosso-Asiatica,' Pallas, 1831, vol. i. p. 398, particulars of a further peculiarity in the structure of the tongue of this bird (*Nucifraga caryocatactes*). The passage is as follows:—"Linguae frenum laxum, in saccum sublingualem dilatabile, qui ad Laryngem usque per gulam extenditur, et in quo avis nucleos Cembræ ultra 50. semuncialis ponderis, circumfert." — THOMAS GROUND (Kenilworth).

**Little Auks at Rochdale.**—Feb. 1st: Female caught alive in a cotton-factory yard (Mitchell Hey), Rochdale. Lived three days. Feb. 5th: Male caught alive, Spring Cottage, Smallbridge, Rochdale. Lived a few hours. — F. WILLIAMSON (Art Gallery and Museum, Rochdale).

**AT CHESTER.**—Two specimens of the Little Auk (*Mergulus alle*) were taken in the Dee at Chester on Saturday and Sunday, Feb. 3rd and 4th. One was killed with a stone, and the other specimen was picked up dead at the water's edge by some boys. The stomach of one contained roots of plants, the other was completely empty. — A. NEWSTEAD (Chester).

**AT KETTERING.**—Feb. 3rd: A Little Auk was found by a workman in a field near Kettering. It was in an exhausted condition, and died shortly after. Another was shot near here last week, but this bird was in good condition. I saw both the birds at Field's, our local birdstuffer. A Large Black-backed Gull was sorting over the horse-droppings in one of our streets, Feb. 6th. — CHARLES E. WRIGHT (Woodside, Kettering, Northampton).

**Causes of our Rare breeding Birds disappearing.**—I beg to correct a mistake in my notes in last month's number by omitting an extract from 'The Zoologist' in the 'Irish Naturalist' for 1908: "'The

'Zoologist' (1908, p. 33) contains notes from Mr. W. J. Williams of two immature Ospreys shot in Co. Sligo in November, 1907," proving that between 1900 and 1911 two specimens have been taken in Ireland, but immature: also the name of "Lough Arrow" instead of "Arron" should have been printed.\* — ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

In Mr. Warren's original letter (Zool. 1911, p. 391) he stated that a dealer had ten eggs of Golden Eagle and fifty of Osprey in his possession, "thus showing plainly why the Golden Eagles and Ospreys of Scotland are so steadily vanishing." In my reply I stated that the Golden Eagle in Scotland, instead of vanishing, has enormously increased in numbers of late years. It is therefore untrue to say that collecting their eggs either by dealers or amateurs has brought their numbers down anywhere near vanishing point, or even seriously reduced them. On the other hand, the Osprey in Scotland is on the verge of extinction. Mr. Warren ascribes this to egg-collecting. On the other hand, I assert with confidence that it is due to the killing of the Ospreys themselves on migration. Their eyries, though well protected, and not interfered with by collectors, are deserted one by one, because either a single bird returns alone and fails to find a mate, or both birds fail to put in an appearance. My reasons for believing that the Irish-killed birds represent the Scottish breeding stock are based on the study of the "fly-lines" of this species. The Ospreys which arrive in our east coast counties (*e. g.* Yorkshire) in the autumn and work their way down south (accompanied by Honey-Buzzards and immature Sea-Eagles) are not likely to be Scotch birds, but are almost certainly immigrants from Scandinavia. On the other hand, the birds which have been killed in Ireland, especially those on their way north in the spring, are in all probability Scotch-reared birds. I distinctly stated that "we are not guiltless in the matter in England, but I am inclined to think that the English-killed birds are generally of Scandinavian rather than Scotch origin." This is a very different thing from stating it as an ascertained fact, though personally I have little doubt on the matter.

With regard to the alleged occurrences recorded in the 'Irish Naturalist,' I venture to print Mr. Warren's statement side by side with the results of my own investigations, and leave the readers of 'The Zoologist' to draw their own conclusions:—

[\* We would again ask our contributors to write the names of localities and persons in capitals.—ED.]

Mr. Warren's statement (*ante*, p. 38):—

"I have taken a period of eleven years, from 1900 up to the past year (1911), and, having taken the trouble to examine the pages of that journal for the period named, can only find *two* references to Ospreys [not recorded as killed]. . . . So for the *eleven years* there is no record in the 'Irish Naturalist' of any slaughter of Ospreys!"

Rev. F. C. R. Jourdain's investigations:—

I did not restrict my observation to 1900 and the following years alone. I believe I am correct in stating that Ospreys are recorded as slaughtered in the 'Irish Naturalist' for May, 1893, again in February, 1895, and, I believe, also in October, 1900, though I have not the last number at hand for reference. Still it comes within Mr. Warren's period. Again, in 1907 (p. 352), one is mentioned as killed near Drogheda. In 1908 two immature birds are recorded for Co. Sligo (p. 78), and in 1910 (p. 13) an adult female from Lough Erne. Total: seven birds killed between 1893 and 1910, or *five in the eleven years during which Mr. Warren states that there is no record!!* all of which are mentioned in the 'Irish Naturalist.'

(As to Mr. Henderson's record of an Osprey seen but not shot, it may interest Mr. Warren to know that Mr. Henderson and I decided not to send this record to the 'Irish Naturalist' till the bird should have had time to get out of Ireland, lest it should meet with the same fate which overtook its relatives.)

Mr. Warren seems to think it a bold statement on my part to assert that the dealer's stock in question could not have consisted of British-taken Ospreys' eggs. He is apparently unaware of the fact that British-taken eggs are so few in number that their value is in proportion to their rarity, while, on the other hand, American eggs are only worth as many shillings as Scotch eggs would be worth pounds. No dealer could afford to offer such valuable specimens for exchange, even if procurable, which is not the case. I fail to see why the Kite should be dragged in this discussion. It is a sedentary species, and does not migrate across Ireland. The protection now afforded to it—partly, I may venture to say, in response to an appeal made by Prof. Salter and myself some years ago—has resulted in a considerable increase in the stock, and this fine bird is now in no immediate prospect of extinction.

There is no doubt that the Osprey did suffer severely in the past from egg-collecting, and also shooting, on the part of such men as

John Wolley, Charles St. John, W. Dunbar, and others. But to make attacks on the egg-collectors of the present day without evidence in support of the charge, when all thinking naturalists are aware that the disappearance of the Osprey in Scotland, like that of the Sea-Eagle and Golden Eagle in Ireland, is due to an entirely different class of men, is a proceeding which can do no good to the cause of bird protection. Moreover, as Mr. Warren's assertions have proved to be erroneous, it is not possible to attach much value to the inferences he draws from them.—F. C. R. JOURDAIN (Clifton Vicarage, Ashburne, Derbyshire).

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## NOTICES OF NEW BOOKS.

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*Eugenio Rignano upon the Inheritance of Acquired Characters.*

Translated by BASIL C. H. HARVEY. Chicago: The Open Court Publishing Co.

THE author of this book has approached the subject in a very fair and candid manner. He has not only brought together the results of experiments made by many eminent investigators, but he has also considered with great equity the views and arguments of those who are opposed to his generalisations. Thus he writes:—"The great service of Weismann, which is not yet appreciated highly enough, is that he brought forward this matter of the inheritance of acquired characters, and questioned its existence, which previously had been not only tacitly admitted by most biologists, but regarded as not needing proof. And we must recognize the fact that the great and justifiable desire to find for this inheritance some proof which should be irrefutable and not open to any objections has remained so far unfulfilled."

Signor Rignano lays great stress on the theory of functional adaptation. He asserts that "the decisive experiment upon the inheritance of acquired characters must leave amputations and similar sudden variations out of consideration, since either their effect is to bring about the re-establishment of an exclusively local equilibrium or the repetition in the descendants of the phenomena by which the parent organism reacted is hindered.

This experiment must rather be directed toward modifications of the functional adaptation, which have a very extensive action, and whose repetition in the descendants is not hindered by anything."

We can thus only give an indication as to the author's standpoint and argument; his book is one that requires careful study, and will not give an adequate reward for hasty perusal, and the reader, whether he becomes a convert or opponent to the view of inheritance of acquired characters, will at least have acquired a digest of the conclusions formed, favourable or otherwise, by many of the very foremost and advanced biologists.

This work appeared originally in French (1906), and later in German and Italian. Its translation into English is due to American philosophical enterprise.

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*The Great Auk: A Record of Sales of Birds and Eggs by Public Auction in Great Britain, 1806-1910, with Historical and Descriptive Notes.* By THOMAS PARKIN, M.A., F.L.S., &c. Hastings: Burfield & Pennells, Ltd. London: Rowland Ward, Ltd.

THE design of this booklet is to place on record the particulars as to date, ownership, price, and name of purchaser of the various specimens of *Alca impennis*, and of eggs of the species which have been sold by auction in Great Britain. This has been done with considerable detail, for Mr. Parkin has taken great pains and trouble to secure all available information. As regards the number of skins and eggs of the Great Auk that may be said to be still in existence, the author states, on the authority of Mr. Edward Bidwell, that there are eighty skins and seventy-three eggs. This publication contains five plates, one of the most interesting of which is a photo-block of a gathering at Stevens's Auction Rooms on the occasion of the sale of a Great Auk's egg on June 7th, 1910. This might well be enlarged and sold separately, as many would like to hang a memento of the well-known sale-rooms with which most naturalists and collectors are familiar.

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*A Naturalist on Desert Islands.* By PERCY R. LOWE, B.A., M.B., &c. Witherby & Co.

THE private yacht is now a factor in zoology; it is taking the place of the old "discovery ship." A few years ago Mr. M. J. Nicoll published his record of three voyages made on board the Earl of Crawford's yacht, 'Valhalla'; in this volume Dr. Lowe describes his experiences and observations on some little-known islands which he visited with Sir Frederic Johnstone on board the latter's yacht, 'Zenaida.' The islands visited in the Caribbean Sea were Swan Island, Blanquilla, and The Hermanos. Dr. Lowe describes the geological and faunistic aspects of these islands with considerable scientific knowledge, and with the entertaining pen of a born journalist; the lists of birds have been previously and elsewhere described. The book is very nicely illustrated, and there is more discussion of natural cause and effect than is at once apparent in the easy and pleasant diction of this naturalist's narrative. It is a very stimulative volume to peruse, and there are some zoological nuggets in its pages.

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*The Sportsman's Handbook to Collecting, Preserving, and Setting-up Trophies and Specimens, together with a Guide to the Hunting Grounds of the World.* By ROWLAND WARD, F.Z.S. Tenth and enlarged edition. Rowland Ward, Ltd.

WE are glad to possess another and the tenth edition of this excellent handbook, an indispensable travelling companion to the sportsman and naturalist abroad. We well remember obtaining the sixth edition in 1891 when sojourning in the Transvaal, and equally recollect the many obligations we were under to it in those days. The present edition is considerably augmented in size, and the information brought up to date. The section relating to "Hunting Fields of the World" is now much amplified, and will help to guide the choice of the sportsman who is blessed with the potentialities for foreign travel. This small volume will also give him intelligent and simple directions for preserving zoological specimens. Many men commence as sportsmen and end as naturalists; this handbook will tend to assist that evolution.

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WITH the new year several noteworthy changes have ensued in the editorial management of some of our best-known publications:—

Dr. J. A. Allen, finding that his health demanded relief from some of his numerous responsibilities, has been forced to resign the editorship of the 'Auk,' and the Council of the American Ornithologists' Union have chosen Mr. Witmer Stone as his successor. Simultaneous with Dr. Allen's retirement, Mr. Frank M. Chapman resigned as Associate Editor. Dr. Allen has guided with conspicuous ability the course of the 'Bulletin' of the Nuttall Ornithological Club, and its successor the 'Auk,' through thirty-six volumes, a record for which he may justly feel a scientific pride, and for which all ornithologists will offer him their sincere congratulations.

The 'Annals of Scottish Natural History,' the old quarterly issue with which we are all so well acquainted, and has reached its twentieth volume, now appears as a monthly journal under the name of 'The Scottish Naturalist,' and no longer includes botany, but is entirely devoted to zoology. Mr. Harvie-Brown retires from the position of a principal Editor, but still assists the editorial triumvirate, which consists of Mr. William Eagle Clarke, Mr. William Evans, and Mr. Percy H. Grimshaw, with the assistance of other well-known naturalists. The new publishers are Oliver & Boyd (Edinburgh), and their branch, Gurney & Jackson (London).

The first part of 'The Austral Avian Record,' edited by Mr. Gregory M. Matthews, has appeared, published by Witherby & Co. (London), and "issued in connection with the Austral Avian Museum, Watford, Herts, England." It is to be published at irregular intervals, and will contain such notes as the Editor deems necessary to require immediate attention, and referring to birds which either have been already treated of in his 'Birds of Australia,' or will not be dealt with in the immediate future.



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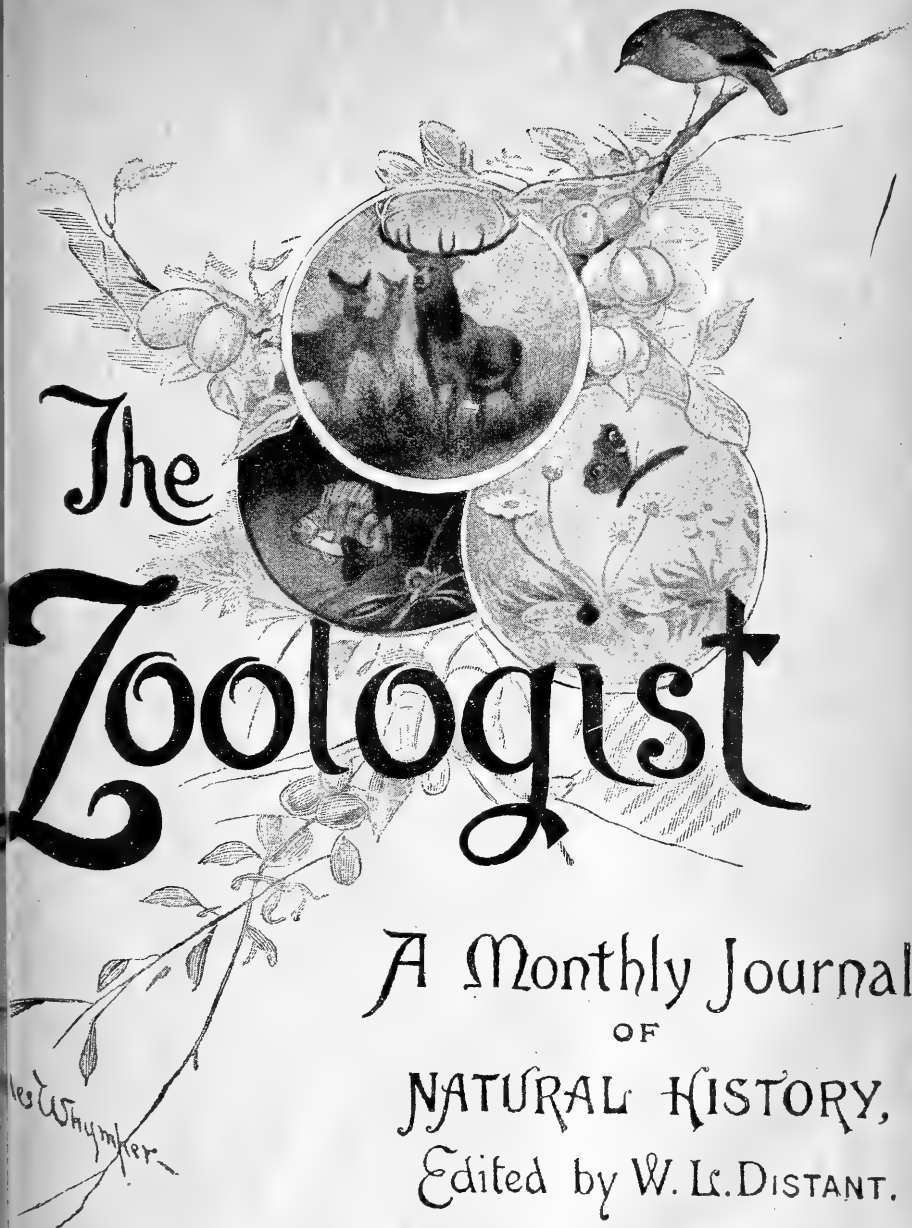
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# THE ZOOLOGIST

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No. 849.—*March 15th, 1912.*

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AN OBSERVATIONAL DIARY ON THE DOMESTIC HABITS OF THE RED-THROATED DIVER (*CO-  
LYMBUS SEPTENTRIONALIS*).

BY EDMUND SELOUS.

*July 13th, 1910.*—Whilst walking amongst the maze of small lakes or pools with which the country where these observations were made is studded, I saw, at first, a single grown Red-throated Diver, with two young ones. I at once crouched, and watched them swimming about together, for a little. I supposed the old bird to be the female but, before long, another appeared, and I then saw that it was the larger of the two—therefore probably the male. The new-comer had something in its bill which I at first thought was a fish, and afterwards a bundle of weeds; this she put down on the water in front of the chicks, just as I have seen Grebes and Swans do. Young Red-throated Divers, therefore, may be fed, at first in the same way. This pair were still unhatched last Saturday—it being now Wednesday. On another and smaller pool I saw a nest which the young had also recently left. It was just on the peaty margin of the pool and was like a rudimentary Grebe's, being much less raised, and not nearly so finished-looking. It seemed to have been made by the bird—or birds—having placed more of the soft peaty earth above the natural level of the pool's margin. No doubt it had been much pressed down by the weight of the sitting bird, but it could never, I think, have been anything but very flat.

*July 14th.*—About 4 p.m. I started out over these northern hills, to see something of the Red-throated Divers, several pairs of which haunt some of the smaller lakes or sheets of water in the vicinity, with their recently hatched young ones. After walking about an hour and a half, I came upon a single bird swimming with two quite small chicks in a pool—for it was no larger—amidst the peaty hag. The old bird was not very shy—evidently through the unfrequency of human intrusion—and when I had crept up under the crest of a small rise or hillock, and lay flat on the ground, with my glasses, she soon became quite unconstrained in her movements, though I was certainly not invisible to her. After swimming about, for a little, the young ones always following her, she approached the shore, and made as though to crawl out on to it. She was, I think, for a moment or two, partly on the land, but the place was evidently unsuitable, and she came swimming out again—she had almost disappeared—to the opposite side, and here, in my full view she, with an impetus such as, when about to land, one communicates to a boat, drew herself out amidst some green sedgy herbage, where she lay or sat, with her head raised, just as though upon the nest, and raising her wings, the young ones immediately ran in under them—one under each—on which she closed them down, and sat quietly. This was at 5.30, and the young were quite invisible for the next hour, when one of them came out, but, the mother raising that wing, again, he, at once, went back, and the bird sat on, as before, till 7.30, when I walked further on, but at 8 I saw all three on the water again. I then lay down under another rise, and, in a very few minutes the same scene was repeated, the parent bird landing this time where the bank was a little higher and not sedgy, to do which she had to make a greater effort than before. In neither instance did she rise on her feet after landing, but dragged herself flat along the ground, and I left her thus seated, with the chicks invisible, as before. This last time I noted that one of the chicks preceded the mother (?) in landing. Evidently they knew her intentions, and were in agreement with them.

My reason for leaving at 7.30 had been that another Red-throated Diver had then circled round about, flying quite low over my head, so that I distinctly heard him snap his bill,

before uttering his guttural note. I felt sure that this was the male, come to join his wife and family—as there is little doubt he would have done had I not been there. I thought he might return and do so, if I went away, but in this I was disappointed. Three others of these Divers went down upon a much larger loch, some way off, whilst I was watching the one with her chicks. Two appeared to be mated, and one flew several times after one of the others, over the water, as it seemed to me, in an amatory manner. There was some appearance, in fact, of a “recrudescence”—but whether a second brood is ever reared by these birds I do not know.

*July 16th.*—About midday I got to a loch where I had before seen (on the 13th, namely) a family party of Divers—the parents and two young ones, before whom one of the former—the mother, as I judged—had put down on the water what at first I took to be a fish, and afterwards a bunch of weeds. A considerable time was now spent in trying to find a good place from which to watch the birds, being myself unseen. This was extremely difficult, or rather impossible, and as it involved creeping, crawling or dragging myself along the ground, almost all round the loch, with intervals of lying and waiting, some two and a half hours were thus occupied, during the greater part of which time all the birds were invisible. At last I again saw three of them, one of the parents having, in spite of my very great caution, taken alarm and left the loch, though this he might have done in the ordinary course of his duties. It was about 2.30 when I, at last, found a spot which offered me both a good view of the greater part of the water, and a shelter from the wind, which, ceaseless as it is, and, even at this time, tolerably cold, is a terrible factor in these treeless wastes. Such protection as I now enjoyed was given by the peaty bank of what seemed to have been once a continuation of the loch the birds were on. It was now a flat oval depression sunk somewhat beneath the level of the present water, which seemed to have shrunk away from it, so that, seated upon its flat, grassy bed, with my back against the low escarpment, my head was not much above the level of where the birds floated, and this did not seem to alarm them.

In about ten minutes after settling myself, there was a

gliding splash upon the water, and, looking up, I was just in time to see the bird that had been absent settling upon it. He had now an unmistakable fish in his bill, and, as though to confirm this, a Lesser Black-backed Gull stooped twice or thrice towards it, as if with the idea of seizing it from the Diver's beak. The latter, who did not seem at all intimidated by this action, now swam towards the partner bird and chicks, diving more than once on his way to them. As he came up, the last time, the chicks swam to him, and he put down the fish on the water, before them, just as he had done on the 13th with the supposed weed, which I now think must have been a fish too. Presumably one of the chicks ate the fish, and a choice as to which should have it may have been exercised by the parent bird, but all this—as also on the last occasion—I was unable to see. In regard to the fish, it did not look to me like a trout, but of a longer and straighter shape, more like a sand-eel. This, taken in connection with the bird having flown down on to the loch with it, and its previous considerable absence, seems to suggest that the young are fed with fish from the sea, and not from one or other of the fresh-water lochs, amidst which these Divers breed. Some of these, indeed, are so small that one can hardly suppose them to contain fish, and it was on one of the smallest that I watched a pair, with young, on the 14th. Others, however, are larger and well stocked with trout, and of these there are two, in close proximity to the one which this pair has appropriated.

After the above incident the birds swam quietly about the little loch, sometimes all together, but more often the two parents would be separated by a little, and then sometimes each would be accompanied by a chick. But this was never for long. Very soon both would be paddling near one of them, and this was always the case when there was any wide interval between the two.

At 3.30 one of the parents, thus accompanied, swam to the far end of the loch, where, just round a little grassy point, the old bird took the shore. Of this, at least, I felt sure, since I could see its head above the grassy projection, higher than it would have risen from the water, and always in exactly the same place, up to 6.0 p.m., when I left; and I might also assume, from what I had seen before, that the chicks were resting, one under each wing—perhaps asleep.



During all this time the other parent, which I then took to be the male, either remained motionless, or almost so, on a particular part of the water, some way off, or swam up, at intervals, to where the others were resting. This he did some three or four times, but only once—the first time—went close to the point, and then, all at once, I saw one of the chicks with him, though I had missed seeing it swim out. In a minute or two it returned to the resting-place, whilst the parent swam down the loch again. I was struck by the way in which, for a long time, this latter bird kept just, as it seemed, on one spot of the water, but at any rate in very much the same place. Another thing that struck me was the infrequency with which the chicks were fed. I assume that from 12 to 2, during all which time I could see nothing either of them or the parents, they were resting under the wings of either one or the other of the latter. From 2, or at any rate from 2.30 to 6, I was able to account for them, and only once was a fish brought in, as recorded. This, presumably, was eaten by only one of the chicks, so that for 6 hours, as a minimum, the other of them had had nothing. The chicks never appeared to feed themselves, and the only time they dived was when a gull made a sort of stoop at them. They were then at some distance from the parent accompanying them, and disappeared all in a moment. Evidently, young though they are, they know how to take care of themselves.

*July 17th or 18th.*—Got to the loch again, and into proper position, at about 6.20 p.m., and had the pleasure of seeing both the parent birds, with their young ones—the whole family—together. They presented a very pretty picture, the old birds gliding slowly and gracefully about on the water, now swimming affectionately together, as it seemed, now separating a little, when, for the most part, each one drew a chick with it, and I could not now observe that the latter looked more to one of their dams than the other—each of them sometimes having both for a little. For a considerable time, both of the old birds, thus accompanied, kept swimming or gliding between a certain point of the shore, and a little way out again, and I noticed that one—I think the female—was the leader in this monotonous activity, the other following, as it were acquiescently, but not going so far. This was towards the lower, or, rather, my end of

the loch, but, about 6.45, one of the birds—the male as far as I could feel sure—began swimming up it, in a purposeful manner, accompanied by one only of the chicks—the other staying with the mother. The male, if it were he, swam, with this one chick, to the exact spot where either he, or his mate, had rested yesterday, with the two of them, and, behind it, they disappeared, and for the next hour or hour and a half the surface of the loch knew them no more. The mother and remaining chick kept where she had been, or swam from there to about the centre of the loch, which was not very far. They often became almost invisible, for it had come on to rain in fitful showers, or mists arose which had the effect of making the little loch look as large as a widely extended one. Whilst it was still clear, however, an interesting incident occurred. I had the glasses on the parent bird, and saw her whole aspect change, in a moment, as she shot suddenly forward and then reared herself high above the surface of the water, showing almost the whole of the smooth and gleaming white under surface. Almost at the same moment another Red-throated Diver came into the focus of the glasses, as I slightly moved them, a few yards in front of the first one, and swimming fast away from her. Evidently it was a stranger bird that had come down on the loch, whilst I had the glasses up, so that I did not see it fly in, to meet with this hostile reception.

The pursuing bird reared itself, again, in anger, shot forward, and then dived. It came up, again, close to where the other had been, and then, rising from the water, flew after it, disappearing, as the stranger had done just before, within a little bay of the loch. The next moment, the intruder came flying over the rising ground that had hidden him, and the victorious guardian reappeared suddenly by its chick, from beneath the water, having dived back to it.

Some time after this—about 8.15 or 8.20 p.m.—the parent and chick swam up to the other end of the loch, where they disappeared in the mist. A few minutes later I saw, probably, the same parent swimming down fast, alone, in a very purposeful manner. She made straight for the bay from which she had recently expelled the stranger bird, and, disappearing into it, there was almost immediately a similar flight out. My reading

is that the parent with whom the one chick had remained, when the family separation took place, had conducted it to its partner, to rest with the other one, and then, catching sight of the same strange bird, that had returned without my remarking it, had hurried down to expel it once more. Having done so, it dived out into the body of the loch, as it had on the previous occasion. After this I saw the two chicks—first alone, and then with one of the parents, at the farther end of the loch, near the point where they had been resting, and here, at 9 or 9.15 p.m., they disappeared, and the loch now seemed empty.

Probably the three were again resting, for the short night, where they had been before, whilst the partner bird had flown away. The latter, however, might have been resting too, but had I sat still where I was, the whole time, instead of leaving my position, a little previously, to ascertain something which I might very well have left alone, I might have been assured in regard to this. When one is unobserved, and has a good post for observation, in general, it is a mistake to quit it for any observation in particular, unless this is very important indeed—as was by no means the case here.

Before this, I had observed another pair of young Red-throated Divers diving as if for food, whilst their dam floated near them, though I could never detect anything in their bills when they came up. I also saw these chicks—I think both of them, but, at any rate, the act was more than twice repeated—rear themselves out of the water, and touch, with their bills, the bill of the dam, who, however, made no response to this action.

The action of the bird to whom, with its mate, the loch belongs, as one may say, when the stranger Diver came down upon it, was very interesting to see. Its whole look and aspect was instantly transformed, and the change from gentle placidity, with graceful, sinuous contours, to violent motion and a much more angular style, was most dramatic.

It was not far short of 10 when I set off home. It was raining, and the mists were lying thick on all the higher eminences. Before very long, I had completely lost my way, and in deep gloom, with a white sea all around me, I had nothing to do but to wait till it lightened and the mists lifted. I alternately walked up and down, sat or lay down, trying in vain to sleep

under the overhanging peat-bank of some dried rivulet, until the short night had passed. It was still misty, all the old landmarks were either lost or looked different, and it was not till 4 a.m. that I eventually got back, after an awful experience, and too tired to sleep properly.

*July 19th.*—*In situ* again, at 3.10 p.m., and saw one of the parent birds, with one chick, at the lower end of the loch, just as was the case for a considerable time, yesterday, in the evening, whilst the other parent, with the remaining young one, were (presumably) resting on the shore's edge, at the other end. Whilst creeping to my place, another of these birds had flown over my head, but I doubt its having been one of the pair. In any case, it did not seem to notice me, but flew steadily on, without any cry. Had it done so, it would probably have circled, for some time, about, uttering its guttural note of disquietude.

I have come, prepared to pass the night, and have nothing to do now, but to keep still, and not, except for some very special cause, leave my place.

The parent and chick keep moving slowly, backwards and forwards, on the water, within a certain small space, and, usually, on the same spot.

3.45 p.m. The other parent flies down on the water (coming from afar) and, diving its way to the two, gives, I feel sure, a fish to the chick. Unfortunately, not expecting such celerity, I did not get the glasses up in time to see either the fish given or the chick take it, but certain movements of the latter, afterwards, leave no doubt in my mind that it has been fed. It keeps stretching up its head, and making various motions of the throat and neck (external and internal) which suggest only one thing, *viz.*, that it is getting something down. Moreover, the upper part of the throat has a swollen appearance. There can be no doubt, therefore, I think, that the chick has been fed. The parent who has thus flown off, and returned with food, is, to judge by the relative size of the two, the female—but where, all this time, is the other chick?

3.51. The bird that has come in, and fed the chick, flies off the loch again. It passes close to where I sit, flying low, and does not appear to notice me.

4.45. The male, as I take it to be (the mother being still away) swims up the loch, with the one chick, to the little point, behind which it seems usual for the birds to rest. He disappears round it, then swims out again, and, to my great joy, both the chicks are now with him. The absent one, it seems, must have been resting there, alone; I had feared that some evil had befallen him, that he had fallen a prey to some gull. In a minute or two the male passes again round the point, with his chicks, but very soon they are all three out again, and swimming down the loch.

Just on 5. All three have now disappeared without my noticing where they went, but I think they must still be at the nearer end of the loch. I would fain know whether the nest is round the little point where the birds rest, but cannot find this out without disturbing them.

As yet, then, both these young Divers are safe. I noted the threatening action of a Gull towards one of them. Yesterday, and, to-day, a Great Black-backed has made several nasty-looking stoops towards the one chick that was then on the water. He varied this by flying over to a young Gull that was crossing the loch, and making the same demonstration, so that, at last, the latter stopped paddling, and seemed in fear—but “it passed.” Why did it pass? The young Gull could have made no effective resistance, if attacked, and there was no parent there, to defend it—at least I could see none. The Gull seemed, as it were, to hint what he “could do an’ if he would,” but the matter went—and from what I have observed generally does go—no farther. In view of the facility with which reasons for destroying any species are coined and administered, I cannot lay too much stress on this. The bark of these Gulls is, indeed, much worse—at least much more frequent—than their bite. Sometimes, no doubt—as I have seen—they do kill a young bird or so, the proper and philosophical answer to which is: “Let them.” It is horribly amateurish and mistaken to seek to interfere between one wild species and another. Only let man, himself, stand aside, and all will be well.

At 5.9 the trio that have been, all this while, resting unseen, reappear from behind the point, and swim down the loch, and at 5.23 they swim up, and disappear round it again.

It is now 5.45 and they are still there, nor has the female, who flew away, at 3.51, yet returned.

At 5.55, I see the female on the loch again; she has evidently but just come down and has a fish in her bill, which looks like a sand-eel—carrying it, as does a Guillemot, lengthways within her bill. With this she dives right up the loch, and then swims round the point, with it, where the other three have, all the time, been. One of the chicks appears, for a moment, just beyond the point, tail first, and disappears round it, again. Then the female comes out from it, swims to the opposite side, dives to the end of the loch, then swims back, preening herself, rises on the water and flaps her wings, turns on her side, as it were, showing the white, gleaming breast and ventral surface, thrusts out a leg behind, and waggles it, &c., all as does the Great Crested Grebe, which, in their actions and domestic life, these birds seem greatly to resemble. The three are still (at 6.15) invisible behind the point, and the mother floats alone, quietly now, and doubtless “with the gratifying feeling that her duty has been done,” on the still surface of the little loch. It must, I think, be the mother, for she certainly looks considerably smaller than the other parent bird. While thus resting, a pair of Black-backed Gulls that have—or rather have had—their nest upon the banks of the loch, at this lower end, take umbrage, apparently, at her proximity and fly over and around her, in a half threatening way, causing her to look conscious, and prepared for any act of hostility.

Now, at 6.35, she swims up the loch, and one of the chicks comes out from the point, to her, but soon goes back behind it again. But for this slight emergence, and the previous one, when the fish was brought, the male Diver, and the two chicks, have been stationary behind this point of land—for there is no stretch of water beyond it—ever since 5.23. Anyone would think that the loch was occupied solely by the female bird, who, having regard to what occurred yesterday, would seem to act the part of sentinel and guardian of the family domain.

6.50. The rest of the family now appear round the little grassy projection, and swim down the loch, to join the female,

who, on her part, swims to meet them. I now carefully keep the two parents distinct, whilst examining them with the glasses, and, if size goes for anything at all, it is certainly the male who has been, all this time, with the chicks, for he is very considerably the larger of the two. Also it is the female who, now, again, at 6.55 rises from the water and flies away, and shortly after this, without being able to say how or where, I notice that the male and chicks have again disappeared.

Before flying off, again, the female had swum to the other side of the loch to that on which the three others, now hidden from view, are, at the other end of it; and it is noticeable that she seems to like to "take off" from this point, though she does not always do so.

When the parents joined, or swam near one another, one of the chicks would generally accompany each. Once or twice both swam to the mother, and then back again to the father, but, on the whole, if there was any difference, they appeared to look to the father as more especially their conductor.

At 6.30 the male and chicks appear at the farther end of the loch, swimming down it. Evidently they have been resting and stationary, in the usual place.

At 7.38 the female flies down on the water, but she brings no fish. The male swims to meet her, and the whole family proceed up the loch, to the point. It is now the female who rounds it, with the two chicks—the male remaining just off it. In a little she reappears, swimming a foot or two out from the shore, and then, turning and going in again. I just see, or think I see, that boat-like impetus with which the landing is accomplished. The male then swims down the loch, and, having got to the end of it, flies away at 7.49. It is always seawards that the birds fly, upon leaving. The largest sheet of fresh water here lies only a few dozen yards away from this one; yet they never go to it. It is, however, in all probability, the one that holds most fish, and indeed is known as such. This, and the fact that all the fish brought in have looked like sea-fish—they are, I think, generally, if not always, sand-eels—makes me suppose that the young of the Red-throated Diver are fed on sea-fish alone.

At about 8.45, the male (as I still think it, though not now

so certain) flies in with a fish. He swims up to the farther end of the loch, dives, but comes up farther from the point than where he went down, plays with the fish, then swims towards the point again, and is met, when some way from it, by the female and young. Presumably, then, one of the two chicks receives the fish, but this, in the light—which, though still a sort of daylight was not so good for the glasses—I could not make out. After this, the chicks divided themselves between the two parents, and after they had all swam about, a little, the male, as far as I could make out—it being now not so easy—swam, with his chick, round the accustomed point, whilst the female remained, and still, at 9.50, remains, with her chick at the nearer (that is, my) end of the loch.

As it grew gradually darker, observation became more and more difficult, but I continued to watch the mother and chick, and at last the mother only—the smaller spot having become indiscernible—till, at last, at 10.5, and when I could still see the larger one, it had, all at once, disappeared. Yet the patch of water on which it had been moving was darker altogether than the larger expanse over which the birds would have had to pass, to join the other couple, and where, had they done so, I would, I am sure, have seen both. I had swept this, at short intervals, with my glasses, all the time, and did again as soon as I missed the darker patch on the darker and smaller expanse, and for some little time afterwards. This going out, all at once—not, beyond a certain point, gradually—of these two birds I had been watching, is I think best explained by their having taken the bank, and by reason of this, and having regard to what I have just said, I may, I think, conclude that it is the habit of these birds, when rearing their young, for the two parents to pass the night, separated from each other and each with a chick.\*

I now lay down against, and partly under, the low peaty bank of this former slight extension of the little loch—no doubt still such in the winter—making the best use of plaid, mackintosh, umbrella and Shetland shawl. Luckily the rain that fell after this was but slight, but there was no comfort, and but little, if any, sleep in the situation, and about 1 a.m. I was at my post

\* See, however, *posted*.



again. At 1.40 the water was fairly distinct and from then till now—2.10—I have searched it with the glasses but seen nothing on its dun mirror.

At a little after 3 a.m., the male Diver—as I feel sure from his size and general appearance—comes flying, at a great rate, from seawards, and makes a fine descent upon the loch. He brings a fish, and diving with it to the point, stays a little, just off it, gives a paddle or two away—then back—evidently waiting. A chick then swims out to him, and receives the fish—how I cannot quite see; it has appeared, before, as though they were put down on the water in front of one or the other. It then goes back and the parent floats idly on the water.

At 3.35 another Diver, which I took to be the female, came flying out of the little bay of the loch, which, from my position—though the best for all-round observation—is only partially visible to me. I took it for granted that this was the other bird of the pair—the female—but a few minutes later, without having since seen a bird go down, either this same or another one swims out of the before-mentioned bay, that has not at all the familiar look and manner of the bird I know, but, in size and carriage, looks like another male, and has a strange, unassured manner. It seems to be a strange male, but the rightful male, still on the water, does not attack it, which seems odd, in the light of what I have previously recorded. After a while, however, he swims down and enters the bay, too—the other having gone back into it—and, as both are now invisible, I again unadvisably leave my place, and crawl up the rise which conceals them. I see, on looking over it, but one bird—the lawful one, I have no doubt, for he shortly dives up the loch as though bound for the accustomed resting place, but, on account of my changed position, I am unable to follow all his progress, and, on getting back to my place, he is nowhere to be seen—he may either have flown away, in the interim, or gone to his chicks. Shortly afterwards the other bird flies out by the bay, leaving me now in doubt whether it really was a stranger, or the female, after all. If so, she has, at any rate, brought no fish, and, if not, I have, as yet, seen nothing either of her or her chick. The male had evidently left the loch, in the performance of his parental duties, without my seeing him, in the dusk or darkness, but whether the fish

he brought back was for the particular chick I had last seen him with, yesterday, and whether the other is still where, or near where, I lost sight of it, I cannot say for certain, though this seems probable.

It was now between 4 and 5 a.m., and as it appeared that there would be nothing for me to witness, which I had not seen before, I thought that I would walk to a point on the coast, which, from what I had heard, might have some attraction for me—a decision which I have afterwards regretted—there is indeed nothing like keeping still and seeing all one can see, when one is certain that there will be something. First, however, I thought I would walk round the loch, as I wished to satisfy myself, if possible, as to where the birds sat behind the little projecting point, so often alluded to, and particularly whether it was on the nest or not. I therefore started to do so, but had not walked many paces before the male (as I think) went up from the accustomed place, and the two chicks then appeared on the water there. Going on, I found, round the little grassy point, a depression in the grass, just answering, in situation, to where, on the first occasion, I had seen the bird's head, motionless, above the level of the bank, and which was, self-evidently, the place where one or other of the dams are accustomed to sit, with one or both chicks under their wings, nor did this depression—roughly circular in form—bear any resemblance to the nest which I have seen, either in itself or in its situation. The nest itself, though I walked round the little loch twice, I was unable to discover. It appears, therefore, that at some time between 10.5 p.m. yesterday, when I last saw the mother and one chick by themselves at the near end of the loch, and its becoming light enough to see the birds at all, this morning, this mother's chick had joined the other under the charge of its father—but at what time this was, and whether the mother had sat with them, also, I do not know. The fact, however, of the depression in the grass I have mentioned being single and not double, and of there being no other than this one at any part of the bank, makes it probable that one parent alone roosts on the ground, in this way, with both the young ones, during the short night. I suppose, now, that the female bird went up the loch soon or just after I ceased to see them in the increasing dark-

ness. She may then have slept, herself, for some time, on the water, before flying off to get a fish for one of the chicks, or first, perhaps, to fish, for herself. The male had also gone off during this dark, or semi-dark period (the chicks being left alone), so that either these birds are wholly nocturnal, or stir with the first grey of morning. It can hardly be supposed, however, that they are able to catch fish before daylight, nor did I see one brought in until 3 a.m.

I am still puzzled in regard to the second bird that flew down upon the loch. I felt sure, at the time, owing both to its size and totally different and unassured manner, that it was a stranger and not one of the pair. It brought no fish and neither went to the chicks nor joined the bird already there, which I had felt no doubt was the male. But why the latter, under these circumstances, should not have attacked it, I do not know, but though the two were out of my sight, for a few moments, in the little bay, I am sure, from general indications and especially from the new-comer's remaining on the loch, that there was no unpleasant incident between them. The matter is perhaps best explained by its having been the female and not the male that first flew in with a fish, for possibly she would not attack a strange male, or the male a strange female, or, again, I may have been mistaken in supposing the second bird to have been a stranger, though rightly accounting him a male, so that it was really the pair after all—and this seems most probable, especially as the second bird dived up the loch, as though going to his accustomed place.

The swiftness of flight of these Red-throated Divers—as a species, of course, I mean—seems very remarkable, considering the bulk of their bodies and narrowness of their wings. I had thought that they could only be sustained in the air through the constant beating of the wings, but, the other day, I noticed one cease to beat them, and shoot a considerable way, holding them outspread and motionless, nor, so far as I remember, did this bird descend all the time they were thus held. No doubt, a powerful impulse being first gained, the bird might, by turns and shifts of the body, through which the wings caught the air at different angles, sometimes even ascend, for a little, without again beating them, but only, I should suppose,

whilst this impetus lasted, so that there would be no real floating, much less soaring.

The depression in the grass which I have spoken of, where the dams sits with the chicks, only corresponds to the size of one parent bird, so that this alone makes it evident that the two do not sit together, side by side. This is after seeing two such depressions, for I have since found the one on the quite small loch, or rather pool, where I first saw these siestas in progress. Here, too, there was no suggestion of a nest other than the mere depression caused by the weight of the bird. From all appearances it would seem that the young Red-throated Divers stay on the lochs, into which, as one may say, they are hatched, until able to fly off them, presumably with their parents.

(To be continued.)

## NOTES ON THE BIRDS OF SARDIS, ASIA MINOR.

BY FLORA RUSSELL.

My handbook was the 'Manual of Palæarctic Birds,' by H. E. Dresser (1902), and I have followed his nomenclature. We left Smyrna on March 15th, 1911, by the railway that joins the Konia line at Afion Karahissar. Smyrna harbour was full of Black-headed Gulls (*Larus ridibundus*), and where the line skirts the bay, north of the town, there were large flocks of Herring Gulls (*L. cacchianus*) as well. It was a fine spring day, the warmth most pleasant. The early fruit-trees were just blossoming, and anemones coming out, but the country showed traces of the severest winter for years. Olive-trees, the wild oleander, and myrtle were brown and withered by snow and cold winds.

At Menemen station the air was full of small Kestrels flying like Swifts. Later I saw these again at Pergamon and identified them as *Falco cenchris*. At Kassaba a flock of extremely tame doves (*Turtur decaocto*) were on the station shed. They were numerous on the roofs of the mosques at Magnesia and Pergamon.

Just before reaching Sart station, which is in the broad valley of the Hermus, we had the welcome sight of three Storks (*Ciconia alba*) following a man ploughing. Further on were a pair inspecting an old nest. I gathered that none had been observed until that day, and that March 15th is an early date for their arrival. Mr. Danford (see 'Ibis,' 1878) gives March 29th for the arrival of Storks in the Sihoun valley. Before we left on April 15th nests were occupied on all the ruins of Roman and Byzantine Sardis, as well as on the flat roofs of modern villages.

The site of Sardis, the capital of Croesus' kingdom of Lydia, was a mile and a half south of Sart station, up the valley of the Pactolus.

On the east bank are the temple ruins, and above that the house of the archæologists who are now excavating them. The eaves of the house had unfortunately provided nesting-places for several pairs of Sparrows (*Passer domesticus*). At night the roof was the haunt of Scops Owl (*Scops giu*), whose melancholy note was to be heard at dusk on most evenings.

But for some patches of ploughed land and some small plantations of Lombardy poplars, the country immediately round Sardis is not cultivated. There is plenty of scrub covering the hills, composed chiefly of an evergreen oak, the *Paliurus* thorn, and *Vitex Agnus-castus*. Plane trees grow to a fair size in the lower valleys, and higher up *Pinus Halepensis* makes little woods, enlivened by small numbers of Blue Tits (*Parus cœruleus*).

Kestrels (*Falco tinnunculus*) were abundant everywhere; I should say I saw more individuals of that species than of any other. Magpies (*Pica rustica*) were equally common in the lower fields and on the hillsides. Crows (*Corvus corone*) were not uncommon, the Grey Crow (*C. cornix*) much rarer. Egyptian Vultures (*Neophron percnopterus*) were to be seen every day circling over the Acropolis, east of us, and often settling a hundred yards from the house. I had an excellent sight of eight Griffon Vultures (*Gyps fulvus*) sitting in a row above the Tombs hill. There were days when numbers of large birds of prey dotted the sky, but at too great a height for identification.

March 16th.—Several Chaffinches (*Fringilla cœlebs*) in the Pactolus wood. Noisy, but not singing. They were there for about a week and then entirely disappeared. Some Goldfinches (*Carduelis elegans*), singing, stayed several days. On April 12th, after a rainy morning, I found the copse full of Goldfinches; the twittering was deafening. They moved on that evening and were the last that I saw.

March 19th.—Riding to the Sulphur Baths at Alladejem up the valley of the Tabakchai, we disturbed a pair of Little Owls (*Athene glaux*) in the Byzantine ruins. Later I saw several more there, and have no doubt they nest in the numerous and convenient holes. A water-course diverted from the Tabakchai was thickly fringed with Water-Tortoises (*Clemmys caspica*). Purple, scarlet, and white anemones (*A. coronaria*) covered the

grassy level of the Hermus plain. Two Hen Harriers (*Circus cyaneus*) quartered the rushy ground.

That evening we climbed the Acropolis and had a magnificent sunset view with a glow on the snow-capped Tmolus. We put up two pairs of Chukar Partridges (*Caccabis chucar*), one pair from the very top of the ruins. It is extremely like the English Red Leg. A Turkish workman shot one some days later, and I was able to examine the small distinctions. Near the top I was attracted by a new and distinct note, a short but very mellow and flute-like song. This was the Nuthatch (*Sitta krueperi*), peculiar to Asia Minor, Palestine, and Syria. It was only recognized in 1863. It is a sprightly bird; after singing it poked its head from side to side, and hopped from the top of one bush to another with a lively movement. The white cheeks and throat and black stripe through the eye are conspicuous. I saw it again at Ephesus on April 17th, where a pair were evidently nesting in the ruined mosque.

March 21st.—A real crowd of small birds in the Pactolus river bed. The poplars and low bushes and brambles, then still quite leafless, were alive with them. My ears were met by a confusion of notes, and at least one strange warbler song.

There were the usual Goldfinches and Chaffinches. Several Willow-Wrens (*Phylloscopus trochilus*), very tame, uttered a feeble "wheet." A Chiffchaff (*P. collybita*) sang rather faintly. Linnets (*Linota cannabina*) were there, and a pair of Cirl Buntings (*Emberiza cirlus*). The latter sang loudly, showing no exhaustion from his journey.

I saw, too, a Serin Finch (*Serinus hortulanus*) and some Siskins (*Chrysomitris spinus*).

There were certainly several other species, but I failed to identify them. They were all on the move northwards down the valley. Some hours later the place was silent and deserted.

While I was watching, a small Grey Hawk which I took for a Merlin (*Falco æsalon*) made a dash among the small birds. It caught nothing, and only scattered them for a moment.

Further south up the river in some tall plane trees I met some Marsh Tits (*Parus palustris*). They were calling vigorously, and were in brilliant plumage. They looked to me larger than the British Marsh Tit, but this is difficult to say.

The black parts were intensely glossy black, the white a decided white, and the grey a cold grey without a tinge of brown or olive. I could not detect any difference in the note. With them were a Blue Tit and a pair of Great Tits (*Parus major*); the latter showed less yellow, and their note seemed less strident than the British bird's.

March 22nd.—I heard the trill of Bonelli's Warbler (*Phylloscopus bonellii*) from the house. It remained on the hillside, and I saw and heard it again on several days.

We rode to the Gygean Lake (Mermere Göl) through Sart, fording the Tabakchai, across the grassy, rushy plain, and reached the ferry over the Hermus in an hour. The low scrub was resonant with the grasshopper-like note of a Warbler. The land north of the Hermus was very marshy for three-quarters of an hour, then it rose and became stony, recalling parts of the Wiltshire downs that have gone out of cultivation. Tall spikes of last summer's hollyhocks had Corn-Buntings (*Emberiza miliaria*) sitting on them, and occasionally a Kestrel. Several sorts of Larks in pairs and small flocks, some distinctly crested, but whether the Wood-lark (*Alauda arborea*) or *Corydus cristatus* I could not make certain. Leaving the huge tumulus of Alyattes on our right we crossed three ridges of limestone and dropped on to the lake. It was a beautiful sight, absolutely smooth, with clear reflections of the brown reeds, a species of *Arundo*, ten or twelve feet high. The lake may be about eight miles long from east to west, and two miles across. A thick belt of reeds seems almost to divide it from north to south. According to the map the east end is marshy. Where we were it had a rocky edge.

Ducks were numerous and remarkably tame. There were Tufted (*Æthya fuligula*) and Pochards (*Æ. ferina*) in equal numbers, as well as several pairs of Shovelers (*Spatula clypeata*) in magnificent plumage. Teal (*Nettion crecca*) were shyer and took to flight, but dropped again in sight.

A Pygmy Cormorant (*Phalacrocorax pygmaeus*) was drying itself on the bank, and flew across several times. It looks quite black as it flies, and the longish tail makes its flight not ungraceful. I am not sure whether another and larger *Phalacrocorax* that I saw was a Shag or a Cormorant.



A pair of Green Sandpipers (*Totanus ochropus*) enlivened one little bay with their clear note and swift flight, and were conspicuous with their dark, metallic plumage and white rumps. Dabchicks (*Podiceps fluviatilis*) were in fair numbers, appearing and disappearing among the reeds.

Coots (*Fulica atra*) and Moorhens (*Gallinula chloropus*) were abundant. Some Herons (*Ardea cinerea*) occasionally rose from out of the reed bed, flapped round and dropped again out of sight. Marsh Harriers (*Circus æruginosus*) circled without ceasing just above the tops of the reeds.

I saw a Dalmatian Pelican (*Pelecanus crispus*) at a great height. It has a fine, strong flight. This is the species "formerly inhabiting and (as shown by the remains of the young) breeding in England. Bones have been found in the peat of the Fens of the Bedford level, and in considerable numbers at Glastonbury, in Somerset." I saw several others on the water when we rowed to the middle of the lake. We thought ourselves lucky to come across a fishing-boat, but there was less to be seen from it than from the shore. I think there was a Swan (species unknown) at a great distance, and a large Warbler flew jerkily in and out of the reeds. The boat was packed with huge Carp with a most muddy smell, and we were glad to be landed.

Towards the west Gulls in large flocks flew over the water, but I could not get near them to say what species.

In some blackberry bushes on the shore were about twenty Purple-winged Starlings (*Sturnus purpurascens*). They flew in complete silence from bush to bush.

On our ride home we came across many flocks, large and small, of Larks. Some were certainly Calandra Larks (*Melanocorypha calandra*). Two Snipe (*Gallinago caelestis*) were flushed from a bog in the plain. A few Black-headed Gulls were on the Hermus.

March 23rd.—The first Stonechat (*Saxicola œnanthe*) arrived to-day. With it was a Redstart (*Ruticilla phœnicurus*).

March 24th.—A good sight of Ehrenberg's Redstart (*Ruticilla mesoleuca*). The white wing patch makes it easy to recognize.

March 26th.—The first Swallow (*Hirundo rustica*) skimmed the Pactolus. At Kassaba station House-Martins (*Chelidon*

*urbica*) were already on their nests under the eaves. It is curious that these should be so much in advance of the Swallows.

From Magnesia we drove to the Hittite rock carving, and saw on the way the first (and only) Hoopoe (*Upupa epops*). While climbing up to the carving I heard Krueper's Nuthatch, and saw several Ehrenberg's Redstarts.

*March 27th.*—The new arrival to-day was a Black-eared Wheatear (*Saxicola albicollis*). A pair remained on the hill near the tombs. A Stock Dove (*Columba œnas*) was brought to our larder. It was all but plucked when I saw it, but I feel no doubt of the species. Numerous Swallows flying over the excavations.

*March 28th.*—The sun really warm to-day. Bonelli's Warbler vociferous. A White-collared Flycatcher (*Muscicapa collaris*) in the river bed. Very tame and quite silent.

*April 1st.*—A pair of Red-rumped Swallows (*Hirundo rufula*) flying about the tombs hill. The light red rump looks almost white as they fly in the sun.

*April 3rd and 4th.*—On the Acropolis at Pergamon I saw a Black-throated Wheatear (*Saxicola melanoleuca*). This is the Eastern form of *Saxicola stapazina*. Two Ravens (*Corvus corax*) were flying across the valley of the Selinus, and croaking loudly. Doves, Kestrels, and Swallows were very abundant at Pergamon. The ruins of the Roman baths were covered with Storks at their nests.

Much of the road from Pergamon to Soma is a raised causeway passing through marshes, and I had expected to see many birds from it, but they were disappointingly few. The frogs' chorus was deafening.

*April 5th.*—The first Nightingales (*Daulias philomela*) arrived. They remained in the Pactolus copses, and one could often hear three birds singing at once. They sang early and late, and loudly during the hot morning hours.

A Whitethroat (*Sylvia cinerea*) was warbling its scratchy song. Like so many other birds that passed through the valley, it was the only one of its kind that I saw. A Common Wheatear (*Saxicola œnanthe*) is constantly among the columns, and I fear the excavations have disturbed its former nesting-place.

April 7th.—Very much warmer weather, and the planes are budding fast. The Red-rumped Swallows are evidently going to build on the tombs hill. From there I had an excellent view of a Roller (*Coracias garrulus*). It flew from tree to tree with a jerky flight up and a sharp turn, showing a beautiful turquoise blue. When perching, the light blue is still most conspicuous.

There were two Blue-cheeked Bee-eaters (*Merops persicus*) hopping and creeping about in some low bushes. The white and black markings on the head show well, as does also the gorgeous, bright green of the back.

April 8th.—I climbed the Acropolis hill at dawn and had a beautiful view over the shoulder into the Tabakchai valley, where one could see clouds of steam rising from the sulphur baths. Many Wheatears were singing—a song not unlike a Corn Bunting's. Several Cuckoos (*Cuculus canorus*) were calling, at first in the distant woods, and then all around me. One settled on the Acropolis wall. These were the first and only Cuckoos I saw or heard.

I was puzzled yesterday by a small bird with a blue-grey head and rufous markings. It was Cretzschmar's Bunting (*Emberiza cæsia*); I saw it well to-day as it sat on a low bush and uttered a short "peep." High up were a pair of noisy Jays (*Garrulus krynickii* is the Asia Minor species). Lower down I watched a pair of Sardinian Warblers (*Sylvia melanocephala*) skulking among the bushes. Another pair I took for Rüppell's Warbler (*Sylvia rueppelli*) but could not swear to them, though the white streak going back from the beak and other plumage point decidedly towards that bird.

April 9th.—We ascended the course of the Pactolus. The valley narrows and the river pours through a rocky gorge. There are traces of quarrying for white marble, probably cut for the temple at Sardis. The lower gorge was full of House Martins and Swallows, above were Crag-Martins (*Cotile rupes-tris*). These look much darker than Sand Martins.

I just got a glimpse of a Dipper (*Cinclus cashmiriensis*), a bird whose absence hitherto had puzzled me.

We were some fifteen hundred feet above Sardis, and the vegetation had changed. *Arbutus andrachne* with smooth,

dark red stems made thick covert on the steep hillsides. It was being ruthlessly cut for charcoal. Judas trees were coming into flower, Madonna lilies and a purple *Aubrietia* grew in cleft rocks. There were sweet-smelling violets, a small iris, and grape hyacinths, none of which grew lower down. A bird of prey remains unidentified, but no one need be ashamed of being baffled by a Hawk. A pair seemed to have a nest in the rocks, and flew round and round in great excitement with cries like those of a Kestrel, though less shrill. They had rounded tails, and were chiefly of a sandy grey colour. Some that I saw from the cliffs at Pergamon appeared to be of the same species.

*April 11th.*—Swifts (*Cypselus apus*) arrived to-day. Six or eight were flying round the temple columns.

*April 12th.*—I saw a Spotted Flycatcher (*Muscicapa grisola*). Also in the river bed I had a good view of a new Wheatear (*Saxicola morio*), the Eastern form of *S. lugens*. It perched on a tree, flew up and down and returned to the branch. The other Wheatears, of which I think *S. melanoleuca* is the commonest, have increased, and many pairs are in the gullies above the house.

*April 13th.*—A Masked Shrike (*Lanius nubicus*) looking for insects in some bushes.

*April 14th.*—I left Sardis. Riding to the station I added a last bird to my list: a Red-backed Shrike (*Lanius collurio*).

This made seventy-five species identified.

## NOTES AND QUERIES.

## MAMMALIA.

**Rudolphi's Rorqual (*Balænoptera borealis*).**—It may be interesting, as a record of a little-known mammal in the British Isles, to state that a "Bottle-nosed Whale," forty-five feet in length, and estimated to weigh about thirty tons, washed up on the beach near Hauxley Point, about the middle of the Northumbrian coast, early in February, 1912, has proved to be an example of Rudolphi's Rorqual (*Balænoptera borealis*, Less.), of which we had no previous good record for Northumberland, though several of the allied species have been satisfactorily identified there, and from time to time more or less doubtful animals have been cast ashore. In September, 1872, a specimen of *B. borealis*, some thirty-seven feet long, was stranded and captured near Bo'ness, on the Forth, and its skeleton secured and prepared for the Anatomical Museum of Edinburgh University by Prof. Sir William Turner, who read a paper upon it to the Royal Society of Edinburgh on Feb. 20th, 1882, at which date it appears to have been the first authentic record for Great Britain. The skeleton of the Hauxley specimen has been secured for the Hancock Museum, Newcastle-on-Tyne, and I am indebted for confirmatory information of its identity to Prof. Meech.—GEORGE BOLAM (Ilkley).

## AVES.

**Nocturnal Movements of the Redwing (*Turdus iliacus*).**—In the last number of 'The Zoologist' (*ante*, p. 72) Mr. F. J. Stubbs contributes some further interesting observations on "Nocturnal Redwings," upon which, if space allows, I should like permission to comment. Mr. Stubbs's strongest point seems to me to be the undoubted fact that the Redwing's "seep" or "tzee" is so much more frequently heard during the dark hours of October and November than the cries of other migrant Passeres; and it is not easy to understand why this should be so, on the ordinary view that normal migration is an all-sufficient explanation. Personally, I have never heard the Blackbird's softer but similar migration-note at night, a fact which has often puzzled me. The Song-Thrush (whose note can hardly be considered as very like that of the Redwing), on the

other hand, is to be heard on the move during autumn nights, but strangely infrequently in comparison with *Turdus iliacus*. I have failed to notice it during the months of July or August, the earliest record I can find in my notes being Sept. 24th, on which night (11 to 12 o'clock) several birds were heard. No nocturnal passage or movement of Redwings was noted during the same autumn until Oct. 12th. Fieldfares I have only heard by night on one or two occasions, but in some years diurnal migrations of this species on a large scale are to be observed in this locality, and Redwings at times accompany them. On Oct. 22nd, 1906, and again on Oct. 28th, 1910, Fieldfares were seen passing between 10 a.m. and 5 p.m. in flocks of fifteen to three hundred birds, each flock pursuing a similar line of flight, a point or two west of south. On both occasions a few Redwings accompanied their larger congeners, but only in the earlier moving flocks. The customary long-drawn "tzee" was emitted at intervals, in the same manner as by night.

If I understand Mr. Stubbs's remarks on the song of the Redwing, it seems clear that he is speaking of the subdued "rehearsing" or "murmuration" already referred to by Mr. F. D. Power (Zool. 1911, p. 431), and not to the genuine fully developed song. The latter I have never heard in its perfection in this district, although in spring a bird may be occasionally found attempting it; whereas the aforesaid "murmuration" is a common feature of mild days during winter and early spring. It might, as suggested, be possibly mistaken by an unpractised ear for a Starling chorus; the true song, I think, could not be confused with it.—S. E. BROCK (Kirkliston, Linlithgowshire).

**Bad-tempered Blackbird (*Turdus merula*).**—For three winters some poultry have been fed in a field adjoining this station, and, as usual, numerous small birds resort there for pickings. Amongst them is a hen Blackbird that behaves in a most extraordinary way. During these three winters she has always been there daily from the time the hens are fed until dusk (or now, in February, about 3 p.m.), attacking all other birds, and driving them away from the meal, &c., which is left. By way of explanation, I ought to say that these hens are only fed in the morning, as they are over a mile away from their owner's house, and so food is left lying about for their needs later in the day. As soon as the hens have satisfied themselves, and the small birds start to feed, this particular Blackbird attacks the Starlings, Thrushes, Sparrows, Robins, &c., driving them all a few yards away; but her greatest energies are kept for attacking her own species, especially the cocks, which she will not leave alone until

they take to the wing and go some twenty or thirty yards away ; whereupon she returns to drive off whoever may have arrived to feed in her absence. One day in December last a young cock Starling turned on her and mauled her pretty severely, after which she sulked for over an hour a few yards away, and only attacked Blackbirds and smaller birds for the rest of the day. Owing to several such lessons she now leaves Starlings severely alone, and is not so vicious towards Sparrows, Robins, and such small fry as formerly, but still spends several hours daily hustling Thrushes, and particularly Blackbirds, at every opportunity. She is a large bird, and is easily distinguished by her appearance and behaviour.—RICHARD ELMHIRST (Marine Biological Station, Millport).

**Varieties of Woodcock, Starling, &c., in South-west Hants.**—That Blackbirds with white patches in the plumage are no great rarity I am well aware, but this season I have heard from various localities of an unusual number of such specimens, several of which I have seen ; the most peculiarly marked was one in which the head, neck, and breast were of an unspotted white, the rest of the plumage the usual uniform black ; another in which the division of markings was somewhat similar, but the white was not so pure. My experience points to the fact that Blackbirds show the "white feather" most frequently about the head, neck, or shoulders, but an entomological friend told me that in his summer rambles, in a certain locality, he had many times seen a Blackbird with almost entire white wings and tail—in fact, his description was "more white than black when flying"—and, what was most remarkable, he always saw it within one hundred yards of the bush where he had first detected it, and it was there only a few weeks ago.

A Moorhen with a considerable amount of white about its plumage was killed in the autumn on the Avon, a few miles distant from the spot where my own specimen was shot a few years ago, as recorded (Zool. 1905, p. 144). I believe the specimen was preserved. I did not see it, but from description it had not so much white about it as my own. Early in December a very handsome Starling was shot, in which all the larger quill-feathers of both wings and tail were of a very pretty slate-blue colour edged with dark grey, which must have made it very conspicuous when flying with its comrades. It had been observed for the last two seasons, and its whole plumage was remarkably spotted and glossy.

At the end of November a small and very dark Woodcock was shot in one of the forest-bogs. I suppose it belongs to the small

dark race described by some authors, and whether native bred or not it is impossible to say. The whole plumage is of a very dark reddish brown with black bars, head and neck almost entirely black, and large conspicuous black blotches on the back; upper tail-coverts uniform dark red-brown, inclining to black towards the end, but the usual silvery white tips are visible; breast and under parts more black than brown. It was a male, weighed just under 10 oz., and had evidently been living well, as it was exceedingly fat and plump. The varied weight of individual Woodcocks is so extraordinary—ranging, I believe, from 7 oz. to 28 oz.—that the weight of the present example is in no way remarkable. — G. B. CORBIN (Ringwood, Hants).

**Shags (*Phalacrocorax graculus*) inland in Cheshire.**—Six of these birds were seen on Jan. 24th and 25th respectively in the village of Ashton Hayes, and during the days named (country covered with snow) they were seen on the church-steeple, dwelling-houses, and even on the branches of an australian tree. Two were shot, and the remaining four disappeared from the village and were not seen again there. On Jan. 26th, however, a third specimen was shot, flying round the Waverton Parish Church-steeple. Two of the specimens have been presented to the Chester Museum. The stomachs of both birds contained a number of small (?) marine worms; being immature birds the sexes were undeterminable. — A. NEWSTEAD (Grosvenor Museum, Chester).

**Wood-Sandpiper (*Totanus glareola*).** — The mere fact of Mr. Greaves recording a party of five Wood-Sandpipers (*ante*, p. 36) is pretty conclusive evidence that he was right in his identification. We used, in the "seventies," often to meet with this species in the Aldeburgh marshes, and noticed their habit of moving about in small flocks, whereas the Green Sandpiper was usually found alone. The last record I have of the Wood-Sandpiper was in June, 1889 (*Zool.* 1889, p. 313), and then there were five together. I was then in the "North Field" at Aldeburgh, and the birds got up in the marshes near the dyke which forms the north boundary of the field.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

**Common Sandpiper in Winter.**—About the 10th of January last a specimen of *Totanus hypoleucus* was shot by Mr. Hyde Maberly at Crosshaven, Cork Harbour—a belated summer visitor. — ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).



**Little Auk (*Mergulus alle*).**—In connection with the Little Auk "invasion" during the present winter, the following may be of interest:—On Sunday, Feb. 4th, a specimen was killed on the Chilterns at Ivinghoe, North Bucks. The bird was in very poor condition and unable to fly. Upon dissection it proved to be a female, apparently a bird of last season. Slight traces of spring plumage were appearing on the neck. The stomach was empty, and I was not surprised to find that the bird weighed only 3 oz. On Feb. 5th and 6th I noted at least five specimens hanging in Leadenhall Market, two of which I subsequently examined. The larger and better plumaged bird, which proved to be a male, weighed  $4\frac{1}{4}$  oz., the other 4 oz. In the former the traces of spring plumage on the neck were very distinct. The stomachs of both specimens, which came from Norfolk, were empty. Another specimen, which I did not procure, was more fully advanced towards spring plumage. I might also remark that a friend of mine observed this species on the Essex coast during the same week.—PERCY W. HORN (Stepney Borough Museums).

**Little Auks at Great Yarmouth.**—The severe weather which prevailed during the first week in February wrought great havoc among the Little Auks. On this low, bleak coast, where there are no rocks to afford them shelter, they were at the mercy of the winds and waves, and being weak through scarcity of food, they were thrown up on the beach either dead or in a dying condition. I received one of these birds on Jan. 27th, and on Feb. 4th three were brought to me by the same individual, who informed me that another was picked up at Caister, two miles north of Yarmouth. As a last resource the strongest of them must have flown inland, as two others were picked up in the town, and one at Upton, twelve miles from the coast.—B. DYE (Row 60, Great Yarmouth).

**Causes of our Rare breeding Birds disappearing.**—I do not dispute Mr. Jourdain's objections to my remarks on the Golden Eagle decreasing in Scotland (*ante*, p. 75), for they may not be applicable to the present status of these birds in that country, of which I have no accurate knowledge; but they certainly apply to the time some years ago before the *owners* and *tenants* of the deer-forests in the Highlands and Western Islands of Scotland began their timely protection, which has *undoubtedly* saved the present race of Eagles from *extinction*. In Buckley and Harvie-Brown's 'Fauna of the Orkneys' a sad account is given of the persistent harrying of the nests, which resulted in the birds being permanently driven away from their

Orkney breeding haunts. Howard Saunders, in his 'Manual of British Birds,' says:—"But to the lowlands the Golden Eagle is now, at best, a rare visitor in the cold season. Its present breeding places are confined to the highlands and islands of the western coast, where, owing to the protection afforded by many of the proprietors of deer-forests, its numbers have to some extent *recovered* from the destructiveness of Grouse preservers." These two writers prove the sad state to which the Scottish Eagles were reduced by the raids of keepers, shepherds, egg-collectors, and skin-hunters until timely protection was afforded them.

As I dispute Mr. Jourdain's assertion that the near extinction of the Osprey in Scotland "is due to the slaughter of the birds on migration through *Ireland*, and duly *recorded* in the pages of the 'Irish Naturalist,'" I now give a correct list of the birds killed during the eleven years between 1900 and 1912, as reported in the 'Irish Naturalist.' Having again carefully searched its pages, I can find records of only *four* birds killed within the period named: One killed near Drogheda in 1907; two shot in Co. Sligo in November, 1907; one shot in Co. Fermanagh, on Loch Erne, Oct. 4th, 1909. I have not gone back over the pages of the 'Irish Naturalist' up to the date of its publication, merely taking the period I have previously mentioned; but if the records in the previous years compare with those of the last eleven, it will not show the amount of slaughter that would seriously diminish the numbers of northern Ospreys on their southern migration.

I now end the discussion by thanking the Editor for his patient kindness in keeping his pages open for so long to this controversy. Mr. Jourdain asks "Why the Kites of Wales should be dragged into the discussion." I do so, to show the difficulty of preserving our rare breeding British birds from the continuous attacks of egg-dealers, skin-hunters, and their agents; in proof of which I now quote a few lines from notes of the editor of 'British Birds' (in the last volume) on the present status of the Kite in Wales. He says:—"In 1909 seven pairs appeared, but only one young was fledged, though in 1909 fifteen birds were known to exist. This year, out of four nests watched six young are safe. It is *painful* to have to *admit* that this result has only been achieved by *force*—that is to say, the nests have been watched *night* and *day* to protect them from being robbed by the *collector* of rare British eggs or his *agent*." This needs no comment; the editor of 'British Birds' cannot be doubted.

—ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

THE discussion between Mr. Robert Warren, our veteran sportsman and naturalist, and the Rev. F. C. R. Jourdain relative to the destruction of Ospreys has interested me. It commenced in the October number of the 'Zoologist' by Mr. Warren stating he had a postcard from an egg-dealer in Leeds, who was anxious to dispose of, amongst other things, "ten Golden Eagles' eggs and *fifty* Ospreys'," thus, says Mr. Warren, showing plainly why the Golden Eagles and Ospreys of Scotland are so steadily vanishing. Mr. Jourdain replied in the next number, rightly drawing attention to the increase of the Golden Eagle in Scotland—notwithstanding egg-collectors—and alleging that the Osprey is on the verge of extinction there "because of the wanton slaughter of the birds on migration through Ireland"—these barbarous murders being recorded in the pages of the 'Irish Naturalist'—for he is "inclined to think" that Ospreys shot in England are "generally" of Scandinavian origin; and as to eggs, he will "undertake to say" there is not a single British-taken egg among the fifty duplicate eggs of which Mr. Warren writes, and complains that he has "looked in vain" for some words of reprobation from Irish naturalists of note when these murders are recorded, and winds up, "Cannot Ireland be content with the destruction of her own fauna without robbing Scotland as well?"

This definite allegation of Mr. Jourdain, that the Scotch Ospreys are killed in Ireland, is still wholly unproved. May not Scandinavian Ospreys visit us as well as Woodcocks, Snipe, Snow Buntings, Rough-Legged Buzzards, &c.? and I submit that imaginary "fly-lines" and probabilities are "not good enough" to convince.

What are the facts? Since 1892, twenty years ago, seven Ospreys have been recorded in the 'Irish Naturalist' as *killed* in Ireland; not one of these was killed in Ulster save the last, and that one on the borders of Connaught. In Ussher and Warren's 'Birds of Ireland,' attention is drawn to the great preponderance of Munster records. Donegal is full of small lakes, and not a single Osprey has ever been seen there, nor in the adjoining co. Londonderry. Once only since 1892 has Lough Neagh, the largest sheet of water in the British Isles, been visited, and the distribution of the fifty-one Irish occurrences from 1832 up to 1900 is so remarkable that the authors of the 'Birds of Ireland' suggest that the Osprey "chiefly arrives along the south-east coast and passes south-westwards." I have devoted over thirty years to Irish bird migration, and do not believe in "fly-lines," unless supported by ample proof. Since 1832, eighty years ago, the Osprey has been met with in Ireland (but not

*always* killed!) about sixty times, of which only nine were in Ulster—across which province it might naturally be expected to travel on its way to and from the Scotch Highlands to Munster, where it has been seen on about thirty-three occasions. Under these circumstances I think Mr. Jourdain builds rather a large edifice on probability, for nobody can tell where the Irish Ospreys come from, and consequently to accuse Irishmen of destroying *Scotch* Ospreys is unfair. As to eggs—can we be sure that none were taken in Scotland since 1892? A clutch usually consists (*vide* Dresser) of three eggs—two clutches might produce six birds; what a tremendous weapon for destroying rare species is this clutch-collecting, for it kills three at a time! The high price of British-taken eggs is the strongest inducement an adventurous dealer has to possess them. And how can anyone “undertake to say” that there is not a single British-taken specimen among the fifty Ospreys’ eggs advertised in Leeds? At the annual meeting, held on 19th of last month, of the Irish Society for the Protection of Birds, at which I had the honour to preside, attention was drawn in the Report to the killing of Ospreys, and members were impressed with the desirability of preventing their destruction. In the ‘*Zoologist*’ for 1907, Mr. Williams expresses regret that such harmless birds should be killed. Seven are recorded as shot within twenty years in the ‘*Irish Naturalist*,’ and I have to thank Mr. Jourdain for the 1907 record, which is omitted from my index just published to eighteen volumes of that journal, as the reference appeared under another heading. It first appeared (like the 1908 occurrences) in the ‘*Zoologist*,’ and the 1895 record is copied from ‘*Land and Water*.’

Mr. Warren and the Rev. F. C. R. Jourdain are excellent ornithologists, and both alike lament the possible extinction of these splendid and attractive birds from Scotland; but let not this crime be attributed to Irishmen more than to Englishmen or Scotchmen on conjectural evidence and without comparative statistics, and let us praise rather than blame the editors of the ‘*Irish Naturalist*,’ ‘*Zoologist*,’ &c., for the records given, as they enable us to realize what is happening, which is the first step to prevention.—RICHARD M. BARRINGTON (Fassaroe, Bray, co. Wicklow).

I HAVE only shortly to say that with every word the Rev. F. C. R. Jourdain has written (*Zool.*, Feb. 1912, pp. 74–77) I am in perfect accord. For the better part of fifty years I have been intimately acquainted with our Scottish air-fauna. I have for at least twenty-five years assiduously collected every item—*any smallest scrap*—I

could find of information upon our rarer, and especially our disappearing, species; and again of those, most particularly, the *Osprey*, *Kite*, and *White-tailed Eagle*. Alas! to these, too, I have been obliged to add for special attention *some others* in later years. I have had lists drawn up of Ospreys, &c., killed in Britain, and I fully agree with what Rev. Mr. Jourdain says about that killing being the principal cause of their almost total extinction. Dealers may possess as many or more eggs of Eagles and Ospreys, but no person need tell me that those represent the eggs of British or Scottish Ospreys (or White-tailed Eagles). I do know that one person has been stated on good authority to possess an abnormal number of Ospreys' eggs, said to have been taken in Scotland. But I agree with Mr. Jourdain that taking eggs alone would not have reduced our Ospreys to the verge of extinction; but it is the *killing of the young migrants in autumn and also the birds returning in spring*, which I believe—along with Mr. Jourdain, and, I may add, with the late Prof. A. Newton, who always maintained the same—has correctly caused the decrease. That we have immigrants from Scandinavia and North of Europe is, I hold, an ascertained fact beyond dispute, and that these compose the bulk of those shot or otherwise destroyed principally in England—and in England principally in the eastern counties. Like Mr. Jourdain, my statement of this is based upon what I consider the *very easy study* of the "fly-lines" of the species. Last autumn, not far from this house where I am writing these notes, a single Osprey frequented a sheet of water, which lies in the centre of a large manufacturing area. Hearing of its arrival and stay of several days, I am glad to say I was active in its preservation, and by my representations I had that done. It remained quite eight days, and then left. I had also written to the R.S.P.B., telling the Secretary of the fact, and praying the Society to give notice to all the county authorities along the "fly-lines" through the counties to the south. Whether this was done or not, I *never* was informed by the Central London Authority! I can only hope that that bird after our care here had equal care given to it elsewhere in other counties. It is now some forty years since an Osprey was shot at this same place I speak of, which was brought to me in the flesh. That, too, was recorded in the 'Zoologist.' One further remark and I have done. Ospreys slain in, let me say, the Outer or Inner Hebrides and West of Scotland or amongst the lakes of "Lakeland," and *the few* which appear in the West Counties, and the *still fewer* which visit Ireland, are of all others those which are the most likely to become Scottish

breeding birds if left alone. Those which pass down the east coast from the Braes of Langwell, Beniedale, and the Ord of Caithness form the bulk of the Scandinavian migrants, *but* these flights of Ospreys are—or were, and might be again—subject to slight accessions from some of our Scottish sites. It must, then, I think, be perfectly evident to anyone who knows anything whatever about the subject wherein consists the principal cause of the extinction of our Ospreys and of some other species as well.—J. A. HARVIE-BROWN (Dunipace, Larbert, Stirlingshire, N.B.).

THE following quotation from the Eighth Report of the Irish Society for the Protection of Birds (p. 6) may be of some interest in connection with the above correspondence:—"We have looked up the records of Ospreys in this country [Ireland], and find that within the last twenty years nineteen birds of this species were seen, and that twelve of them were killed; Mr. Jourdain has, therefore, some ground for his strictures."—F. C. R. JOURDAIN (Clifton Vicarage, Ashburne, Derbyshire.

[This discussion has pursued its normal course, and is therefore now closed.—ED.]

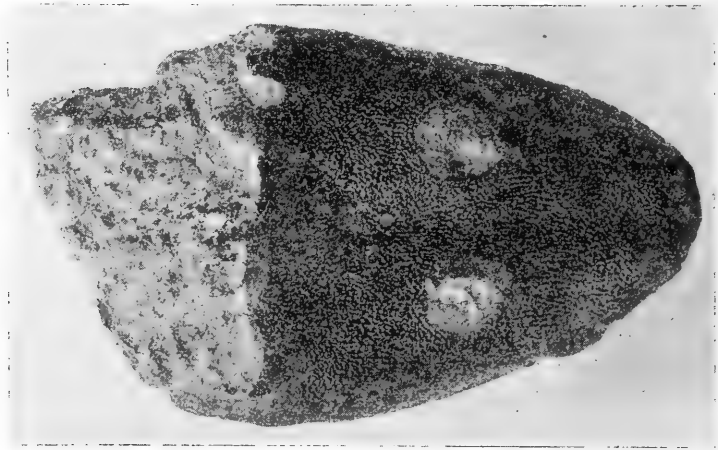
**Snow and Wildfowl.**—The snap of cold, snowy weather which distinguished the middle of January was provocative of considerable unrest among the various ducks and wildfowl generally off the east coast. There was a remarkable movement southward noticed on the 16th, when all sorts of ducks, including Wigeon, Sheld-Ducks, and others, were rushing through Yarmouth roadstead in big crowds. An unusual number of Oystercatchers were seen in the neighbourhood, while Dunlins came to Breydon in thousands. Being away from home on that date, I missed the bulk of the fowl, but next day they were still passing, and on the 18th I observed a flock of nearly seventy Brent Geese, with flocks of ducks, still moving in that direction. The Sheld-Ducks and Mallard that flocked to Breydon were tantalisingly out of reach of those who sought them with shoulder and punt-gun, the tides being so "poor," owing to the easterly wind, that they could not get near them. A few, however, were killed. I went through Saturday's market, which presented an unusual appearance, for on every third or fourth stall couples or more of duck were exposed for sale, Mallard and Duck being the commonest. Folks from the Broad district assured me that all the Broads had been alive with fowl, considerable quantities of Wigeon, Mallard, and Teal being noted. The Holkham Geese became some-

what demoralised by the stress of weather, and numbers skirted the north coast of Norfolk. Two Pink-footed Geese were shot at Palling, and brought to market. I saw one with which an attempt had been made to keep it alive, the wing having been cut. It fretted and died, and only weighed five pounds. Some Brent Geese were also on sale; for a number of years past this species has been rare off this coast. Three or four Little Auks were secured, and two or three Little Gulls. I saw a flock of Larks come straight in from sea on the 18th. A keeper living near Hickling reported thousands of Mallard and Wigeon on the Broad, and about five hundred Pochards, Tufted Ducks, and Scaups. He observed one morning fifty Sheld-Ducks, eleven Goosanders, two immature Black-throated Divers, one immature Red-throated Diver, two Smews (one a very old male), and several adult Golden-eyes, besides many Curlews, Dunlins, Ringed Plovers, and Sanderlings. Snipes were abundant, Jack-Snipe unusually so. On the 17th five Long-tailed Ducks were seen by another competent observer. On the 27th I saw two Smews in the market, one of them an exceedingly beautiful adult female; it is rather remarkable that adult males are always scarce here. Two or three Bitterns appear to have been seen; one found hiding in a stranded fish-basket was turned out by a gunner and promptly shot. It may be interesting to add that an observer, whose rambles favour West Norfolk, writing to a local paper, remarks that the Gadwall has not only become "settled" on the West Norfolk meres, but is decidedly increasing. He states that in 1850 a pinioned pair were turned out at Narford; that "these increased, spread to other pools in the vicinity, and have probably been strengthened by immigrants from the Continent. Some years ago it was computed that the number which frequented one private water alone was from 1400 to 1500 birds, and that upwards of 1000 pairs then bred in that part of the county. . . . I have seen flocks of over a hundred on six different sheets of water. On one occasion I saw a Gadwall on Fowlmere followed by twenty-two ducklings, evidently two broods." Such an easily bred fowl, and one quite on a par with the Mallard for edible purposes, should certainly be encouraged to extend its range.—A. H. PATTERSON (Ibis House, Great Yarmouth).

#### AMPHIBIA.

**Bothriceps huxleyi in South Africa.**—The Karoo-beds (Permian-triassic) of South Africa are remarkable for the number of important fossil vertebrates they contain. These include many types of reptiles,

particularly a large number of the curious forms which approach very nearly to the mammals in structure, and probably were the ancestors of that group. Besides these the Amphibia are represented by the Labyrinthodonts, in which the complicated infolding of the enamel of the crowns of the teeth is a characteristic feature. A beautiful specimen of the skull of a small Labyrinthodont (*Bothriceps huxleyi*, Lydekker) from this region has recently been presented to the Natural History Museum by Mr. Distant, who received it from Mr. Robert Marley, who found it in the Berg districts near Natal. Nearly all the hard rock in which it was originally embedded has



*BOTHRICEPS HUXLEYI* Lydekker (about two-thirds nat. size).

weathered away from the upper surface of the skull (see fig.), so that the peculiar sculpture of the roofing bones, the nearly terminal nostrils, the orbits, and the well-developed opening for the median pineal eye are well shown. Specimens such as this, lying loose on the surface, and more or less weathered out of the hard matrix in which they were embedded, are probably not uncommon in many localities in South Africa, but for the most part they are overlooked and neglected. A collector who, like Mr. Robert Marley, would look out for nodules showing traces of such weathered-out skulls and bones might well find specimens which would add materially to our knowledge of the extraordinarily interesting extinct vertebrate fauna of South Africa.—CHARLES W. ANDREWS (British Museum).



## NOTICES OF NEW BOOKS.

*The Ox and its Kindred.* By R. LYDEKKER. Methuen & Co., Limited.

THIS book constitutes a reliable and fully illustrated book of reference to the domesticated cattle of the world. It also gives a description of "British Park Cattle," which were long regarded as truly wild. Mr. Lydekker, in his preface, writes: "And I venture to hope that this volume will appeal alike to naturalists, to the owners of pedigree cattle, to cattle-breeders generally, and to archæologists." This hope will be fully realized. All the chief authorities have been consulted, and many references are given to valuable memoirs little known and less read on the subject.

In the present chaos as to a definition of the term "species," it is a great consolation to read the following dictum of Mr. Lydekker:—"It is quite certain that such animals as European cattle, humped cattle, gayal, yak, and the two kinds of bison severally represent perfectly distinct species, in spite of the fact that, under certain conditions, some of them will interbreed and produce fertile offspring when in a state of partial or complete domestication. Consequently, interbreeding or non-interbreeding cannot be taken as a test of the specific or racial status of any kinds of animal." In the specific descriptions of the present day that time-honoured test is never considered—for all museum purposes it is an obsolete rule—and it is well on logical grounds to have it disclaimed.

*Prehistoric Man.* By W. L. H. DUCKWORTH, M.A., M.D., &c. Cambridge University Press.

THE progress of anthropological study has departed in no respect from its evolutionary standpoint, but is marked by more caution on account of the greater—though still meagre—finds in the prehistoric remains of *Hominidæ*. In this manual Dr.

Duckworth has marshalled in small compass all the finds relating to the early days of our genus—even supposing that in the time to come only one genus will be recognized. Three divisions can now be formulated as expressed by the author:—

Group I. Early ancestral forms. Ex. gr. *H. heidelbergensis*.

Group II.

Subdivision A. *Homo primigenius*. Ex. gr. La Chapelle.

Subdivision B. *H. recens*; with varieties { *H. FOSSILIS*. Ex. gr.  
Galley Hill.  
*H. sapiens*.

The concluding paragraph is to the point:—“If progress since the foundations were laid by the giant workers of half a century ago appears slow and the advance negligible, let the extension of our recognition of such influences and possibilities be taken into account. The extraordinarily fruitful results of excavations during the last ten years may challenge comparison with those of any other period of similar duration.” We may be on the eve of finding further remains which may largely qualify our previous conclusions on prehistoric man.

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*Butterfly-hunting in many Lands.* By GEORGE B. LONGSTAFF, M.A., M.D., &c. Longmans, Green & Co.

DR. LONGSTAFF is a great lover of entomology and an ardent collector of insects in the field; he has seized every opportunity to follow his favourite pursuit; he made the best of his possibilities when attending the meeting of the British Association in South Africa, and also during several tours made in various tropical and subtropical countries; the results and itinerary form the substance of this somewhat massive but interesting volume. Some of the chapters are reprints of papers published by the author in the ‘Transactions’ of the Entomological Society of London, and have been revised and enlarged, and the introduction and the chapter devoted to “Some Early Reminiscences” recall old scenes and old friends to many of us.

Dr. Longstaff is an evolutionist who thoroughly accepts the doctrine of the “survival of the fittest,” and may be described as a moderate “natural selectionist.” One of the most interesting observations is his witness to the universality of the gesture language in mankind, long since so ably stated by

Dr. E. B. Tylor. By this process Dr. Longstaff made himself understood by a Blackfoot Indian, and by using the deaf and dumb signs as in England.

The volume contains many interesting bionomical observations, and is well illustrated.

---

*More Animal Romances.* By GRAHAM RENSHAW, M.B., F.Z.S.  
Sherratt & Hughes.

DR. RENSHAW has resumed the publication of his animal romances. Equipped with his zoological knowledge, an eloquent pen, and a vivid imagination, his pages teem with life, and the environment is painted with a free hand; but, of course, the reader must always remember the title of the book—"Animal Romances." We do not suggest that these word-pictures are greatly overdrawn; they are, on the contrary, decidedly realistic, but the task is a difficult one, and the patient bird-watcher would no doubt sigh for the capacity to compose these graphic and lurid pages. The illustrations are very beautiful, and Dr. Renshaw transports his readers to regions which teem with animal life—in fact, his book fulfils the purpose of a zoological bioscope, but necessarily in many cases the impressions are mentally produced; they are not realisms, nor could they be expected as such. The book should find many readers on the border-land of science, and the only criticism we would hazard is as to whether the term "antediluvian world" is not somewhat archaic?

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## EDITORIAL GLEANINGS.

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MR. C. HUTCHINS, of Omokoroa, Tauranga, New Zealand, who was brought up in a rural district in Essex, England, states in the 'Lyttelton Times' (Jan. 13th, 1912) that in the district in which he lives song-birds are losing their vocal powers. "We have Sky-Larks in large numbers, also Song-Thrushes, Blackbirds, Goldfinches, and other English birds, but not a song from one of them. The Thrush is the only bird that seems to try to sing, and his effort is a miserable failure. It is only a squeak compared with the loud clear notes of

former years. The Sky-Lark here is utterly devoid of song. In these days I never see it soaring aloft to sing. A short time ago I watched a Sky-Lark sitting on a post. He fluttered his wings and tried to sing, but the effort resulted in complete failure. This absence of song amongst the birds has been noticeable here for the past two or three years at least. I should like to know if the same circumstances have been observed in other districts."

---

In the 'Bradford Scientific Journal' (January, 1912), Mr. George Bolam gives a description of the "Fish Poisoning in the Wharfe on the 15th October, 1911." "One photograph represents the heap of dead fish collected by the keepers from the river, and was taken at Mr. Lancaster's farm on the Bow Beck on the 16th, when, as he informed me, it contained in all 1054 fish (no more were added afterwards), *viz.* 1003 Trout, 30 Grayling, 12 Eels, and 9 Barbel. The two largest of the latter were each about 31 in. long, and weighed together, I was told, close upon 18 lb. They have been preserved by the Ilkley Angling Club. Two of the next largest Barbel (perhaps 4 or 5 lb. apiece) are represented in the second photograph, and, having been given to me by Mr. Lancaster when the fish were about to be buried, have been presented one to Ilkley, and the other to Keighley Museum. 790 Trout collected on the Sunday, 15th October, weighed together, approximately,  $1\frac{1}{2}$  cwt., the largest not exceeding about  $\frac{3}{4}$  lb. 213 were added to the heap next morning in my presence, but not weighed; they, however, did not run large. Some of these were brought by the Denton keeper, and no more were afterwards collected. The largest Grayling would be about  $1\frac{1}{2}$  lb.

"The poisoning arose from an escape of ammoniacal liquors from the gasworks, owing, I believe, to some repairing or relaying of pipes. This had been finding its way into the river for three or four days before any harm was done to the fish, though no doubt it must have been stronger or escaping in greater quantity on the night of the 14th, when the mischief arose; but for several days previously the smell from the drain mouth had been very bad, highly objectionable to those dwelling near it, as well as to anyone having occasion to pass that way, and offensive to the nose for a considerable distance. No ill effects were noticed until Sunday morning, the 15th, when large numbers of dead and dying Trout were observable."

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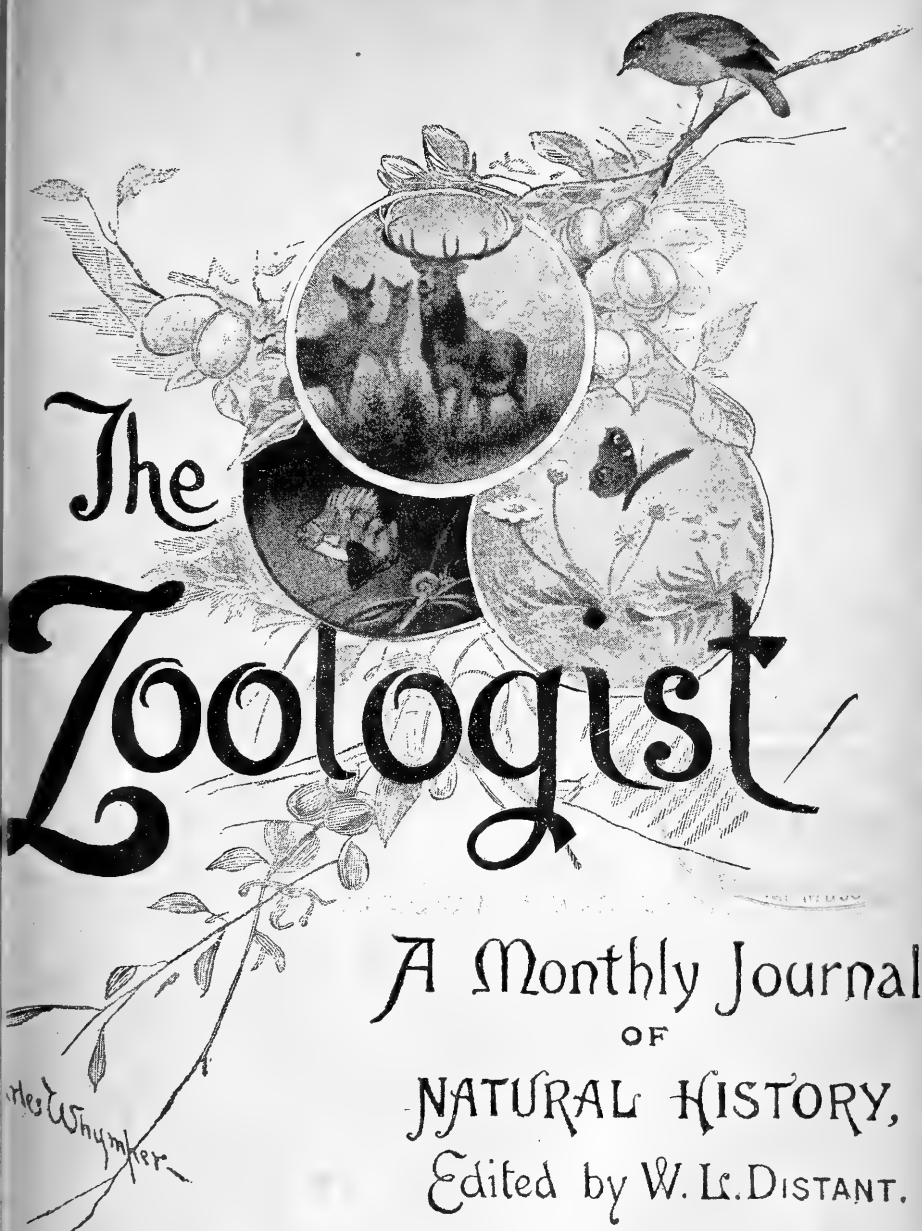
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# THE ZOOLOGIST

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No. 850.—April 15th, 1912.

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ORNITHOLOGICAL REPORT FOR NORFOLK (1911).

BY J. H. GURNEY, F.Z.S.

It hardly seems like twelve months since I wrote the last Ornithological Report for Norfolk, but nevertheless the time has come round to draw up another, and I had better begin with—

*The Vernal Migration.*—The spring migration must have commenced early—at any rate, the Rev. M. C. Bird, to whose notes I am always so much indebted, informs me, though not on his own authority, that the Chiffchaff was heard near Norwich on Feb. 12th, and the Wryneck on March 13th. After this came a spell of cold weather, so that on April 6th it was no surprise to see deep snow on the ground. Writing from Lowestoft on that day, Mr. C. B. Ticehurst alludes to the desultory way in which bird migration was proceeding, such weather probably acting as a check upon it.

The Crossbills had perhaps already departed; I know of none being seen near the sea during March and April, but emigration is so difficult of observation compared with immigration. The travelling birds seldom leave our Norfolk shores before nightfall, and then it is impossible to see them depart, and their exit can only be guessed at by their absence afterwards, which may or may not be immediately remarked. From May 15th to July 26th small parties of Crossbills were probably moving along the coast, as between those dates they were seen by W. Burdett at Northrepps, the greatest number viewed by him being twenty-six on July 20th, very early in the morning. On June 19th I saw four flying rather high, and making straight for the sea, half a mile distant, calling as they flew over the tops

of the trees. A good many must have bred again in the Thetford and Brandon district, for eight nests were found in less than half a square mile by Mr. B. B. Riviere, and on April 15th Mr. W. A. Clarke saw a nest at Foulmere.

*The Breeding Season.*—The summer of 1911 was terrible, being the hottest and most rainless summer experienced in the counties of Norfolk and Suffolk since 1868 (see Weather Report, by A. W. Preston, F.R.Met.Soc.). In many places fields of barley took fire by the sparks emitted from adjacent lines of railway. July 31st was supposed to have been the hottest July day for fifty-two years, and on Aug. 9th my thermometer stood at 96° in the shade. Young Partridges did not suffer nearly so much as many people, who are unaware how little moisture these birds require, expected, and contrary to anticipation it proved an extraordinarily good year for wild Pheasants.

The great event of 1911 was the breeding of the Bittern, possibly due to the drying up of some of the Dutch swamps by the great heat. Miss Turner has already published an admirable account of the way in which she found the young one (cf. 'British Birds' and 'Country Life' (Dec. 2nd, 1911)), but I can add a few particulars to this record. The last nidification of a Bittern in Norfolk, if not in England, was in 1886, when a young one was obtained. Although nearly full-grown, there was no doubt about its being home-bred, for there was still down upon it when I examined it at the shop of the late Mr. Cole.

It is equally satisfactory to have established, on the excellent authority of Mr. N. Tracey, the nesting of the Common Curlew in the vicinity of King's Lynn. Readers may perhaps remember that the nidification of this species was provisionally announced so long as twenty-three years ago (Zool. 1889, p. 336).

Another species which I think calls for some remark is the Little Owl, for it seems to be resolutely spreading, and to be making its way into Norfolk and Suffolk. In 1910 seven were recorded as mercilessly destroyed by keepers, and during 1911 seven or eight more can be added to that list. Mr. Tracey has every reason to believe that a pair bred near Lynn.

*The Autumnal Migration.*—The first part of the autumn migration was very slack; only a single Bluethroat was seen, and one good observer, who often comes to Norfolk, and who

stayed on a smack in a harbour well situated for making observations, says that from Sept. 10th to the 30th he never saw fewer migratory birds on the Norfolk coast. The fact was, the weather was too fine. What bring us oversea migrants, and among them rarities from Russia, and even from Asia, are mist, rain, and strong head-winds. The birds travel by night, and unless we have these unsettled conditions of weather they pass over Norfolk and its shores without alighting. Birds probably travel at an immense height, and if all goes favourably the phenomena of migration do not come under human ken at all; millions may pass our shores in a single night without anyone being the wiser, or suspecting their presence. However, on the night of Sept. 12th Mr. F. Penrose recorded a movement of small dimensions, which included an Icterine Warbler ('British Birds,' v. p. 188), and there was another rush on Sept. 30th, and again on Oct. 5th. During October a nephew of Mr. Arthur Patterson, who is stationed on the "Leman and Ower" light-vessel, sent his uncle some interesting memoranda on birds, in which he reported visitations from six Kestrels, a Barn-Owl, a Short-eared Owl, a Water-Rail, a Jackdaw, a Brambling, a Greenfinch, and a few Starlings. Subsequently he furnished Mr. Patterson with several more observations:— Nov. 28th, a Starling or two; 29th, about thirty Snow-Buntings, one Lark, one Yellow Bunting, two Tree-Sparrows, and three Starlings; 30th, Grey Linnet, Greenfinch, Thrush, and several Chaffinches; Dec. 4th, about 2 p.m., a flock of about twenty Yellow Buntings came on board, and a flock of Crows passed over, high up. Mr. Paston, however, finds that since the lights were made to revolve on the "Leman and Ower" Sky-Larks have been less attracted. Birds of prey were by no means numerous, nor are they likely to be so when Government rewards are offered for their destruction in Norway.\* Three Rough-legged Buzzards, a Peregrine Falcon, a Marsh-Harrier, and two Merlins

\* Probably a portion of those which we used to get in Norfolk came from the province of Trondhjem, where premiums have been paid in twelve months on one hundred and eight Eagles, besides other birds (cf. 'Field,' Aug. 26th, 1905). When I was in Romsdal I found the inhabitants thought this head-money well worth earning. Prof. Collett has memorialised the Storthing at Christiania in favour of the Common Buzzard, the Rough-legged Buzzard, and the Snow-Owl, but, I am afraid to the present, in vain.

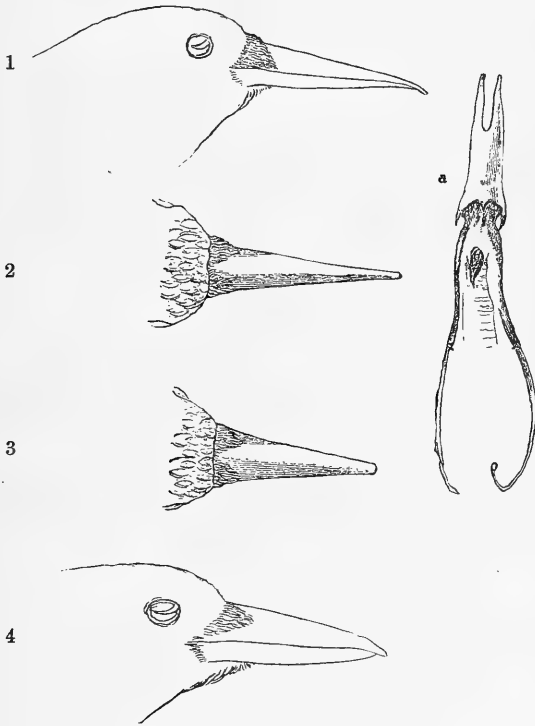
were all that came under my cognizance. Wood-Pigeons have also been scarce, and fortunately so, from a farmer's point of view.

Another scarcely less harmful bird, in spite of all which sentimentalists may say about it, is the House-Sparrow, which is a parasite to man more than any other wild bird which exists. Spasmodic attempts to keep it down have lately been made in Norfolk by the formation of Sparrow clubs—to wit, a combination of farmers, who undertake to destroy them by netting and taking their nests. The parish in which I reside and nine others adjoining thus combined, and paid for the twelve months ending Nov. 30th premiums on 11,438 Sparrows and 4772 nestlings and eggs, but even these measures are only partially effective. The Sparrow is too firmly rooted in all the cultivatable parts of England to be turned out, but the idea that migrants come to us over the North Sea is untenable.

As a set-off to the destructiveness of the Sparrow and the Wood-Pigeon—and, I am afraid, we must add the Rook—the ornithologist can point to the benefits conferred on man by the Barn-Owl, or White Owl, as it is termed, of which a striking instance will be mentioned presently. The Owl is one of the seven birds which receive throughout the administrative county of Norfolk a so-called protection by order of our County Council during the whole of the year, but if the word "Owl" is to be understood in a generic sense, I fear the law here is little better than a dead letter. There is one engine of destruction, the pole-trap, which used to kill all comers—Owls, Hawks, Cuckoos, Woodpeckers, &c.—but this, having become illegal in 1904, is much less used than formerly, although there are still several gamekeepers who employ it, being unaware that they are thereby rendering themselves liable to a fine of forty shillings.

*The Migration of Nutcrackers.*—With regard to the Nutcrackers, the migration was far from being confined to England; in fact, we only received the fringe of what was a very widespread movement, reaching all over Germany and into France. If they all belonged to the Siberian race they must have come a long distance. In addition to the two Norfolk examples, one was taken in Suffolk, one in Bucks, and one in Sussex. All these are considered to have been the slender-billed *Nucifraga macro-rhynchus*. The 'Revue Française d'Ornithologie' records a good

many "Casse-noix," but does not say whether they were thick- or thin-billed; in some examples the distinction is not very apparent. Swiss examples are, however, stated by M. Ghidimi, of Geneva, to have been *N. c. macrorhynchus* (T. C. 1912, p. 247). Here it may not be out of place to reproduce Mr. E. de Selys Longchamps' outlines of the beaks of the two races ('Bulletin de l'Académie de Bruxelles,' 1844, p. 298). It may also be well



1 and 2, *Nucifraga c. macrorhynchus*; 3 and 4, *N. c. caryocatactes*.

to give his drawing of the Nutcracker's bifurcated tongue, which has been alluded to by the Rev. J. G. Tuck and Mr. Ground (*ante*, pp. 34, 74). Possibly its bifurcation assists the bird in extracting the seeds from fir-cones; yet the Crossbill has no such help. Immediately beneath the tongue there opens a dilatable sac or pouch, which is well described by M. de Sinéty in the 'Proceedings' of the French "Académie des Sciences" (1853, p. 785). M. Sinéty also draws attention to the very

expandable nature of the œsophagus, remarking that he has taken as many as seven hazel-nuts from the pouch, and six more from the œsophagus of a single Nutcracker. When the pouch is thus charged, he goes on to say, it will hang down, "comme une énorme goître sous le cou," its size sometimes attaining to double that of the bird's head.

*Principal Norfolk Rarities.*—The chief rarities for the year 1911 were a Serin-Finch in January (a curious date!), a pair of White-winged Terns in May, a Red-footed Falcon in June, an Icterine Warbler in September, a Sabine's Gull and two Nutcrackers in October, as well as a third in Suffolk, and one, if not two, Black-throated Divers in December. The occurrence of another Serin-Finch in midwinter (Jan. 28th) is especially noteworthy, for this is a bird which, when it does come to England, one would look for in the spring or autumn rather than in the winter. Norfolk was visited by a Serin-Finch in January, 1887, and by a Citril-Finch in January, 1904, also by a Red-breasted Flycatcher in December, 1896, and by a Water Pipit in January, 1905. It is probable that all these birds were of eastern rather than of southern origin, but even admitting that to be the case, their presence at such a time of the year is very remarkable, and can only be accounted for by their being blown out of their course by wind.

Another species which, when it does occur in the eastern counties is generally met with about midwinter, is the Little Bustard, and Mr. Howard Saunders states that it is chiefly a winter visitor to Germany also ('Manual of British Birds,' p. 526). Again, several Nyroca Ducks have been taken in winter, and in 1909 Mr. Dye recorded a Glossy Ibis in Norfolk in December,\* and in 1903 I referred to an Avocet on Dec. 31st.† All these are southern birds whose winter range is in Africa, and they are out of place in England in December and January, and it cannot be supposed that they come to us voluntarily.

Rainfall, as registered by Mr. Edward Knight, 25·18°. Wind, prevailing direction, W. Gales on fifteen days.

#### JANUARY.

1st.—There is not much recorded in my journal for January. A couple of Waxwings sent to Mr. Lowne were the only ones

\* Zool. 1910, p. 74.

† Zool. 1904, p. 215.

announced. A single Little Auk was sent to Mr. Roberts; this was perhaps a returning bird from the passage noted two months previously, fortunate enough to have escaped death from starvation.

2nd.—On the 2nd Mr. Gerard Gurney put up the ubiquitous Green Sandpiper, to which no season of the year seems to come amiss, and on the 6th a Norfolk Plover, much behindhand, was seen near the coast by the Rev. M. C. Bird, the same belated bird being observed again on the 20th by the keeper.

14th.—On the 14th a Knot was shot at Hellesdon, nearly twenty miles from the sea; evidently it had followed the river, and may have come with a party of waders which were heard by Mr. B. B. Riviere the same night passing over the lighted city of Norwich. On the 21st Mr. F. H. Barclay flushed a Bittern on Hoveton Broad, where rare birds are protected; and on the 25th Mr. Pinchin identified two Mealy Redpolls near the sea.

28th.—The end of the month produced the first novelty, one of the Yarmouth birdcatchers bringing Mr. Lowne a cock Serin-Finch, which he had caught on the North Denes, a very favourite haunt of the bird-netting fraternity. This is the fifth, if not the sixth, Serin-Finch which has been netted at Yarmouth, and I believe they have all been cocks; yet at Blakeney none have been taken, but there is no netting there. We do not know what governs the separation of the sexes in the *Fringillidæ*, well exemplified in the Chaffinch and Brambling, but which ceases at the end of February.

#### FEBRUARY.

No notes.

#### MARCH.

1st.—During most of February I was watching birds in the Pyrenees, and have no more notes until the beginning of March, when a Sea-Eagle, said to have weighed sixteen pounds—which is hardly credible—was shot on a sporting estate at Downham, and forthwith went the round of the papers as a Golden Eagle!

3rd.—Three Snipe's eggs found by the keeper (M. C. Bird); very early.

25th.—Some Redstarts, which were probably Black Redstarts, seen at Yarmouth by Mr. A. Patterson, and about the same time several were reported from Lowestoft by Mr. C. B. Ticehurst. The Black Redstart is either commoner, or more observed than

formerly, but it is only met with upon the coast. In May, 1885, it was described in 'The Zoologist' as a very rare Norfolk bird, but no one could say that of it now; its migratory line of flight appears to be especially between Caistor and Southwold in Suffolk. During fifteen years I never met with it at Cromer, and regard the example said to have been seen near there on May 15th, 1872, as doubtful. Mr. Patterson also saw a Wheatear in Yarmouth Park, and the following day Mr. B. B. Riviere saw two Wheatears at Croxton, which is near Thetford. If these Wheatears had just come from the south, which I do not think likely, they must have been moving in the teeth of a north-easterly gale, which was registered at Yarmouth as force 8. That would be a very high wind, and if it prevailed on the Continent would be sufficient to blow them from Southern Russia, whence so many other involuntary migrants are supposed to come to England.

31st.—Complaints of the damage done to the pear-tree buds at Neatishead by Blue Tits (*M. Bird*), but a gentleman who shot thirty-eight of them must remember that they eat a great many *larvæ* as well. In the opinion of the late Prof. Newton, Titmice were to be regarded as benefactors to the horticulturist rather than the contrary.

#### APRIL.

10th.—*Barn-Owls' Nests and their Contents.*—The Barn-Owl is a quaint and useful bird, and, happily for agriculturists, it is generally distributed, so that there are few parishes of any extent in Norfolk where its weird shriek cannot be heard. A measure of protection is accorded to them, yet their numbers hardly seem to increase, which certainly is not for lack of field-mice, of which we have plenty. As far as my experience goes in this county, the idea that they sometimes eat the young of tame pigeons in dove-cots, though still prevalent, is absolutely without foundation. To-day, although the wind was not high, a large pollard oak near my house blew down, which I regretted the more because it had long been a haunt of the Barn-Owl. As was to be expected, there were plenty of pellets in the cavity of its trunk, some of which were so dried that they may have been cast up twelve months or more. With some assistance I collected 114, and had them soaked in water. The result was the skulls,



or portions of skulls, of 19 young rats, 126 long- and short-tailed field-mice, 69 shrew-mice, and three small birds, apparently greenfinches—a pretty good testimony this to the utility of the Barn-Owl! I have never seen a full-sized rat in a Barn-Owl's nest; generally they are about a quarter grown or less, and I can hardly believe they would tackle a large one. About June 9th Mr. Q. E. Gurney found the remains of two moles in a Barn-Owl's nest, and this I regard as most unusual food, but it was in the same parish where a mole was found before (Zool. 1910, p. 136)—a parish where these little burrowers are very plentiful. On revisiting the nest with my nephew on the 19th two Barn-Owls flew out, but there were no more moles, only some mice-pellets and one egg. On July 3rd there were five eggs, and on the 15th six. On the 27th three of them were hatched, and on Aug. 4th the other two were hatched.

17th.—A Tawny Owl's nest† with young in a pigeon-locker at Intwood, and about the same time another nest, also with young, was seen by Mr. B. B. Riviere at Colton. In the same locker a pair of Jackdaws were nesting, but the tame Pigeons had apparently forsaken it, perhaps from suspicions of such predatory neighbours. The Tawny Owl is apt to be very aggressive when it has young, and it is dangerous to approach the nest without a stick.

#### MAY.

1st.—A Cuckoo's egg in a Chaffinch's nest at Brunstead (M. C. Bird).

2nd.—A Lesser Redpoll's nest with two eggs at Croxton (B. B. Riviere).

4th.—The Earl of Kimberley reports over thirty Heron's nests on Kimberley Lake. There is one nest at Wheatacre and two still at Earlham, where there was only one last year; from both these places they have been driven by injudicious felling of trees. Four nests at Catfield, and one at Ranworth (M. C. Bird).

8th.—This was really a summer's day, and perfect for birds'-nesting. Accordingly, it was with no small pleasure that Mr. Gerard Gurney and I directed our steps, by invitation, to one of the smaller Broads, where Redshanks and Reed-Buntings were soon seen, but on this occasion no Grasshopper-Warblers, although it is a favourite place for them, and some had been

recently heard. Flitting among the reed-tops were a good many Bearded Tits, which the absence of wind had tempted up from their recesses. Although the "Reed Pheasant" no longer suffers from the rapacity of dealers, the gradual growing up of our Broads must more and more limit its area of distribution. A Coot's nest was presently found, containing two eggs and four newly-hatched young ones, whose orange heads were quite resplendent among the reeds. These active mites speedily slipped over the sides of the nest, but one bolder than the rest crept into its fabric, evidently thinking that between the blades of bolder-rush its brilliantly coloured head would be concealed, and it was less conspicuous than might have been expected. In six weeks these young Coots would be white-breasted Coots. Further on Mr. R. Gurney punted us to a Great Crested Grebe's nest, and again the scarlet countenance of a very young Grebe was seen eyeing us from between the blades of the bolder. About 1 p.m. the "boom" of a Bittern was distinctly audible, and again at 1.20 the strange sound swept over the water, not loud this time, but rising in volume like some distant fog-horn. Naumann expresses it on paper by the syllables "ii-prumb," repeated slowly, which perhaps is as near to it as any imitation can be. It seemed very similar to the "booming" of the Little Bittern which I heard at Saham Mere in 1894.

9th.—A Teal sitting upon eight eggs at Hempstead, where there have been the unusual number of four nests this year. In 1835 above a thousand were taken there in a decoy (Norw. Nat. Trans. ii. p. 21), which has long ceased working, although the pool remains. Perhaps, however, Skelton, the old decoyman, reckoned every Duck which was smaller than a Mallard as a Teal.

10th.—The Bittern which we had heard on the 8th, reported by Mr. R. Gurney to be "booming" rather freely on his brother's marshes, or rather among the reed-beds, and generally in the afternoon. It continued to be heard by the broadman until the end of May, after which there was a period of several weeks' silence. The "booming" is evidently to be regarded as a spring call, and when sitting the Bittern would naturally cease to make it.

11th.—Three Black Terns upon Breydon Broad (G. Jary), and on the 16th eighteen more, and a pair of White-winged

Terns on another Broad. Also a pair of Black-necked Grebes (M. C. Bird).

23rd.—W., 3. A Spoonbill seen by Mr. T. A. Coward on Easton Broad, Suffolk, and on the 25th the same or another on Breydon Broad, where it remained until the 31st (G. Jary). This was the first one reported in 1911.

30th.—Examined, with Mr. C. B. Ticehurst, a number of seeds of the common laurel, which had been driven into the crevices of the bark of oak-trees by Nuthatches at Keswick, and which puzzled us considerably, but were eventually identified by the gardener.

31st.—To-day Mr. N. Tracey was shown a nest of the Common Curlew in a fen which lies a few miles from Lynn. The broken remains of three eggs were lying in the nest, which a game-keeper subsequently explained to Mr. Tracey by saying that he had come upon a fox apparently engaged in sucking them.

#### JUNE.

1st.—About this date a Red-footed Falcon, as I am informed by Mr. Saunders, was brought into Yarmouth, but I did not learn in what parish the shooting of it was perpetrated, or into whose possession the bird passed. This was not known as a British bird until 1830, when no fewer than five were killed in Norfolk, and others have been taken since; the last two occurred in April, 1901, and June, 1908. It is even possible that it may have bred in the county.

6th.—N., 2. A Spoonbill in Kimberley Park (the Earl of Kimberley), and a few days later it was to be seen on Breydon Broad.

7th.—Two Pigmy Curlews seen at Cley (C. Borrer).

22nd.—S.W., 4. Two more Spoonbills on Breydon Broad, which stayed until the 27th (Jary).

29th.—A Woodcock's nest with three eggs at Croxton (B. Riviere).

#### JULY.

8th.—*Nesting of the Bittern.*—After an arduous search in a dense reed-bed, higher than a man's head, a well-feathered young Bittern was found by Miss E. L. Turner and J. Vincent, which it was naturally concluded could not be the only one, as

the Bittern lays four eggs. It refused to take food when placed in its mouth, whence Miss Turner judged that the young are fed by regurgitation, and the only sound it uttered was "a curious bubbling note." As the young of the Bittern are not hatched



YOUNG BITTERN. (By Miss Turner, Norfolk, July 7th, 1911.)

simultaneously it is possible that this was the youngest bird of the clutch. The illustration of a young Bittern taken at Ranworth long ago (Gurney and Fisher, Zool. 1846, p. 1321) will hardly bear comparison with Miss Turner's beautiful photographs, one of which I am permitted to reproduce. The discovery of the nest fell to the Rev. M. C. Bird eleven days later.

From Mr. Robert Gurney, who was with him, I learn that when found it was full of Bittern's feathers, with a few fish-scales, probably those of Rudd and Roach. This nest, which I had an opportunity of examining afterwards, *viz.* on Aug. 1st, was, according to my tape measurements, 18 × 15 in. at the water's edge, with a depth in the centre of about 4·7 in. ; roughly speaking, it was an ovate circle. It rested on no solid foundation, there being about 18 in. of water below it, in which I felt about in the hope of finding a rotten egg. The fabric is well shown in a photograph by Miss Turner, who thought that its flatness was probably owing to its having been trampled down by the nestlings. But even in this condition it hardly deserved the epithet of a careless structure, which has been applied to it by some writers. The nest was situated among the stems of the reeds, and could only be approached by wading. It was principally composed of broken stalks of the bulrush, here called "bolder-reed" (*Scirpus lacustris*), by vast tracts of which it was surrounded.

The young Bitterns kept about, and on the 27th two were seen by Mr. Robert Gurney, but not together. This was within half a mile of the nest, and the old bird could be plainly heard croaking to them. That they eventually got off unmolested there is every reason to believe, and I think a general desire was shown to protect them.

15th.—An Avocet on Breydon Broad, but it only stayed two days (G. Jary).

16th.—Two young Grey Crows at Siderstrand about this date (Sir S. Hoare). Last week one was seen near Thetford (Davey).

#### AUGUST.

21st.—*The Food of Starlings.* — Three Starlings shot at Keswick and submitted for microscopic dissection to Mr. John Hamond were found to contain Noctuid larvæ, Weevils, Carabid beetles, and a few elderberries. On Sept. 5th four more, killed at the same place, were sent to the School of Agriculture, and the following report on their stomachs was drawn up by Mr. Hamond, which may be compared with the report on those killed in April, 1910 (Zool. 1911, p. 173) :—

SEX.	INJURIES.		BENEFITS.		NEUTRAL.
	Farmer's Crops.	Insects, &c.	Weeds.	Insects, &c.	
♀	1 piece of oat-husk	11 Carabid beetles, 4 Staphylinid beetles	1 seed of <i>Rumex crispus</i> , 1 seed of (?)	3 Noctuid larvæ, 9 Weevils (2 <i>Otiorrhynchus</i> , 6 <i>Sitones</i> )	2 spiders, 1 Lamellicorn beetle (which?), 63 seeds of elder
♀	—	1 Carabid beetle	—	4 Noctuid larvæ, 25 ants, 1 Halticid beetle, 2 Weevils (1 <i>Sitones</i> , 1 <i>Otiorrhynchus</i> ), 7 small gastropods ( <i>Helix</i> )	About 45 whole elderberries & 88 seeds
♀	—	1 Carabid beetle	—	1 Earwig, 2 Weevils (1 <i>Otiorrhynchus</i> ), 2 small gastropods (1 <i>Helix</i> , 1 <i>Pupidon</i> ?)	About 50 whole elderberries & 214 seeds
♂	—	1 Carabid beetle, 2 Staphylinid beetles	—	1 Noctuid larva, 8 Weevils (2 <i>Otiorrhynchus</i> , 6 <i>Sitones</i> ), 1 gastropod ( <i>Helix</i> )	1 elderberry & 59 seeds

Mr. F. J. Mann, of Shropham, considers that Starlings cause him a loss of three "comb" per acre on every acre of wheat. When the wheat is up they get down to the young roots with their strong beaks, and so destroy all further germination. Whether they are seeking wireworms, or whether they are after grain, the result is the same to the wheat, which shrivels up and perishes.

25th.—Mr. E. Saunders informs me of a young Pintail Duck on Breydon Broad—a very early arrival, if not one escaped from captivity.

30th.—At the end of this month Mr. Catley saw a bevy of young Quails in a wheat-field at Cley. But very few breed in Norfolk or Suffolk now, nor is it possible that they can be anything but rare when a single ship lands 76,000 at Liverpool, all caught at the beginning of the pairing season in Egypt ('Field,' March 2th, 1912).

## SEPTEMBER.

13th.—Pomatorhine Skua at Cley (C. Borrer), the only one reported this year; it was following some Sandwich Terns, and was not shot. As usual, there were a good many Richardson's Skuas on this part of the coast, where they are enticed by the Terns.

15th.—Red-necked Phalarope at Yarmouth (F. Chasen).

23rd.—Mr. N. Tracey saw a Grey Phalarope at North Wootton, where it remained a fortnight, dividing its time between two ponds at some distance from one another. It was very tame, but was unfortunately eventually caught in a trap which had not been intended for it.

30th.—A severe gale from the north-west, which in the evening attained almost to a hurricane (force 9 at Yarmouth, force 10 at Spurn Head), was extraordinarily destructive to the tops of oak-trees, which it snapped off, owing, it was supposed, to brittleness after the prolonged drought, but the Rev. M. C. H. Bird attributed it to the enormous crop of acorns.

## OCTOBER.

1st.—The next day a Gannet came ashore alive at Lowestoft (C. B. Ticehurst), and Mr. Ramm identified three Little Gulls at Blakeney, as well as some Grey Phalaropes which had been carried out of their course by the violence of the wind. A Fork-tailed Petrel was brought to Mr. Pashley, and an Arctic Skua was picked up in the Naval Asylum grounds at Yarmouth (A. Patterson).

3rd.—N.W., 2. To-day Mr. Bird reports the unusual number of seven Land-Rails on Ruston Common; probably this also was the effect of the gale. Another Gannet, a young male,† was picked up at Horsey (E. Saunders), and the next day another found dying in Lowestoft Harbour (C. B. Ticehurst). They certainly are commoner in Norfolk than they used to be. On the 16th I saw a young one dead on Cromer Lighthouse hills, but it had been defunct a long time. About Sept. 11th Mr. F. Richards saw a nice lot at sea.

6th.—The night of Oct. 5th was again boisterous, a strong gale blowing from the north-east, which at seven o'clock next morning was only three points less in its velocity than that of

the week before (Sept. 30th). Coming as it did at the height of the migratory season, and from the north-east, it was to be expected that it would have an immediate effect upon birds, with the movements of which wind is an all-important factor, as Norfolk naturalists know well. Accordingly, the following day the head-woodman at Hempstead, near Holt, informed me that he had seen a bird answering to the description of a Nutcracker. This it proved to be. The unfortunate bird† lived to get as far as Cawston, where there is a large fir-wood, where one, presumably the same individual, was shot that afternoon. On the same day, and only about two miles from where the Nutcracker was first seen, a Hoopoe turned up.

9th.—N.N.E., 4. Another Nutcracker† shot at Sparham, within five miles of where the other was shot, and it is not unlikely that they came over together on the night of the 5th, with a third which was shot in Buckinghamshire, as recorded. From what I have seen of them in Switzerland, I should judge the Nutcracker to be a bird of feeble flight, not well adapted for crossing seas, and without a wind behind them these would hardly have got over the North Sea. On looking back through 'The Zoologist,' I do not find that a Nutcracker has been accorded a place in these Norfolk Notes since 1907, and the last before that was a doubtful occurrence in May, 1899.

12th.—About three hundred Rooks seen at daybreak by Mr. F. N. Chasen arriving at Yarmouth, cawing loudly as they dropped on the sand-dunes. Many Rooks were to be seen during this month busy on the recently drilled wheat-fields, in spite of all efforts to keep them off. It is to be presumed that they are not long in finding out which farmers have, and which have not, dressed their grain with "corvusine." Rooks no doubt do a certain amount of good, that no one will deny, but Mr. Walter Collinge, in his recent Report to the Council of the Land Agents' Society (1910), lays a verdict of heavy damages against them. In eight hundred and thirty dissections made by himself and Mr. T. Thring, the percentage of grain was 67·5, and if to this be added roots and fruit, it was 71 per cent. In Henry VIII.'s time Rooks were kept in check by Act of Parliament.

13th.—A flock of eleven Norfolk Plovers† in a field of swede-turnips at Hempstead, where the gamekeeper had noticed them



for some weeks ; also the largest congregation of Starlings on one of the reed-ponds that I think I ever saw.

17th.—Greater Spotted Woodpecker† at Hoveton. A marked arrival of Goldcrests at Yarmouth (B. Dye), and four Brent Geese at Cley (Pinchin).

18th.—Mr. Arthur Patterson found among the rejectamenta of the sea some birds at high-tide mark at Caistor—a Wood-Pigeon, a Chaffinch, and a Robin—and the next day, continuing his walk along the shore, some Starlings and Thrushes. During the two preceding days the wind had been registered at Yarmouth as due east and very high. Probably we little know how many migratory birds succumb to the violence of these autumnal gales. A Rook, afraid to venture any further until compelled by hunger, remained, Mr. Patterson was informed, for three days on the 'Argus' steamship.

23rd.—Mr. Dye was informed that a Great Grey Shrike was seen to-day on Gorleston Pier.

28th.—N.N.E., 4. A young Sabine's Gull identified a little below Blakeney Harbour by Mr. C. Borrer. A few days before one was shot at Humber-mouth (Caton-Haigh).

31st.—A young Marsh-Harrier† shot at Croxton whilst feeding on a dead hare.

#### NOVEMBER.

1st.—Mr. Pinchin saw a Merlin and a Peregrine.

10th.—Two Barn-Owls hawking over the marshes at 4.25 p.m. (Bird).

11th.—Nutcacker shot near Bury, in Suffolk ; it had been seen for a week or more (J. G. Tuck), and may perhaps have come over with the other three in October.

17th.—A somewhat unusual incident happened on the Sheringham golf-links to-day, a ball played by a gentleman who is well known as a golfer being twice picked up and then dropped again by a Rook. The sabie bird must have been a recent and hungry arrival, which mistook it for something edible.\*

24th.—Mr. Dye received a Little Gull, shot on the south beach, Yarmouth.

29th.—Two Storm Petrels taken off Lowestoft. One of these

\* I have heard of a Gannet picking up a golf-ball in the sea, but that was not to eat it.

birds was kept alive for ten days by Mr. Ticehurst, who is of opinion that the food is found entirely by the sense of smell ('Avicultural Magazine,' p. 112).

#### VARIETIES OF PLUMAGE.

At the beginning of January a Wren,† nearly three parts white, but with wings normal, was found dead at Boyland, and has since been presented to the Museum by Colonel Irby. In February a white Chaffinch occurred at Blofield, and a pied Corn-Bunting† near Stalham (E. Gunn). In May a pied Robin at Belton (A. Patterson).

Sept. 27th.—*Perdix montana*, Briss. It is always in the same district that this red phase of the Partridge is met with. Having been unconsciously introduced into Norfolk from the Continent some sixteen years ago, as is supposed, the strain continues to crop up from time to time, in spite of not being spared by shooters. To-day one of these red birds† was killed at Bylaugh, and forwarded to Mr. T. E. Gunn. Another was seen in the spring at Cranmer, paired with a Partridge of the ordinary colour, where, Mr. Hamond was informed, they bred, and that the young were normal.

Oct. 12th.—A Blackbird† with a handsome white back at Northrepps, in the same lane where I remember a pied one on Sept. 28th, 1908; if it was the same bird it had grown a good deal whiter in thirty-five months.

28th.—One of the so-called Sabine's Snipes, now known to be only a melanism, was shot out of a field of turnips at Beeston, near Cromer, by Dr. W. Sumpter, and was ascertained to be a male by Mr. Pashley.

Nov. 25th.—A nearly white Redwing† shot at Framingham (Roberts); last autumn, it will be remembered, three varieties of this species were recorded.

#### HYBRID SWAN × GOOSE.

On July 26th, through the courtesy of its owner, Mrs. N. E. Reynolds, I had an opportunity of examining the hybrid Mute Swan, of which I contributed an illustration last year (Zool. 1911, p. 161), and which a great many people have since been to see, as it is thought a great curiosity. The beak and legs of

this singular cross-bred Swan are orange-yellow, and the feet large, a point noticed by the farm-servant when she assisted in liberating it from the egg. But the most striking feature about the bird is its long, thick neck, which, with the head and tail, are now almost white, the back and body only remaining blotched with slate-colour. The call of this hybrid is said to be fairly distinct from that of its parents, but I did not hear it. It generally lives by itself on a pond at Beeston, sometimes flying half a mile or so and returning. The Swan, which is its father, strongly objects to having it on the same piece of water, and this jealousy is thought by Mrs. Reynolds to mean that her hybrid is a male.

THE BIRDS OF THAT PORTION OF THE NORTH-EAST COAST BETWEEN TYNEMOUTH AND SEATON SLUICE, NORTHUMBERLAND.

By J. M. CHARLTON.

(Continued from p. 28.)

RINGED PLOVER (*Ægialitis hiaticola*).—Formerly numerous, but now an uncommon visitor, generally in winter. I have seen as many as eight gun-barrels emptied at one of these birds at St. Mary's, but it only fled all the swifter. I have not come across any examples of the rarer, smaller form of this species, which is a spring visitor to England.

GOLDEN PLOVER (*Charadrius plumbealis*).—Flocks of these birds are not uncommon during some winters, when they frequent the arable land in company with companies of Lapwings.

GREY PLOVER (*Squatarola helvetica*).—A fairly regular autumn visitant on migration. Mr. C. M. Adamson mentions the following as being in his collection:—A male of the year was shot on Whitley Sands on Sept. 16th, 1839, from a small flock. Another at Hartley, Sept. 14th, 1846. On Aug. 20th, 1862, a female in summer plumage was shot at Hartley on its southern migration. An immature male was shot near Seaton Sluice on Oct. 12th, 1895. Since then there have been quite a number of other occurrences. In his Catalogue J. Hancock mentions that the third example was the only bird in the summer plumage of which he had record for Northumberland and Durham.

LAPWING (*Vanellus vulgaris*).—A common resident. Large numbers arrive in the autumn from the Continent, when huge flocks haunt the fields, and I have occasionally seen them arriving in April.

TURNSTONE (*Streptilas interpres*).—Formerly a regular visitant in spring and autumn while on migration, but now observed infrequently. The first actual records I know of were the

occurrences of several in the breeding plumage near Tynemouth during the summers of 1829 and 1830.

OYSTERCATCHER (*Hematopus ostralegus*).—Regularly seen in early autumn when the birds which have bred further north pass south for the colder months. Mr. W. G. Monks informs me that while he was on St. Mary's lighthouse one of these birds killed itself by flying against the glazing.

AVOCET (*Recurvirostra avocetta*).—The only specimen recorded for Northumberland was procured at Hartley. This is mentioned in Selby's Catalogue as being "killed not long ago," and "in the possession of Mr. Wardle." Selby's Catalogue appeared in 1831, but how are we to judge as to the date of this occurrence when we have only the scanty information "not long ago." It might be anywhere within the limit of a hundred years! In the autumn of 1907 a fisherman of Bates' Island informed Mr. Leonard Gill, Curator of the Newcastle Museum, of a bird which aptly suits the description of this species that had been observed by him in the vicinity of the island.

GREY PHALAROPE (*Phalaropus fulicarius*).—A very rare autumn visitant. On Nov. 22nd, 1838, one was shot on the coast. Mr. R. Duncan informs me that one was shot at the island in about 1856, and one two years later. The last record I have is of one which was shot on Whitley Sands in 1906, and was set up by Mr. Wright for Mr. Watts, of Whitley Bay.

RED-NECKED PHALAROPE (*P. hyperboreus*).—A very rare casual visitant. Three have been shot here: one on August 16th, 1832, in the first plumage, at Tynemouth; another at Cullercoats, on Nov. 22nd, 1838, in the same garb; and the last at St. Mary's Island in December, 1872. The first two are in the Hancock Museum, while the third is mentioned in Mr. C. M. Adamson's 'Scraps about Birds,' and was in his collection.

WOODCOCK (*Scolopax rusticula*).—Only seen on migration in October, and then they arrive in fair numbers on the coast at night, and are often so exhausted that they can be taken by hand. In some years large numbers are seen, but in others very few. In 1907 many were procured, several on the lighthouse, one in our front garden. One flew into an open window, being attracted by the light in the room, and was caught. A specimen was shot, so Mackenzie says ('History of Northumber-

land'), in December, 1863, which had a valuable diamond in its stomach. This species has been killed by flying against the lighthouse at St. Mary's Island, as many as five having been procured in a single night.

COMMON SNIPE (*Gallinago caelestis*).— Sometimes seen near the coast; generally in Briar Dene in spring when the foreign bred birds, which have spent the winter with us, arrive on the coast preparatory to leaving us. Formerly the large numbers of migrants arriving from the north in October remained to rest for a day or so before passing inland, but now, of course, they are too much disturbed. I am indebted to Mr. W. Douglas, of Cullercoats, for the following note concerning this species, and I can vouch for the truth of his statement. During August of 1903 he had some homer-pigeons which he was desirous of trying, so he took them about six miles away from his house and freed one. After circling round once or twice the bird shot off in the direction of home. Near where the pigeon had been released was a small marsh, and from this he saw a small bird rise up and fly after the pigeon. On arriving at his house about two hours later, he looked into his pigeon-cote and found the bird he had released there, and sitting just outside on the roof was a Snipe! On his attempting to reach it, it flew away, and he did not see it again. It is very singular that a Snipe, one of the most retiring of birds, should approach right into the midst of the dwellings of men. Perhaps it was on its way to the coast, and having no companion of its own species, it thought it would follow another bird which appeared to be in the same condition as itself.

JACK SNIPE (*G. gallinula*).—An autumn and winter visitant of irregular occurrence. I know of about twelve or fifteen occurrences.

AMERICAN PECTORAL SANDPIPER (*Tringa maculata*).—Whitley Sands claim a specimen of this bird as the only one of the species recorded for Northumberland. On June 27th, 1853, Mr. Robert Duncan shot a bird, which, after considerable examination, was identified as belonging to this species. Mr. Duncan and his father first noticed it as they were walking along the shore to the island; it flew up in front, and they at once saw it was something out of the ordinary. His father

fired several shots at it, and each time it flew a little further on or back along the shore. At last it perched on a mass of seaweed at the mouth of Briar Dene Burn, and Mr. Duncan, Junior, walked up and shot it as it flew away. It was purchased from him by Mr. C. M. Adamson, who perceived it was a bird he did not know, and after much discussion it proved to be an American Pectoral Sandpiper. (H. Saunders, *Man. Brit. Birds*; J. Hancock, *Cat. Birds Northd. and Durham*.)

DUNLIN (*T. alpina*).—Now an occasional winter visitor, but formerly more numerous, like most of the birds here. Birds of this species have been killed by flying against the lantern of the lighthouse on St. Mary's Island. J. Hancock records the first, in September, 1830, a male in the first plumage, which is set up in the Hancock Collection.

LITTLE STINT (*T. minuta*).—A rare autumn visitor, generally seen in September. On Sept. 12th, 1843, Mr. C. M. Adamson shot three out of a flock of six on Whitley Sands, and another the same day and place out of a flock of Dunlins. One of these specimens is in the Hancock Museum.

CURLEW-SANDPIPER (*T. subarquata*).—A very rare autumn visitant. The late John Hancock procured two on Whitley Sands in September, 1849; both were immature birds. Another example was shot at St. Mary's Island on Sept. 1st, 1896; it is also an immature, and is now in the Hancock Collection.

PURPLE SANDPIPER (*T. striata*).—A fairly common visitant in winter, and the most numerous of the wading birds to be found on this part of the coast, the nature of the shore being most suited to it, *i. e.* the seaweed-covered rocks and sand. J. Hancock gives the first record, two immature birds shot on Sept. 9th, 1830—in the Hancock Museum. The same naturalist mentions two examples which were shot at St. Mary's Island on May 18th, and had attained the summer plumage. Mr. R. Duncan also informs me that he once shot a bird of this species in summer plumage in the same month.

KNOT (*T. canutus*).—A regular early spring and autumn visitant. The first specimen recorded is in the Hancock Museum, and was shot on Whitley Sands in 1836. Mr. C. M. Adamson says the following with regard to this species:—"A female in the summer plumage was shot on its return from the breeding-

grounds on July 19th, 1854, at Hartley Bates; it was a single bird and is the earliest I have known killed. I well remember picking it up. I thought at the time it was a lovely bird. It was beautifully marked, with much of the rich pink colour still left on the breast, and it had such a glossy appearance, mixed with purple reflections. It was flying along the coast, coming over my head when I was sitting amongst rocks on a reach of land running out into the sea." Mr. R. Duncan informs me that the day after this he himself shot another specimen, also in summer plumage, but a male.

SANDERLING (*Calidris arenaria*).—An occasional winter visitant, decidedly uncommon.

RUFF (*Machetes pugnax*).—Formerly of regular occurrence, chiefly immature birds, now totally absent.

COMMON SANDPIPER (*Totanus hypoleucus*).—As a spring and autumn migrant this bird is occasionally seen, generally in Briar Dene. It is within the range of possibility that in former years this species bred in Briar Dene among the masses of bracken, which still abound. The first recorded specimen is in the Hancock Museum, in the first plumage, shot on Whitley Sands in 1830.

REDSHANK (*T. calidris*).—Formerly a common bird in winter on the shore, but now only irregularly seen.

SPOTTED REDSHANK (*T. fuscus*).—A very rare autumn visitant. The only record I have is of one obtained in the first plumage on August 26th, 1831, at St. Mary's Island.

GREENSHANK (*T. canescens*).—A rare autumn visitant. I have three records of it. One was shot on Sept. 12th, 1843, in the first plumage, on Whitley Sands by Mr. C. M. Adamson, who mentions it in his 'Scraps about Birds.' Another was shot by Mr. R. Duncan on August 31st, 1861, in the first plumage, at St. Mary's Island; and the last specimen obtained was shot at St. Mary's Island in 1907.

BAR-TAILED GODWIT (*Limosa lapponica*).—A rare autumn and winter visitant, of which there are only two records. One was shot at St. Mary's Island on August 30th, 1837, and another, in first plumage, on Whitley Sands in October, 1840. The former was a male in the red summer plumage, and had not commenced to moult. Mr. C. M. Adamson says it was the only red bird he had seen shot in Northumberland in autumn.



COMMON CURLEW (*Numerius arquata*).—Occasionally seen in winter but never common, as there are no mud-flats about. In spring flocks are sometimes heard passing over at night, and then occasionally on an exceptionally starlit night one may utter its spring love trill.

WHIMBREL (*N. phæopus*).—An annual spring visitant on migration. Mr. C. M. Adamson relates the following on this species in his 'Scraps about Birds':—"On August 26th, 1851, I got a mature Whimbrel at Bates' Island. It was moulting on its back, and the new feathers were coming, spotted with reddish brown like the plumage of the younger bird but darker. It apparently had been partially moulting for some time, as it had many feathers similar to those coming. The remainder of the plumage which had not been renewed was very much worn and faded. This bird showed that it had commenced to moult during summer, and that the early feathers changed had come in what might be supposed to have been its summer plumage, that is, supposing the species had a summer plumage. Now I remember having seen many Whimbrels in spring, but I cannot call to my recollection ever having seen one with what might be called any change to summer plumage on the back; all the back, so far as I remember, showing only the worn feathers acquired at the autumnal moult the previous year, and without change of colour except by wear, the breasts being more or less spotted with grey only. Probably if such an occurrence ever happened as a moult of the back feathers in spring in this species they would come with rich-coloured spots as in this bird, which had begun to moult during its summer condition. I think, however, that by the time this bird had finished its autumnal moult these rich-coloured spotted feathers would have altered in appearance and would have formed a portion of the bird's regular plainer plumage of winter. Why does the Whimbrel not get a decided summer plumage?"

ROSEATE TERN (*Sterna dougalli*).—In his 'Scraps about Birds' Mr. Adamson mentions two specimens in his collection—a mature in summer plumage, and a young one in first plumage. "They were shot at Hartley Island as they flew together, the old one accompanying the young and attending to it (August 6th, 1846). The young bird's quills were not fully grown, showing

how early these birds leave their breeding-grounds and depart to more southern climes, the nearest breeding-place being the Farne Islands, perhaps forty miles north." Mr. J. Wright informs me that one was shot near Whitley in about the year 1902.

SANDWICH TERN (*Sterna cantiaca*).—A very occasional visitor in spring and autumn. I only have two records—one shot at St. Mary's, August 26th, 1866, by Mr. R. Duncan; the other a mature female shot at St. Mary's on Sept. 6th, 1895, and now in the collection of H. Coxon, Esq.

COMMON TERN (*S. fluviatilis*).—A regular and fairly common spring and autumn visitant on migration, especially at the beginning of August, when numbers are to be seen fishing close to the shore.

ARCTIC TERN (*S. macrura*).—Very occasionally single individuals are seen fishing off the coast during early autumn, being visitors from the Farne Islands where this species breeds. A male was shot at St. Mary's Island on Oct. 2nd, 1895, and is now in the Hancock collection.

LITTLE TERN (*S. minuta*).—An uncommon visitor on migration. Mr. R. Duncan informed me of an immature specimen shot on St. Mary's Isle, August 16th, 1873. The only other record I have is of one shot in September, 1892, by my father off the coast, which was also an immature bird.

(To be continued.)

THE LARGE LARCH SAWFLY (*NEMATUS ERICHSONI*).

BY ERIC B. DUNLOP.

THE Large Larch Sawfly belongs to the family *Tenthredinidæ* of the order Hymenoptera. In Europe it is found in the north and central portion of the continent, and in North America from Central Michigan to Labrador.

MacDougall describes the female\* as follows:—“*She measures up to  $\frac{3}{8}$  in., or a little over, in length, and in spread of wings just less than an inch. The ground colour is black. The head and thorax are black; the first joint of the abdomen is black; then follow joints coloured red; the end of the abdomen again being black. The mouth parts, the two front pairs of legs, except at the part next to the thorax, and the upper parts of the femora of the hind legs, are reddish or reddish-yellow. The tibiæ are yellowish or pale in the upper parts. The antennæ are nine-jointed and somewhat thick, and taper towards the apex. With a lens the head and thorax are seen to be sparsely and finely pubescent, and the thorax is markedly punctured. The wings are glassy and are slightly clouded below the stigma.*”

The male is very scarce; out of three hundred pupæ Prof. Hewitt secured only two. The following differences in the sexes are noted by him†:—“*The male is smaller than the female. The terminal portion of the abdomen is broadly rounded. The legs are paler in colour than those of the female, and only a small portion of the distal extremities of the tibiæ of the third pair of legs is dark coloured.*”

*The egg is white in colour, and measures just over a millimetre in length. The full-grown caterpillar measures three-quarters of an inch, or a little over, in length. It has a round, black, hairy head, with a single ocellus on each side. On the upper surface, all down the back, the colour is grey-green; the sides are lighter; the under surface is yellowish-green. If a lens is used, there will be seen, on the abdominal segments, transverse rows of minute warts with*

\* The ‘Journal’ of the Board of Agriculture, October, 1906, p. 889.

† *Ibid.*, December, 1908, p. 650.

spines. The spiracles along each side are brown. The legs number twenty. There are three pairs of thoracic legs (true legs), which are black, and seven pairs of abdominal legs (pro-legs), which have the colour of the under side of the body. The head is followed by twelve segments—1, 2, and 3 are thoracic segments, and each bears a pair of legs; 4 to 12 inclusive are abdominal joints; 4 has no legs; 5, 6, 7, 8, 9, and 10 have each a pair of pro-legs; 11 has no legs; and 12, the last joint, carries a pair of pro-legs. Before the first moult the head and thoracic legs are green. Hewitt states that there are five ecdyses and therefore six larval stages. The larvæ hatch out in eight to ten days after the eggs have been deposited. The larval life lasts from three to four weeks. The cocoon measures less than half an inch in length. It is brown in colour and cylindrical in shape, with rounded ends. The caterpillars spend the winter in the cocoon, and pupate about three weeks before their appearance as the imago.

The flies are very erratic in their appearance, the earliest being seen at the beginning of May, and they have also been recorded as late as the end of July. It has been suggested that there are two broods, but this is certainly not the case. The females, which reproduce parthenogenetically (without the intervention of the male), deposit their eggs, soon after emergence, in the shoots of the year, these offering less resistance to the ovipositor than the older growth. Usually the eggs are laid in two parallel rows, the eggs of one row alternating with those of the other. Occasionally they are laid in a single row. From twenty to forty are deposited.

Prof. Peck\* has an interesting paragraph on the saw of these flies; it is as follows:—"This instrument is a very curious object; in order to describe it, it will be proper to compare it with the ordinary tenon saw used by cabinet-makers, which, being made of a very thin plate of steel, requires a back to prevent its bending. The back is a piece of iron in which a narrow and deep groove is cut to receive the plate which is fixed. The saw of the *Tenthredo* is also furnished with a back, but the groove is in the plate, and receives a prominent ridge of the back, which is not fixed, but permits the saw to slide forward or backward as it is thrown out or retracted. The saw of artificers

\* Quoted in 'British Insects' by E. F. Stavelly, p. 162.

is single, but the saw of the *Tenthredo* is double, and consists of two distinct saws with their backs. The insect, in using them, first throws out one, and, whilst it is returning, pushes forward the other; and this alternate motion is continued until the incision is effected, when the two saws, receding from each other, conduct the egg between them into its place. In the artificial saw the teeth are alternately bent towards the sides, so that the fissure or 'skerf' may be made sufficiently wide for the blade to pass easily. To answer this purpose in some measure in the *Tenthredo* the teeth are a little twisted, so as to stand obliquely with respect to the right line, and their points of course project a little beyond the place of the blade without being laterally bent; all those in each blade thus project a little outwards. But the 'skerf' is more easily procured and a free range effected by small teeth placed on the outer side of each saw, so that whilst the vertical effect is that of a saw, the lateral effect is that of a rasp. The teeth point inwards towards the 'handle' and their outer edge is beset by smaller teeth which point outward. . . . Now it is well known that all wounds caused by a rough or blunt tool are more difficult to heal than those which are clean cut. This holds good in the vegetable as well as in the animal kingdom, and it is here, probably, that the final cause of the complicated structure of this beautiful little instrument may be sought. It is not desirable that the wound should heal. The fissure in which the egg is inserted is not a mere resting-place, but is designed to afford nourishment to the eggs, which, absorbing the juices of the plant, actually grow, between the time of their exclusion and their hatching. A supply of nourishment is thus produced and maintained by the stoppage of circulation consequent on the opening of this wound, which, in some cases is further irritated, at the time of oviposition, by the introduction of a drop of poisonous fluid, which in some cases results in the formation of an excrescence or 'gall.'"

Owing to the irregular emergence of the adults, larvæ of all sizes may be found on the same tree at one time. They are to be found in a normal year up to the end of August, but in the past summer (1911) I could not find any remaining on the trees three weeks prior to this, the brilliant weather with which we

were favoured having undoubtedly aided the development of the larvæ. The eggs are usually deposited in the terminal shoots of the lower lateral branches; the larvæ do not, as a rule, devour the fresh green growth of the year, but commence to eat the foliage on the growth of the previous year, feeding their way towards the axis of the tree; very exceptionally I have known the new foliage of the year devoured. When in the younger stages the larvæ feed in clusters, but as they grow older this trait is not so marked, no doubt because each caterpillar requires more food. On being disturbed, a characteristic position assumed by them is obtained by holding on to the branch with the thoracic legs and elevating the abdominal portion until the posterior part of it is over the head. When full-fed they drop from the branches, and usually spin their cocoons under the leaves and grass beneath the tree, not entering the soil. I have found them in another situation, *i. e.*, under large stones, down the sides of which the larvæ had evidently crept. From under one stone, about a foot square, I have taken as many as twenty-five cocoons.

*Nematus erichsoni*, the appearance and habits of which have just been described, was not known to occur with any frequency in this country previous to the commencement of the present century. In the last few years, however, it has been found to be present in such alarming numbers, in various districts, that the Board of Agriculture and Fisheries has placed this sawfly among the dangerous insects scheduled under the Destructive Insects and Pests Order, the presence of which on any plantation must be at once reported to the Board. Every occupier, on whose land the insect is found, is bound to report the discovery under a penalty of £10.

That the matter is serious is obvious from the following quotation:—"During several extensive outbreaks [of *N. erichsoni*] since 1880 it has killed from 50-100 per cent. of the mature larch over vast areas in the North-eastern United States and South-eastern Canada. It is evident that the amount of merchantable-sized timber that has died as the result of defoliation by this insect will aggregate many billions of feet."\*

\* U. S. Department of Agriculture. Bureau of Entomology. Bulletin No. 58, p. 60.

Though in recent years attacks by this insect have been recorded in England, Scotland, and Wales, it is perhaps in the English Lake District that the most serious damage has resulted. Some account of the attack there and the methods resorted to in order to combat it will now be given. It has been stated that harm was done in the district by this insect in 1868, but the identification was not reliable. The present attack was first observed in 1904, more seriously in 1905, and in 1906 the caterpillars were satisfactorily identified as being those of the Large Larch Sawfly. Apparently the centre from which the pest spread was the Dodd Wood, which is about four miles from Keswick, in the Bassenthwaite direction. Thousands of trees are stated to have died there; they varied in age from twenty to seventy years. In the past two years I have found the insect present in widely spread localities in Cumberland and Westmorland—in fact, wherever I have searched for it this *Nematus* has been found present. The strength of the attack varies greatly in different portions of the area. As might be expected, pure larch-woods suffer more severely than those in which other kinds of trees are mixed with the larch. Trees which have been attacked by the Large Larch Sawfly may be recognized by their terminal shoots being withered and brown, and curled towards one side (that on which the sawfly has deposited her ova). This withering is practically invariable, but I have met with a case in which some very vigorous English and Japanese larches showed no sign of it, though the shoots had all suffered from the attacks of the sawfly. These trees were about seven years old, and better specimens I have not seen; no doubt their exceptional vigour enabled them to withstand the attack more successfully than is normally the case.

When the attack is really severe the tree is defoliated, all the green growth, with the exception of the shoots of the year, being devoured by the caterpillars. The larches then present practically the same appearance that they do in mid-winter, and woods attacked as severely as this have a brown appearance, which is easily recognisable at a distance of several miles. In August these trees put forth a fresh flush of foliage, and present the appearance more usually associated with spring. In the

past remarkably fine autumn I noted defoliated larch-twigs actually sprouting again as late as Oct. 7th.

The repeated defoliation of the trees is certain to do them great harm, even if death itself does not result. This is a most serious matter, for in Lakeland many thousands of acres are devoted to the cultivation of the larch.

Unfortunately, for the most part, little has been done in the way of attempts to keep this sawfly within bounds. A few land-owners have had the larvæ wiped off their young trees by hand, and as for some part of their lives the caterpillars feed in clusters, this is not such an impossible task as it might appear to be. This method, of course, is only of value in the case of young trees. During the period of rest, scraping up the litter beneath the trees and mixing it with hot lime has been tried, but found far too expensive.

The Manchester Corporation, on their property at Thirlmere, have, however, used vigorous methods to mitigate the attack, and it is pleasant to be able to state that a great amount of success has attended their efforts. One method tried was to fell the crop on a plantation, and burn the branches on the ground during the last week in May, in the hope of destroying the emerging sawflies. This was not a success. In the case of young trees, crushing with the gloved hand is employed as elsewhere, but where large trees are concerned (between 6 ft. and 20 ft.) spraying is resorted to. This is very effectual, and where the stock is pure larch the cost has been found by the forester at Thirlmere to average about 6s. 1d. per acre. The operation is carried out with knapsack-sprayers and a solution of arsenite of copper. The arsenite of copper is mixed with an equal quantity of wheaten flour, and made up into half-ounce packets; one packet is sufficient for four gallons of water, the capacity of the knapsack-sprayers in use there. The reason for the addition of the flour is to make the solution more adhesive. One application is stated to be sufficient for a season.

The larvæ, when about three-quarters grown, are easily dislodged from the trees, and after showers of rain or strong wind they may be found on the ground in great numbers. Subsequently they climb up the trunks of the trees to the foliage again. This having been noted at Thirlmere, suggested another



means of reducing the numbers of larvæ on trees too tall to be sprayed. A draw-knife is used to smoothe the rough bark on a belt about 15 in. wide round the trunk of the tree at about breast-height. Archangel or Stockholm tar, slightly heated, is applied to the surface. The tarring requires repeating about once a fortnight whilst the attack lasts, in order to keep a moist surface. Bands of straw covered with tar are also fastened round the trees. By either method the larvæ perish on the prepared surface in their attempt to reach the higher portion of the tree. Small trees can be shaken by hand before being tarred; the larvæ, if they have got past the earlier stages, will then drop off like rain. Shaking has no effect on the smaller larvæ. Trees too large to be shaken by hand are jarred by striking them with a wooden mallet provided with a piece of felt or sacking on the striking face, in order to prevent damage to the bark. Jarring should be repeated at least once a week. Unfortunately a great number of caterpillars never fall to the ground, and are therefore unaffected by the tar-banding.

Though much good may be done by these methods, it appears to me that the means which holds out the best prospect of permanently reducing the numbers of *N. erichsoni* is by way of encouraging the natural enemies of the pest. Fortunately there is an ichneumon which is parasitic on the larvæ of the Large Larch Sawfly; this is *Mesoleius aulicus*. It has been proposed by the Board of Agriculture to breed out cocoons from woods where these ichneumons have been observed, with a view to determining the percentage of larvæ parasitised, and if a satisfactory result is obtained, to distribute numbers of the cocoons among woods where the attack is just beginning. By hatching the cocoons under a net the sawfly can be retained and killed, and the parasites allowed to go. It is hoped that in this way the parasites will obtain a much wider distribution than by natural means, and that the spread of the sawfly will be checked and its attacks minimised. It is noteworthy that the number of pupæ affected with the ichneumon at Thirlmere rose from 15 per cent. in 1909 to about 62 per cent. in 1910. Some collected for and examined by Hewitt in the spring of 1911 only showed 18 per cent. parasitised. Others from near Crummock Water had as few as 6 per cent. parasitised.

Hewitt states that two specimens of the larva of a species of Diptera have been obtained from the larvæ of *N. erichsoni*. As no mature insects of this parasite were obtained, it is extremely difficult, on account of our scanty knowledge of the larvæ of Diptera, to identify even the genus. He believes, however, that they are *Tachinidæ*, belonging to the subfamily *Sarcophaginæ*. They appeared to be mature, and measured 10 mm. in length. A parasitic fungus (*Cordiceps*) also plays a part in reducing this *Nematus*.

At Thirlmere the Manchester Corporation has adopted various means to encourage birds to frequent their woods. I visited one of their plantings in May, 1908, and saw only a small number of Golden-crested Wrens and Tits, other birds being conspicuous by their absence. This was not altogether surprising, for birds are not particularly partial to larch-woods, much preferring hard-woods, *i. e.* oak, ash, and similar trees. To encourage the birds to remain in their plantations throughout the winter, coconuts and bones have been suspended from the trees, more especially for the benefit of the Tits. Covered feeding-trays have also been provided; this is a great improvement on the original method employed here, for the food was scattered on the ground. To keep the birds about the woods during summer nesting-boxes have been put up, for larches do not present suitable facilities for the nesting of Tits and Starlings. The nesting-boxes are made by the estate forest workmen during bad weather, when outdoor work cannot readily be carried on. At first the boxes were made by boring out small logs and covering the ends; subsequently they were made from bark-covered slabs of waste wood from the saw-mill. The latter were much more appreciated by the birds, probably because in the first case the entrance hole was made near the top of the log, and the bird had to drop down to the level of the nest, instead of the hole being on nearly the same level as the nest, which is the case in the boxes made from slabs. The nesting-boxes are attached to the trees at a height of about 16–20 ft.

The boxes were first provided in 1908; in that year 60 boxes were suspended, and of these 19, or 31·6 per cent., were occupied. In 1909 another 114 were added; of the total, 81, or 46·5 per cent., were utilised by the birds. In 1910 a further

105 were placed in the trees, and it was found that the birds had occupied 56 per cent. of them. In 1911, 347 boxes were in position, and 229 of them were tenanted, an increase of 66 per cent. The species which use them most freely are the Tits and Starlings. The boxes are put up in the hard-woods as well as in those of larch, and the former are used more than the latter, but as the woods are only a few moments' flight apart there can be no doubt that the birds brought up in the hard-woods are beneficial to the larches near by. It is certain that the number of birds in the woods has greatly increased as a direct result of providing nesting-boxes for them. I have watched at close quarters the Great Tit and Chaffinch taking the larvæ of *N. erichsoni*. They work their way along a twig, and then, fluttering off, seize a caterpillar, immediately returning to a stouter portion of the branch in order to devour it (the larvæ are frequently at a point of the twig which will not bear the weight of a bird). In an infested planting which I had under close observation in 1910 there were many Tits present so long as the sawfly larvæ were on the trees, but as soon as they had dropped from them to spin up, the Tits left the locality—a significant fact.

On dissecting a number of birds from a larch plantation which had been attacked, I found that the Great Tit was the bird which had fed most freely on the caterpillar. According to my experience this is also the species which is most ready to avail itself of a nesting-box for breeding purposes. There can be no doubt that the smaller Tits also take the larvæ, and I have noted flocks of Rooks and Jackdaws devouring them. Starlings have been seen feeding on the larvæ at Thirlmere; as has been previously noted, this bird takes advantage of the nesting-boxes there. It is therefore certain that the erection of artificial nesting-sites for birds is of considerable value in checking the Large Larch Sawfly; this has evidently been realised, for in the present spring (1912) several private landowners are imitating the Manchester Corporation, and putting up nesting-boxes in their larch plantings. In the Wythop Woods, near Keswick, Jays were said to be of the greatest service in reducing the pest.

Hewitt states that during the winter months, when the larvæ

are enclosed in their tough cocoons, they are safe from the attacks of avian enemies, but in this he is not correct. During the autumn of 1911, in a larch-wood which was frequented by Pheasants, I found that these birds (they received no artificial food) had scratched over all the litter beneath the trees which had been attacked by *Nematus erichsoni* in search of the cocoons of this insect. This bird would certainly be of great value in reducing the sawfly if present in sufficient numbers.

The Short-tailed Field-Vole (*Microtus agrestis*) is also of use, for it extracts the larvæ from their cocoons during the winter months. Prof. Hewitt calculated that at Thirlmere, in the winter of 1907-8, these rodents had destroyed 25 per cent. of the larvæ. I have taken as many as sixty empty cocoons from a few inches of a Vole's run. Any undue increase of the Field-Vole is, however, not desirable, for the damage which this animal can do to vegetation, when present in large numbers, is well known.

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## NOTES AND QUERIES.

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### A V E S.

**Early Appearance of Chiffchaff in Shropshire.**—Between 6 a.m. and 7 a.m. on March 14th a Chiffchaff was in good song close to my house. I hear from Mr. H. E. Forrest, our authority for this county, that several other early records have also come to hand. This is practically a fortnight earlier than usual for Salop, and nearly a month sooner than in last year, and for comparison I give personal records of the earliest appearance of this species in this same district in former years:—1903, March 25th; 1904, April 8th (absent from home since April 2nd); 1905, March 23rd; 1906, April 1st; 1907, March 28th; 1908, April 1st; 1909, April 2nd; 1910, March 21st; 1911, April 10th (exceptionally late date, but the first record for Salop generally); 1912, March 14th. It would be of great interest to know if the species has appeared exceptionally early in other counties generally, or the area covered by this early stream of migration.—J. STEELE ELLIOTT (Dowles Manor, Shropshire).

**The Little Auk in Essex.**—On Feb. 8th I saw a Little Auk, apparently asleep, floating with the tide in one of the channels near Foulness Island, on the Essex coast. On approaching me it turned and swam towards the further bank, and I watched it picking something from the edge of the mud. It did not dive, but once it stood up in the water, and allowed me to notice that the collar on the lower neck was tolerably distinct. In the dead birds that I have examined this feature is variable, but in the whitest young bird (recognized by its small bill and dull black upper parts) I found that the feathers of the lower neck had grey bases, although these were not showing through. A party of Dunlins were feeding on the mud, and as the Auk swam near them they ran away from it in apparent fear, and kept a yard or so away. It is to be hoped that sufficient data are forthcoming to allow us to know the exact cause of these remarkable invasions.—FREDK. J. STUBBS.

**A Correction.**—I desire as shortly as possible to refer to Mr. Warren's quotations (*ante*, p. 109) from our 'Faunal Series.' He singles out the Orkney volume to refer to. Our remarks in that volume (1891) relate almost entirely to the Erne (Sea-Eagle, or White-tailed Eagle), and not to, as is misleadingly stated, "Eagles" generally! That statement is *extremely* misleading to all readers who do not possess our complete series; quoted as a general statement what almost entirely refers to the rarer of our British Eagles. All our notes which *do* refer to *Golden Eagles* in it treat of at most *two pairs* of nesting birds of this species, and these confined to Hoy, if, indeed, the whole evidence can be accepted to account for more than *one pair at any time*! But if the other volumes be consulted and compared a different aspect will be found exhibited, where Golden Eagles have always been—and still are (of course)—far more abundant than Sea-Eagles. To quote from one *insular* volume without comparing with *ten others*, I repeat, is utterly misleading, and doubly so even where the previous writer's "*compression of facts into two pages of text*" cannot always be accepted as minutely correct. We cast no reflection here, however, except to say that the nesting eyries of the Golden Eagle are *not*, as is quoted (*ante*, p. 110), "confined to the highlands and islands of the western coast," and I do not think that they have ever been so, within my recollection!—J. A. HARVIE-BROWN.

#### INSECTA.

**Cocoons of Gyrinus.**—In Mr. Gordon Dalglish's interesting notes on the Whirligig Beetle he says (*ante*, p. 71) that the pupa of

*Gyrinus* has been seldom found, and I therefore wish to state that on July 17th, 1880, when fishing in the Exeter Canal with my friend the late Rev. John Hellins, the well-known lepidopterist, he pointed out to me numerous cocoons of this beetle attached to the stems of rushes, leaves of flags (*Iris*), and sedges. He informed me that he had succeeded in rearing from these cocoons a hymenopterous parasite which he thought was new to science, and that he had forwarded specimens to some eminent authority in London. If I remember rightly, he published a note on the subject in the 'Entomologist's Monthly Magazine.'—W. S. M. D'URBAN (Newport House, Countess Wear, near Exeter).

**The Sense of Fear in Insects.**—Prompted by Mr. Dalglish's interesting notes on *Gyrinus* (*ante*, p. 64), I would like to add an observation of my own that I find in one of my note-books. I had a specimen of *Pelobius tardus*, a water-beetle well known for its power of producing sounds, and dropped it into an aquarium containing a two-inch Perch. This savage little fish at once darted at the beetle, mouthed, and attempted to swallow it; five or six times, in perhaps as many seconds, the struggling insect disappeared in the mouth of its enemy, and each time it managed to kick itself out—or perhaps it was ejected by the fish with a view to getting a better hold. Finally it took refuge under a stone, where the Perch could not follow it. Now, the most curious feature of the struggle was the succession of eloquent screams that came from the beetle; they were, of course, quite as audible as they would have been from an insect held in the hand, and, although minute, the cries appeared to have exactly the same significance as those of a rat when cornered by a terrier. Yet a little thought suggests that an insect like *Pelobius* has really no use for a sense of fear. The rasp-produced sounds, intensified by the violent efforts of escape, and only by the purest coincidence giving the human observer the impression that the insect was under the empire of an emotion exactly like fear, had not the slightest effect on the fish. I noted this particularly at the time.—  
FREDK. J. STUBBS.

## NOTICES OF NEW BOOKS.

*Distribution and Origin of Life in America.* By ROBERT FRANCIS SCHARFF, Ph.D., B.Sc. Constable & Co., Ltd.

THIS book is a valuable possession to the student of zoogeography, not necessarily for the acceptance of all the author's theories on the subject, but as a digest of most of the best work on distribution to date. He refers to those whose views on the subject are not supportive of his own—his and Mr. Lydekker's appear seldom to coincide—while naturally a large number of writers are quoted whose conclusions are more in unison with those he has formed, the result being that the volume is a guide to the work of others on the same subject.

Dr. Scharff is a strong advocate of former zoological bridges in the postulate of long-since submerged continental connections, many of which propositions have already received the support and dissent of many prominent zoologists; some almost necessary conclusions can only be understood on these hypotheses, while others appear to scarcely require their insistence when other means of dispersion are considered. Although the systematist has more frequently worked outside the subject, his work has a very important bearing upon it. Species which some of the older writers quoted as examples of wide dispersal have been since recognized as including several distinct species, thus very considerably modifying more than one conclusion once generally accepted. The same difficulty applies to the present recognition of genera, a previously considered very distinct and widely dispersed species often appearing now as a genus comprising several distinct though closely allied species. That this must prove a disturbing element in all considerations of faunal and floral distribution is obvious.

No reader, whether he accept the whole thesis of Dr. Scharff or otherwise, can carefully peruse this volume with disadvantage,

while the bibliography, which certainly does not include everything, is a very acceptable compilation.

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*Evolution in the Past.* By HENRY R. KNIPE, F.L.S. Herbert & Daniel.

THIS volume constitutes a more or less popular introduction to palæontology, and designed by an "endeavour to trace the steps by which life, once initiated on earth, attained its present development." Commencing with the nebular hypothesis, a real start is made with the Palæozoic Age and the beginning of the Cambrian Period. The fauna and flora of each age and period is enumerated with care and so far as fossil records will allow, while a great feature of the work is the number of beautiful plates drawn by Miss Alice B. Woodward, more or less conjectural of the appearance of organic life in those eras. We say conjectural; the frontispiece and the plates depicting *Homo mousteriensis* and *Pithecanthropus* being our justification for that term. The book supplies a want, if the text is studied with discrimination by those readers to whom the subject is not too familiar, while it must be remembered that the lovely illustrations are not *photographed* from nature in bygone days. The book is speculative but necessarily so, and the information is exceedingly well garnered from most of the best and reliable sources.

---

MISS BATE reports in the 'Geological Magazine' for January last (p. 4) that she has discovered a new fossil Mouse in Crete, which she has named *Mus catreus*. It was evidently of large size. The find occurred in a cave deposit near Sphinari in West Crete, and consists of a right mandibular ramus embedded in a matrix.

The evidence has been strengthened by the discovery of an innominate bone some distance from the first find.

From dental measurements as well as from the position of the iliac crest it is shown that *Mus catreus* is allied to *Cricetomys*.

W. R. F.



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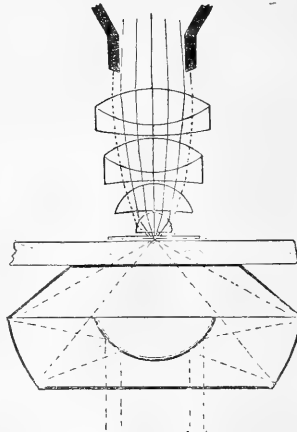
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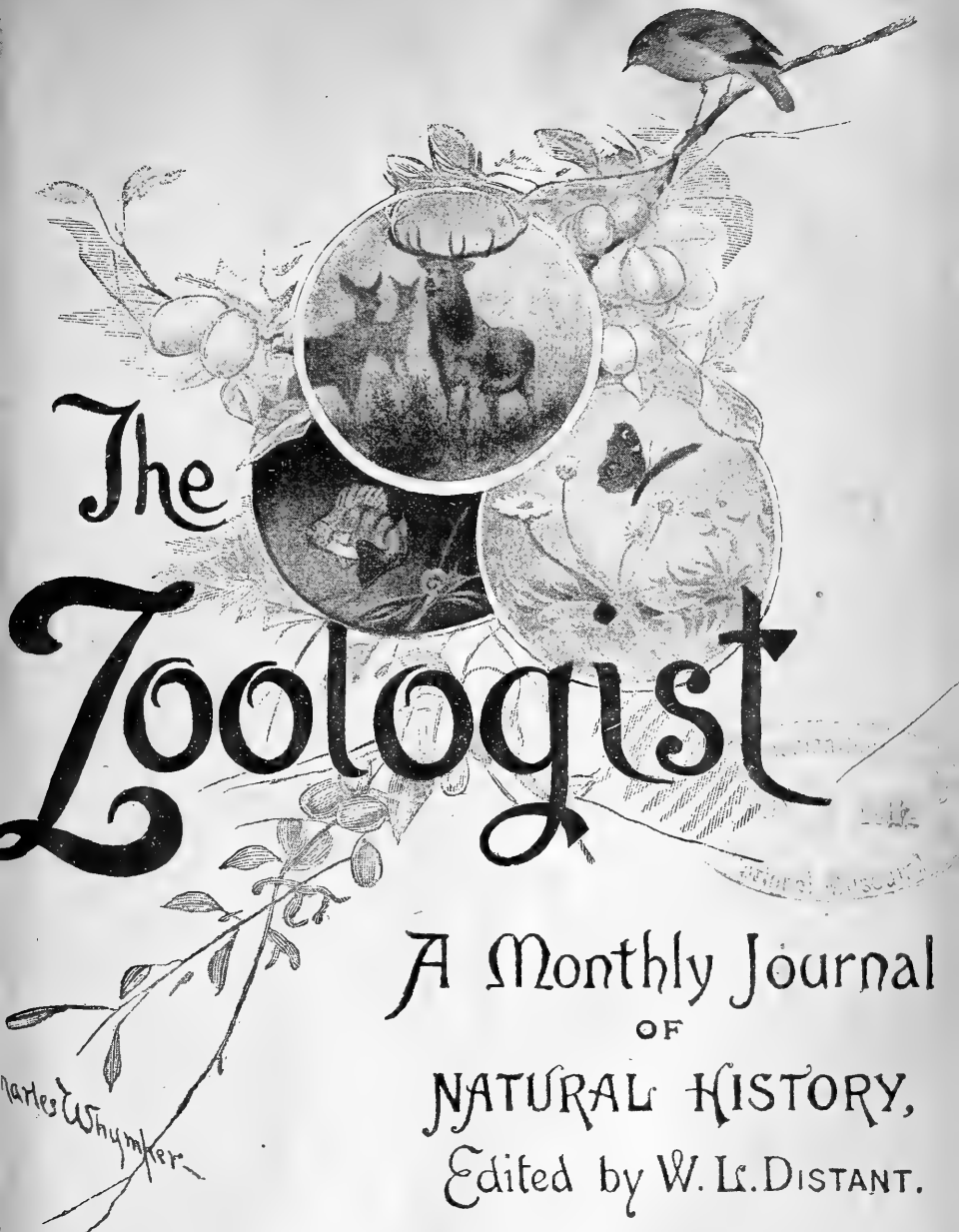
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# THE ZOOLOGIST

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No. 851.—May 15th, 1912.

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## THE EVOLUTIONS OF WADERS.

BY J. M. DEWAR, M.B.

THE complicated aerial movements which some kinds of Waders perform at times and in certain circumstances are described or mentioned in many of the books dealing with the habits of shore birds. As a descriptive term, "evolutions" is more commonly used than any other word, and thus, apart from the question of its appropriateness, it has custom as well as convenience to recommend it. My purpose is to analyse the simpler forms of the movements, and by connecting the observed phenomena with the conditions under which they are known to occur to suggest an explanation of their nature and possible origin.

The evolutions of Waders are apparently confined to the subfamilies *Charadriinæ* and *Tringinæ* of the family *Charadriidæ*,\* and within these subfamilies to the genera *Ægialitis* (with exceptions), *Tringa* (with exceptions), *Ereunetes*, *Calidris*, and *Limosa*. The small genera *Eurynorhynchus*, *Limicola*, and *Tryngites* occupy doubtful positions. Little appears to be known about the Spoon-billed Sandpiper (*E. pygmæus*), but there is no *primâ facie* reason why it should not exhibit evolutions. As far as it goes, the evidence regarding *Limicola* and *Tryngites* inclines towards the negative. For reasons which will be apparent later the genus *Squatarola* may have to be included, though whenever

\* The arrangement followed is that given by A. H. Evans in the 'Cambridge Natural History,' vol. ix., Birds.

I have seen the Grey Plover (*S. helvetica*) with Waders showing typical evolutions it has always separated from them at the beginning of flight, and when alone as a species it acts in a way similar to that of the Golden Plover (*Charadrius pluvialis*). I have not been able to decide from the descriptions I have read whether the genus *Macrorhamphus* shows typical evolutions, or the form represented by the Golden Plover. This genus is placed in the subfamily *Scolopacinae*; in its habits it is said to resemble *Limosa*. From the information available to me regarding the family *Charadriidae*, and bearing on this matter, I have ventured to set down a number of conditions, all of which are fulfilled by the birds known to me to show these movements. The birds are: (1) of small or moderate size; (2) of gentle disposition; (3) those in which the upper parts are of a pale brown, pale grey, or pale brownish grey colour, and the lower parts more or less of a white colour in winter; (4) those which live in flocks in winter; (5) those which are regular inhabitants of the shore in winter. It is scarcely worth while at present to make out a list of the species of these birds. A greater desideratum would be to learn of exceptions and of the conditions which do not apply to them, and also of species which fulfil the conditions and yet have no evolutions.

The evolutions of the genera named are built up, as it were, on a simpler form of movement generally characteristic of the whole family, and consisting of specifically swift flights in compact strings to windward and to leeward in horizontal planes. The Oystercatcher and the Curlew exhibit these simple movements. The Plovers (*Charadrius*) have added what I call the "reverse." It consists of a sudden rotation of the body from one declination to the other about an imaginary antero-posterior axis passing through the body. When this takes place, as it often does, so that the pale lower parts are quickly exposed to the observer, an effect is produced on the retina as of a flash of light. Plovers show the "reverse" at irregular though frequent intervals. The evolutions proper are often very complex and bewildering, but there is a form of movement which I believe to be the keynote of all of them. Resting on the basis of the windward and leeward movements, it consists of a sudden upcast gradually slowing down, and then curving over into an

increasingly rapid descent. The whole flock, if not too large, enters into the formation of the movement. It may be repeated any number of times, at regular intervals, unless horizontal movement intervenes. It is usually performed on the beat to windward, and with the wings outstretched. During the upcast the under surfaces of the birds are directed towards the sun, and a "reverse" occurs at the summit, so that the descent is performed with the under surfaces turned away from the sun. Thus an observer stationed between the birds and the sun sees a change in the swiftly moving flock from a white and solid to a grey and diffuse appearance. Occasionally the upper surfaces face the sun during the upcast. When this is the case, the "reverse" seldom occurs. So that the evolutions in a relatively uncomplicated form consist of a succession of movements, each of which is made up of a swift drifting to leeward, followed by a beating to windward, and during the latter a rapid sequence of peculiar movements takes place in vertical planes. The vertical movements may attain to little height, or reach a considerable elevation. While there is no hard and fast line to be drawn between the lower and higher forms, the summits of a given series maintain a very uniform elevation. The lower form is that more often seen, and the preceding description applies to it more particularly. The higher form is mainly associated with landing and may want the upcast, the descent being started from a windward or leeward movement in a high horizontal plane. Very often the descent is a slow fluttering movement, the birds being spread out thinly like a sheet, and having their upper surfaces directed towards the sun. Usually, though not always, at a level about equal to that of the summit of the lower form there is a "reverse," causing suddenly a change to a conspicuously white appearance, which is maintained to the end of the movement, and from the time of the "reverse" onwards the descent is hastened. To show the lower form of movement in perfection, the flock should be of small or moderate size, and there should be immediate danger from a bird of prey. A flock of Knots, attacked by a hawk, did not fly away as I had expected. They drifted swiftly to leeward over a short linear distance, and on the windward beat to the starting-point they developed a succession of the lower form of movement. This

device was repeated many times during the several minutes in which the hawk persisted in its attack.

Coming next to the nature of the movements, I suggest that both the lower and the higher forms are imitations of the spray thrown up by the waves of the sea when they meet with solid obstruction. Several considerations warrant this view. The column of sea-spray and the column of Waders each describe a curved path in a vertical plane through the atmosphere. In general form and in detail the two curves have much in common. In both there is a quick upcast gradually slowing down, and, at the summit, curving over into a descent, the speed of which steadily increases until the movement is at an end. In both the upcast column looks white and solid, the descending column is more scattered and reflects less light. The "reverse" of the Waders at the summit of their curve resembles a peculiar movement of the drops of water at the summit of the column of spray. As the water turns over the summit, the particles tend to slip quickly downwards and to one side until the arcuate movement is arrested with great suddenness by the force of gravity. The abrupt change of the strongly reflective drops of water from one direction of movement into another produces the sensation of a flash of light. This effect is similar to that excited by the "reverse" of the Waders. After the column of spray has been propelled upwards to a great height, the descending drops adopt a movement of their own, in addition to the movement of descent. It gives them a glittering appearance, and also slows the descent. These two conditions are simulated by the Waders during the descent of the higher form of movement. During the descent of high sprays the drops of water sometimes alter their form and appearance a second time. This occurs on a level with the summit of the lower spray, and takes place instantly. The drops become blurred in outline, extended horizontally, and more reflective of light—characters which are retained to the end of the descent. The sudden increase of the reflection has its counterpart in the effect produced by the "reverse," which sometimes happens at a similar level during the descent of the Waders in the higher form of movement. One other circumstance to which I have not yet referred is certainly not the least remarkable, and seems to have a more important



bearing on the psychology of the evolutions than any mentioned hitherto. When a column of spray is thrown up, one sees the whole curve complete for an instant before it collapses. That is to say, some particles do not pass over the summit, and only rise in the upcast column to heights which correspond relatively to their heights at the beginning of the impulse. If the flock of Waders is small, the phenomenon is absent, because there is not sufficient material for its production. When the flocks are of moderate or large size, the details are reproduced with wonderful exactness. Those Waders which enter later into the curve ascend the upcast of the column to a greater or lesser height according to their earlier or later entry into the movement, and their ascent comes to a sudden end, wherever they may be, with the general collapse of the form of movement.

It may have been gathered that there are reasons for believing in the defensive character of the evolutions. I propose now to give some of these reasons, and will revert first to the case of the hawk and the Knots. Before the hawk arrived the Knots were resting on an isolated and exposed reef. They rose when the hawk approached, and performed the evolutions I have already described. They continued to do so until the hawk went away. Then they resettled on the rock. During several minutes the hawk made most persistent efforts to break into or detach a portion of the closely packed, swiftly moving flock. The attempts not only failed, but the entire performance appealed to me as being unusually inept for so adroit a bird. Since the date of that event I have seen several encounters of hawks with Knots, and also with Dunlins, and in all cases the results were similar. The Carrion and Hooded Crows attack Waders at every opportunity. If the flock is resting on a reef, the crow approaches cautiously on foot, apparently in the hope of reaching the edge of the flock and seizing one of the smaller Waders. The Waders forestall this move by rising and performing evolutions similar to those shown in the hawk's case. But the crow never follows. It retires a little way, and waits till the birds settle, when the process begins again. The observer is walking along the shore, and sees ahead a flock of Dunlins or Knots. If the birds make their escape by passing him instead of going on ahead, they will probably perform. They rise, and

at first proceed by the direct horizontal mode of flight. Beginning some time before and continuing for some time after passing the observer, they develop a regular series of the lower form of movement, and then resume their ordinary flight. The simpler evolutions may occur at any time under the pressure of an immediate cause, which I believe always to be some form of danger. With this exception, the evolutions, and more especially the complex forms, are confined to the period when the tide is above mean water-level, with a greatest probability of display at or about high-water. There are at least two possible reasons for this circumstance. During the period between half-tide and high-water the supply of food gradually diminishes, following several hours of plentiful and rapid feeding. This would mean that the restlessness prevalent after half-tide is an exhibition of superabundant energy without the usual outlet. That the evolutions are not due to mere restlessness may be inferred from the following consideration. In places where birds of prey are rare or absent, and in early winter before much shooting has taken place, the Waders may, and often do, come in with the flow to the high-water mark and go out with the ebb, without ever leaving the ground. Under what may be regarded as ideal conditions of feeding and security, they prefer to exert themselves as little as possible. This observation should be kept in mind when one attributes to an overflow of energy the extensive displays which occur later in the winter without any cause obvious to casual inspection. The other reason is that the period of high-water is the time of greatest danger actual or potential. The rise of the tide crowds the Waders together, and makes them a conspicuous and an attractive mark. This is well known to man and predatory birds. In many places the Waders are known to leave the foreshore at some fairly definite time before high-water, and go to a distant place of refuge. If the Waders have been much disturbed, the first flock to arrive usually performs more or less extensive evolutions before it alights. Later arrivals generally fly in directly when they see birds of their own kind already settled. The report of a shotgun, fired at as much as six hundred yards distant from Waders on a refuge, makes them rise and perform their evolutions. At each repetition, as the birds find out that no harm results, the

movements gradually become less prolonged, less elaborate, and eventually are not aroused. When high-water comes late in the winter's afternoon the Waders return in the dusk over the same course as that taken before high-water. They come back sedately in low flying strings, in marked contrast to the generally prolonged displays which they give at the earlier time. On the return journey the dim light increases the Waders' margin of safety to the extent of absolute security. As the winter advances, the evolutions become of almost daily occurrence from half-tide onwards, until the Waders leave for the refuge, and when high-water occurs early in the day they delay beyond the usual time their return with the ebb, so that a landing may be effected on the foreshore out of range. Some of these observations show that the danger need not actually be present. It is sufficient that the memory of a past danger should be fresh, that a place or period should be "notoriously dangerous."

If the view be accepted that the evolutions have been evolved for a defensive purpose, and that the essential form of movement is an imitation of the sea-spray, it is tantamount to saying that the evolutions of Waders are an example of Protective Resemblance within the literal meaning of the words, though I doubt if any definition that has ever been propounded for Resemblance covers the present instance. Resemblance to the intermittent motion of an inanimate object has not, as far as I am aware, been hitherto described, and I have no evidence leading me to believe that deception is practised or intended (unconsciously as by general consent it is assumed to be). On the other hand, there are some reasons for believing that the object is to baffle pursuit or attack. I have not seen a predaceous bird which suggested by its actions any doubt it may have had as to the nature of a flock of Waders. The hawks, in particular, attacked the Waders at sight, and on two occasions were seen to steer a course from a distance directly and without hesitation towards Waders engaged in evolutions. At the same time the close packing of the flock, the rapid and apparently purposeless movements in unexpected directions bring home to pursuers the relative invincibility of the device.

In Britain the principal enemies with whom the smaller Waders have to contend are man, diurnal birds of prey, crows,

and possibly the larger gulls and the owls. At the present time and place man is undoubtedly their deadliest enemy. In places where game protection does not exist, the birds of prey are presumably more numerous and more formidable than they are here, and in former times the same was no doubt true. Further, it is not too much to suppose that the birds of prey preceded man as destroyers, and a time was when their visits to the shore were of daily or even tidal occurrence, in place of being occasional as they now are in the more populous parts of our country. Realizing the important part predatory birds may have played in the lives of Waders in the past, the special development of evolutions by the smallest and weakest of the Waders, and the present success which attends the evolutions directed against the attacks of those birds, I look with some measure of confidence to birds of prey as probably the original cause of these movements.

A difficulty which I do not underrate lies in the application of the present view of things to the more complicated movements. The only way out I am able to suggest is to realize the nature of the movements made under the direct attack of a bird of prey, and to proceed from these to the more complex phenomena, together with a search for the causes that apparently underlie them. Anyone who does so through a series of observations will appreciate the close gradations of the phenomena from the simple to the complex, and in raising a natural order of succession will understand the difficulty of deciding where one form ends and another begins. When they are fully developed the complex evolutions evade general description, and one can only mark their salient features. The most characteristic of these is the movement in the form of the spray, which I believe to be common to all the simple and complex evolutions above the line of the horizontal windward and leeward movements, though it may be discerned only with difficulty, when mutilated or disguised by the operation of special conditions. So also in the search for apparent causes one finds the element of danger common to all, whatever form they may take, and in the case of the more complex evolutions the associated dangers are correspondingly grave. It is a matter for observation that the evolutions assume the most bewildering forms during the

period of high-water, and that the same period is chosen by gunners as most generally suitable for their purpose, the method of election being to lie hidden in ambush near the high-water mark until the Waders are driven within range by the tide. Thus an inference is made that there is a connection between complexity of the evolutions and an implied uncertainty of the Waders regarding the position of dangerous places, or doubt as to the intentions of visible enemies. As the birds move in-shore the immediate circumstances revive their memories of former experiences, and lead them into exertions which otherwise they would not feel called upon to make. Hence the addition of far-reaching horizontal, vertical, and oblique movements to the simpler evolutions may be imperative, so as by the freedom and variety of the movements to reduce the possibility of death to an unlucky chance.

I may now bring together the conditions or factors which are associated with or contribute towards the development of the more complex evolutions. When the flock is large the movements are often sectional, and what seems to be a succession of waves passing through an extended flock is in many cases an extremely quick repetition of the simpler form of the evolutions by sections. The "sheet movements" which provide much of the spectacular display are rendered possible by the same circumstance, and generally grow out of the simpler form. They are more especially the manœuvres which take place prior to flight from one place to another, and before this happens they may be greatly prolonged. Throughout the "sheet movements" there are more or less frequent recurrences of the movement in the form of the spray. If the danger is not pressing, greater liberty is taken in developing the movements. But the moment the position and intentions of a human enemy are disclosed, the evolutions generally come to an abrupt end in hurried and direct flight to a place of safety. Above all, I attach importance to two factors in the production of complexity—first, the suspected presence of human enemies in ambush, and, secondly, the period of occurrence when the tide is above mean water level, which really means a reduction of the available area of dry shore, with an associated implication of danger. In the understanding of the meaning of this fact

inherited or instinctive knowledge comes into play, and may explain the actions of the birds when human enemies happen to be absent. I may add that, when the evolutions become complex, they surpass the stage which may be regarded as imitative of the spray. While the simple spray-forms are retained, and are incorporated with the more complex evolutions, these movements evidently cannot be reduced to a common term.

In other words, one may say the simpler evolutions are imitative in character and protective in purpose; in the complex evolutions the simpler imitative movements are partially hidden by the development of a wealth of movement which is still protective in purpose, but which, as regards character, is incapable, at present, of a simple and comprehensive explanation.

AN OBSERVATIONAL DIARY ON THE DOMESTIC  
HABITS OF THE RED-THROATED DIVER (*CO-  
LYMBUS SEPTENTRIONALIS*).

BY EDMUND SELOUS.

(Continued from p. 96.)

*July 24th.*—*In situ* at 12 (midday), and find one parent, with one chick, at lower end of the loch. From size and appearance I take the former to be the female.

1.9.—Bird off, leaving the chick by itself. It rises from the bay, as is usual, or somewhat usual, with it, having dived there, apparently, and taken me by surprise. I notice that, though it goes off in the usual direction, it makes a wide circle, flying northwards, generally speaking, which would bring it, over various lochs, to another part of the coast. It utters the guttural cry—a sort of deep, short quack—at intervals, and, at first, I think it has seen me, but as it does not return, and keeps circling about, I am in hopes it has not, or that, at least, sitting quiet here, in my accustomed place, it has not minded me.

Shortly after this, the chick, thus left on the water, disappears. When I last saw it, it was, I think, in or near the bay. The other chick I have not yet seen, and the loch now, at 1.30, seems empty.

1.50.—All at once I see a Diver, at the near end of the loch, just skimming over the water, in flight, and the next moment it is hidden by the rising ground, behind which lies most of that little side-shoot of the loch, which I have grandiloquently called the bay, at the entrance of which I, at the same time, catch sight of the chick, again, just before he disappears into it. A moment or two afterwards, I hear, some way off, the guttural “awk, awk, awk” of a Red-throated Diver, in the air. From this it would appear that the other bird—the male of the pair—has been sitting all the while—no doubt with the other chick—in the usual place at the far end of the loch, and that he has now dived down to this end, and flown away—since he could not have swum down the loch without my seeing him. The second chick has, no doubt, been left sitting on the bank, as before.

3 p.m.—The female flies down on to the loch with a long-looking fish, of much larger size than is usual, in her bill, and, in a moment or two, after seeming to be pleased with her prize, she dives with it, and disappears for a little while, after which she and the chick appear, swimming out of the bay together, and go up to the other end of the loch, but do not round the resting-point, as I may call it, nor does the second chick, which I suppose to be, all this while, there, appear. The female bird has therefore been away for two hours, all but nine minutes, having left at 1.9. The male left at 1.50, and has not yet returned. The female now keeps at the upper end of the loch, with the chick, but without rounding the point. I put down the glasses for a moment to make this entry, and, before I do make it, raise them again. The second chick is then also with her, and the three now swim down the loch together. It is pretty now to see the chicks, who are still quite small, going through the same preening and flapping actions as their big parents. They turn on their sides, in the water, showing, not a large white, but a small grey under surface, and thrust out and waggle behind them a bluish-looking webbed foot, which looks as large as their heads. Then, stretching up their little bodies in the water, they flap their little wings vigorously, after which one of them dives. At 3.30 all make up the loch, and disappear and reappear again, round the point, several times. They then retrace the loch, when the mother, diving away from both, into the bay again, appears the next moment, on the wing, rising above the hillocks that enclose it. This is at 3.40, and in just two minutes she comes down on the water again, but without bringing a fish. During her absence the chicks have swum up the loch by themselves, and one has gone round the point, but the other keeps out on the open water. When the mother returns (first just outside the bay, and then across to her usual point at my end of the loch) this chick gradually works its way down to her, and the two are now together again. Thus the usual position of affairs—one chick with the mother, on the water, at one end of the loch, and the other at the other end, resting, probably on land, round the point—again obtains. It is now just as it was before the female flew away, for a fish.

4.8.—Female off again, *viâ* the bay, which she enters, skim-



ming the water, and then appears, again, above the hillocks just as before. I now follow her flight for a long time—or rather way—first with my eyes and then with the glasses. She goes high in the air, beyond the farthest line of hills, in the direction of the sea, so that she must, I think, when I lose her, be over the sea, following the coast-line, and prepared, it may well be, to descend into some accustomed bay or inlet. Why she does not go more directly to the point I do not know, but a circling mode of approach seems customary with these birds. The chick, again left to itself, goes, as before, into the bay.

4.35.—Female down again. She descends at the upper end of the loch, but without touching the water, glides just over it with her wings raised, and not pulsating, and disappears into the bay—a very graceful performance. I unfortunately forgot to make a point of seeing whether she carried a fish, but, as I cannot remember that she did, I feel sure she did not, for had she done so it must have struck me. Now—at 4.40—she and the chick come swimming out of the bay. They swim up to the head of the loch, and are joined, as before, by the other chick, coming from beyond the point. They swim down the loch again, and, as the chicks press after the dam, she dives once and then again. The second time she must have come up in the bay, into which the chicks swim, and at present I see no more of any of them. I should have thought that the mother was off again, but for the chicks staying there—for, were they left alone, they would probably go up the loch. At a few minutes past 5, one of the chicks issues from the bay, and this poor little thing (for I believe it to be the unfed one) swims all the way back to the point, by itself, and disappears round it, first, however, going round another point, at the opposite side, from which it soon comes out. I thought, from this, that the mother had again flown away, but, walking till my eyes were just above the crest, saw both her and the other chick in the bay, and retreated without having disturbed them. In a little while they swim out and up the loch, and then back again, without being joined by the chick that has gone round the point. At 5.30 the female again dives into the bay, followed by her chick. As far as I have been able to observe, therefore, one chick only has been fed from 12 o'clock, it being now 5.30, and that one only once.

This seems a long interval, but is it only when the fish is seen carried in the parent's bill that it is brought to the chick? A small fish may lie hidden in the bill, or, again, one might be disgorged. I am inclined to think that this is the case, for what, otherwise, is the import of these successive journeyings of the female bird to and from the loch? In one of them, indeed, the time spent away was, perhaps, too short for a fish to have been caught—*viz.* two minutes—but not, presumably, in any of the others. Another point presents itself. Since, now, during five hours and three-quarters, the two parent birds have never once been in my sight, on the water, together, the bird that I saw go off, at 1.50, and thought was the male, may have been the female after all. If so, then the male has not been here at all. But, as I write this, at 5.53, a bird flies in with a long, shining fish, and, coming down on the water, just off the point so often referred to, the chick at once appears round it, and tears, as one may say, over the water for its meal. Having eaten the fish, both it and the parent disappear round the point, and very shortly afterwards—a matter of seconds—the other parent—for it can hardly by possibility be the same—appears just outside the bay, at the opposite end of the loch, swimming very placidly, and with its head turned *towards the point*. The same bird would hardly have dived the whole length of the loch, and come up with its head in the opposite direction to its course under water. I think, therefore, that this bird bringing in the fish must have been the male, and the other the female, who had been in the bay all the time—nor had I seen her fly out of it. This is the first time, too, that either of the birds, in returning, has come down off the point, just round which the male, but not the female, is accustomed to sit with one of the chicks. The bird that appeared off the bay very soon dived, probably going back into it, since there was no reappearance. Assuming, as I believe to be the case, that it was the male that flew off at 1.50, and that came back with a fish at 5.53, then there seems a tendency for the duties of the two parents to become more distinct, and keep them more apart, each attending to, and feeding, one chick. It appears also (studying this pair) to be the male only who sits on the bank—at least for any length of time—with one of the chicks, but not the other, and who feeds

this chick, the female, for the most part, keeping with the other at the other end of the loch, on the water, and feeding this other one. Assuming that the female, at each coming back to the loch, brought her chick something, then this one was fed much better than that of the male, who only got one fish from his father between 12 and 5.53—I do not know how shortly or how often he had been fed before 12. On the other hand, I cannot be certain that both chicks did not get something from the mother, though I do not think so; and again—this perhaps presumably—she may never have brought anything except when I saw it in her bill.

On my way back I found two well-grown chicks of the Red-throated Diver, in a quite small loch, and, going round it, found both the nest and sitting-place, without any possibility of being mistaken, or of confusing the one with the other; for whilst the latter—the sitting-place—though well-marked—as also the six inches or so of track between it and the water—was a depression in the grass only, the former—the nest—also upon the grass—had been constructed with non-growing grass or other herbage that had been brought and laid there. It was close to the water, on a little peaty island, just off the shore, and quite unmistakable. So well ought a nest, such as this, to serve as a sitting-place, that it seems strange another should be preferred, but it would appear that when the nest has once been left it is not returned to.

*July 26th, 1910.*—Got to the loch about 11.45 a.m., and made two careful stalks by the aid of some small stone-piles that I had put up yesterday, in order to see, if possible, the male bird in his resting-place, with the one chick; but in this I was not successful, since the parent bird was away. The chick, however, was, I feel sure, up there, but I did not see him till he had seen me first, so that he first appeared on the water at that end, and began to work his way down to the further end, where he joined his other parent, and chick, in the bay. Here they all three were when I got into a new position, which gave me another view of the point, and greater part of the bay, though less comfortable and not so well concealed. At about 1.20 or 1.25 the male flew in with a fish, and, swimming up with it, the whole family were now together. The male took special care to

give his fish to one of the two chicks, and not the other, seeming, by coming directly up to this one, and, I think, pushing him on a little, to separate him from the other one, with its parent, so that the two couples were a little apart from one another when he first put the fish he was carrying down on the water, where it was immediately seized by his *protégé*. He then seemed to have no farther care, but floated away, when the other chick made a rush at the favoured one, and endeavoured to get his fish. In this he should not have been successful, since the latter had had the first and best opportunity. Yet the fish did not appear to have been disposed of when the rush was made, and there was some scuffling (with, I think, one dive) between the two. After the feeding, the family began to separate, the male and his chick floating away from the female and hers, into the centre of the loch, whilst the two latter remained a little off the mouth of the bay. The male's chick, however, went on swimming up the loch, and I there lost sight of him, whilst the male himself hung back, turned round, and in a minute or two—at 1.35—flew away. The segregation of the family life, as one may call it, is well seen in all this. When I arrived the mother and one chick were in a bay by themselves, at one end of the loch, and the remaining chick at the other end, in a certain accustomed place, no doubt where the male parent had left him when he flew off to catch a fish, which was before I came. It was only my appearance at his end which sent him down to the other, though he then, as the next best thing, joined his other parent. The male, then, on arriving with his fish, singles out one of the two chicks in a noticeable manner, to whom he gives it, and when the feeding is over the family again divides.

2.37.—I now, for the first time since his going up, see the solitary chick at his end of the loch, but swimming down it. He does not, however, come far, but having passed a little projecting point of the shore, on the opposite side to his special one, goes back and disappears behind it. I did not see him, when he went up the loch, go round his usual point, but he simply disappeared; he may not, therefore, have done so—which would be a fresh departure.

4.30.—Female off. Her flight up from the water is very sudden. Between the time of the last feeding and now, she and the chick

have kept within the bay, floating idly on the water, sometimes keeping for a long time in almost exactly the same spot, sometimes not so stationary, because of the wind, sometimes paddling within a small orbit, and, at intervals, sleeping on the water, with their heads turned backwards and beaks thrust into the feathers of their backs. There is, to-day, a much more liberal allowance of sunlight, which makes the black loch sparkle, and shows to much more advantage the great beauty of plumage of the parent bird. The perpendicular stripings of the neck would, I suppose, be claimed by the followers of Thayer as "obliterative"—therefore protective—but it would puzzle one, I think, to say how this applies in the present case. The stripes seem to produce a prismatic effect (at any rate, through the glasses), which is certainly calculated to attract rather than escape notice—they seem crowned with a rainbow light; again, both the delicate mauvey-grey of the head and neck, and the red patch on the throat, are conspicuous, each in its own way, so that any protective effect of the stripes, were this a reality, would be nullified by them. With what does either of these tints harmonise? From the moment that coloration can be seen at all, the head, neck, and throat of this bird are all most conspicuous, as also the red eye and black beak, with its well-defined, dagger-like outline. Both the stripes and the mauve have, indeed, a peculiar effect, but it is an effect which catches the eye, not one which escapes it. When the bird sat on the little green projecting bank, here, the bluish head, rising above it, was salient enough, and unlike any other shape or colour round about it, either near or far—yet these are its chosen breeding-haunts. It was, in fact, the saliency of this head which first gave me an insight into the habits of the species in this respect. On the surface of the lochs themselves these divers are, at once, seized by the eye, especially their head and neck, about which there is something very distinctive. In short, in their striping, colouring, shape, size, and *tout ensemble* there is nothing protective, unless it be claimed that, by being easily distinguished, they attract only cursory observation.\*

5.30.—Female in with the same long, rounded, shiny-looking

\* I am not, in this, denying the principle of protective coloration, but the fact is, there are really "two kings of Brentford," and the official crowned one is always encroaching on the throne of his compeer.

fish. She flies straight to her chick in the bay, and, laying it on the water, the latter takes it whilst it is yet leaving her bill, and pouches it with ease and celerity. It is a matter of a moment, and no undue disparity in size between chick and fish now appears. The chicks are bigger than they look. They are still all covered, as far as I can see, with a light brownish woolly down. This gives an idea of smallness, and they do look very small beside the parents, but the latter are big birds. Still, with all this, the fish just brought was a tremendous rations—something like a whole tongue, a good many times enlarged, for us.

A little while before this the other chick came out on the water, but almost immediately retired again. He keeps rigorously at the upper end of the loch, in a sort of little basin which it forms, all by himself, but not now behind that particular point which hitherto he always has gone behind. The same kind of change has been to remark with the female bird and her chick, for whereas they used to be constantly moored, as one may say, in the bend of the loch, on one side, they have now, since a day or so, changed this spot for the bay opposite.

Just before this entry I saw a Red-throated Diver (not one of my pair) make a very fine descent from a height on to a loch only just behind the first rise here. The wings were held raised above the back, pointing backwards, with a sharp bend at the jointure, and thus, without a single beat, the bird stooped most gracefully, and with some fine sweeps—in a leisurely way—on to the water, almost sheer below it. Thus on these narrow wings, in spite of the disproportionate size of the body, such a bird as this can stoop as though it were an Eagle or Heron.

Male in with a fish, and there is now an interesting scene. He comes down in the little loop or pool at the further end of the loch, but does not see the chick, who has changed his place, and does not see him either. He waits off the point, a little, then off the opposite shore, and then begins to dive down the loch in search of the chick, scanning all about, each time, when he comes up. In this way he progresses to a little off the entrance to the bay, within which are the mother and chick, so that the whole of it must be visible to him. He then, instead of entering it, turns and dives up the loch again, and going further within the projection last spoken of—on the opposite side to the one round which the chick usually is—I see him, all at once,

start forward, with an eager motion, lowering, at the same time, his bill, till, with the fish in it, he ploughs the water in front of him. I cannot see the chick come out to receive the fish, but, a moment or two afterwards, the parent returns, accompanied by the latter, and the fish is no longer in his bill. The interest of this observation lies in the conclusive proof which it seems to furnish that each of the parents has a chick to take care of, and which, alone, it feeds; for when he came to the mouth of the little bay, the male, with his fish in his bill, must have seen the other chick with its mother, but, instead of bringing it the fish, he went back again, to continue the search for the other. Having found it, he delivered the fish, and the chick thus fed was the same one that he had singled out to feed in the bay, where it had got, as one may say, by accident, away from its usual abiding place. Thus what I have long surmised is, by the chance of the one chick having changed its place, and neither having seen nor been seen by the parent, made now strikingly apparent.

But this is not the only matter of interest. Having fed his chick the male begins swimming down the loch again; but first I must say that, previous to this, on his first coming down at the other end of it, his mate had swum out into the entrance of the bay, uttering a deep guttural sort of quack, the first note I have heard either of the birds utter, whilst down on the loch. She then swam back out of my sight again, and the incident seemed closed. The male now, however, having fed the chick as described, swims with it down the loch, slowly at first, the chick apparently doing all it can to hinder him—constantly swimming in front of him, and seeming to want him to turn back. Embarrassed, but not deterred by these movements, the male at length dives, comes up near the entrance of the bay, swims on, and there now appears, advancing to meet him, the female. Rounding a bend of the shore—for each bird has kept close in—the two come opposite, and in full view of, each other, when each makes a little flight, and then another, over the water, and as they, each time, end the flight, before sinking down again, they, as it were, walk on the water, as a Penguin walks on the land, bolt upright, with the whole of the white expanse of the under surface, from the legs, or almost, upwards, showing—in fact, as it would seem, a courting or nuptial pose. This is most

salient and interesting, and a fairly exact idea of it is conveyed by thinking of a Penguin running for a few steps, and then, for an appreciable period, standing upon the water, the naked legs or feet just hidden by it. At the end of this mutual display, when the birds ride together on the water, the female again utters the deep guttural quack. After this they both swim into the bay, then, in a moment or two, one of them reappears at the entrance of it, rises in a slant from the water, and is off. Meanwhile, the chick that has been fed, being thus evaded, turns and repairs to its own upper end of the loch again. This may be at about 6.30 to 6.45. There is nothing further to record up to 7.30 p.m., when I leave.

In reference to the above nuptial pose or antic of these Divers—if we consider it as such—it may be instructive to quote from my paper on the Great Crested Grebe, in which something similar, though with an odd addition, is thus described:—

“ The two, fronting each other, touch, first, with their beaks. Then the female dives and comes up with a small piece of weed which she lets drop. Immediately afterwards the male dives too, and, coming up with a larger piece of weed, the two again front one another, and, all at once, both of them leap entirely upright in the water, standing, it would seem, on their feet, either upon the water itself or on the mud or weeds just below the surface. They look like two Penguins, and each, as they stand face to face, must have the fullest view of the whole broad silver surface of the breast and body, as well as of the throat, of the other. Immediately after they have assumed this upright attitude, the hen bird catches hold of the dangling end of the weed which the male has brought up, and both, holding it between them, make little waddling steps, now forwards, now backwards, but not going more than a few inches, either way. Having done this for a little, both birds sink down again on the water, the piece of weed, which they had, all the while, held, falling disregarded between them, and then set off swimming for the nest, on the opposite shore.” Thus in each of these species we see a similar pose, in which the points of either are shown to the same advantage; but in the Grebes the idea of nest-building—still persisted in, though without apparent necessity—seems to have mingled with that of nuptial display.

(To be continued.)



NATURAL HISTORY RECORD BUREAU, CARLISLE  
MUSEUM: REPORT FOR 1911.

BY LINNÆUS E. HOPE & D. LOSH THORPE, Keepers of the Records.

THE year 1911 was a remarkable one in many respects. The coldness of the early months of the year and the heat of the succeeding summer and autumn were not without their effect upon the bird-life of the country. The cold spring slightly retarded migration, and the bulk of the summer visitors were a few days later in arrival than in the previous year, although some individuals were reported earlier.

The earliest reported migrant was again the Sand-Martin, which was seen at Westward, Wigton, on March 18th, the earliest note in 1910 being March 13th, at Crosby-on-Eden. The Cuckoo was reported at Todhills on April 17th, eleven days earlier than in 1910, and the Corn-Crake was recorded on April 27th, the earliest note sent in for 1910 being May 1st.

Many birds finished their nesting early and commenced migration, whilst some species reared several broods and stayed very late, as, for instance, a Swallow was reported sitting on her eggs as late as Oct. 17th. This may have been a third brood.

One or two notes by correspondents seem remarkable and invite comment. On July 4th Major Spencer Ferguson wrote: "Last night twenty Grey Geese passed over Lynehow to Rockliffe Marsh from east . . . time, 8.20 p.m." Mr. J. M. Charlton (a good observer) wrote: "On July 25th a flock of Wild Geese was seen flying north-east over Brampton . . . grey in colour . . . time, 8.30 p.m. . . . seen by two observers." Wild Geese were also seen by other observers near Carlisle towards the end of July. Both correspondents remark on the abnormality of the dates (July 3rd and 25th).

The Wild Geese which visit the Solway Marshes do not, as a rule, arrive until the middle or near the end of September, and they have generally left by the end of April. That Grey Geese

did occasionally stay on into June or even July was well known to Macpherson when he wrote the 'Fauna of Lakeland.' He says, "Geese so notoriously linger late in their winter haunts, *if not breeding birds.*" It is possible that the Geese seen in July last year were non-breeding birds, paralleled by the large flocks of non-breeding Bar-tailed Godwits which sometimes spend the whole summer on the Solway.

In these notes we have more than once remarked on the apparent increase in the numbers of Grey Lag Geese which now visit the Solway, and the birds seen late may have belonged to this species, which as its name denotes is much addicted to lingering or "lagging" late in its winter haunts.

It is with a feeling of great regret that we report the fact that no Wild Swans wintered on the River Eden at Carlisle during the winter of 1911-12, a break in a sequence of six annual visits by this fine species being thus created.

The 'Glasgow Weekly Mail' of Dec. 9th, 1911, reported thirteen Wild Swans on the River Nith at Dumfries, but enquiries proved that they were merely Mute Swans, though perhaps strangers to the Nith.

The 'Times' of July 13th, 1911, recorded the nesting of a Black Redstart at Crosthwaite, near Keswick, and in this case also the result of our enquiries was disappointing. We may, however, congratulate ourselves that the breeding of the Great Crested Grebe in "Lakeland" was in 1911 established beyond doubt.

Records relating to Mammalia are few, but it is interesting to note that the Roe Deer still rears its young in the north-east of Cumberland.

#### WESTMORLAND AND SOUTHERN LAKELAND NOTES, 1911.

BY ERIC B. DUNLOP.

Though the weather at the commencement of the year was more open than at the beginning of 1910, the birds, curiously enough, were considerably later in coming into song. For instance, in 1910 the Song Thrush was first heard on Jan. 4th, in 1911 not till Feb. 12th. The Chaffinch came into song on Feb. 1st, 1910, and on Feb. 17th in 1911.

I saw the first Wheatear, a male, on April 14th. The cold

east wind which had blown for a month previously no doubt made this and other migrants late in arriving. On April 15th the first Common Sandpiper was noted; on April 21st the Swallow and Willow Wren; on April 22nd a male Redstart. The Cuckoo was heard on April 29th.

On May 4th a Whitethroat was seen, and on this date the first House Martins were reported to have returned to a large colony. A Whinchat was seen on the 5th, and on May 16th a Spotted Flycatcher. On May 27th a nesting-hole of the Great Spotted Woodpecker was examined; it contained young fully a week old.

Curlews were unusually late in leaving their upland breeding haunts: normally they have left us before August dawns, but they were still on the hills above Windermere on August 10th. The same delay in quitting their breeding-grounds was noted on the eastern side of Westmorland. Possibly the hot and dry summer had made food difficult to procure, and caused these birds to be more backward than in a more moist season.

The summer-like weather at the end of September caused the Great Tits to utter their spring notes, and the Chaffinches to sing. I do not remember hearing Chaffinches sing in this district at the fall of the year before. On Oct. 26th the first arrival of Fieldfares was noted.

On April 22nd I saw, near Windermere, two Waxwings; they had been seen about the locality for some weeks previously; search after this date failed to reveal their presence. They flew together as if paired.

I have much pleasure in recording, for the first time, the nesting of the Great Crested Grebe in "Lakeland." On a certain quiet sheet of water I saw, on April 18th, two pairs of these fine birds. One pair brought two young off in safety; the other birds were, I believe, also successful in their nesting operations, though I did not see the young as I did in the first case. I have good reason to suppose that they bred in this locality in the two previous seasons.

A Great Snipe was shot near Shap in the autumn, and was subsequently recorded in the 'Field.'

Two pure white Grouse chicks were hatched from the same clutch of eggs near Lazonby. On being handled, they were

found to have the ordinary dark eye of the Grouse. One of the birds was reported in autumn.

The following are a selection of the notes and records sent in to the Bureau :—

*January* 2nd, 1911.—Fourteen Grey Lag Geese seen near Silloth (W. Nichol).

3rd.—Heard Bewick's Swans in flight near Silloth (W. Nichol).

5th.—Saw about forty Grey Lag Geese at Skinburness (W. Nichol).

16th.—Saw about twenty-seven Grey Lag Geese at Skinburness (W. Nichol).

30th.—Grey Lags again seen at Skinburness (W. Nichol). Hawfinch seen at Newby Grange, Crosby-on-Eden (E. Hodgson).

*March* 2nd.—A flock of Wild Geese flying north-east passed over Stanwix at 1 p.m.; a second flock passed in the same direction at 3 p.m., about twenty-five birds (L. E. Hope).

10th.—Raven seen near Botcherby by two observers (H. H. Hodgkinson).

17th.—A Tawny Owl flying in a plantation with a Squirrel in its talons; the Squirrel screamed as it was carried away, Westward, near Wigton (R. W. Barwise). A White Stork seen near Raby Cote, Silloth (W. Nichol).

18th.—Three Sand-Martins seen to-day; also a pair of Common Wrens nest-building at Westward, Wigton (R. W. Barwise).

26th.—Three of the Whooper Swans left the River Eden to-day (T. Hudson). Sandwich Terns arrived at Ravenglass to-day, three days later than usual (J. M. Charlton).

30th.—Thirty Wild Geese seen near Silloth by J. Backhouse.

*April* 3rd.—Saw a Kingfisher at Gosling Beck, near Moorville (J. B. Cairns). First Wheatear seen near Silloth, also at Wigton (W. Nichol).

4th.—The two remaining old Whooper Swans and the three young ones left the River Eden to-day (T. Hudson). I saw a Yellow Wagtail to-day near Silloth (W. Nichol).

10th.—Flock of three hundred Bernacle Geese near Silloth (J. Backhouse).

12th.—Redshank wading in shallows by Weaver's Bank in Public Park, Carlisle (L. E. Hope). First Ring-Ouzel of this year seen, Cumberland (Eric B. Dunlop).

12th to 14th.—Gaggle of forty Grey Lag Geese at Skinburness (W. Nichol).

15th.—The first Common Sandpiper noted, near Troutbeck (Eric B. Dunlop).

16th.—A Swallow seen near Silloth by R. Peat. A Sand-Martin seen on River Irthing, near Brampton, wind from west; also a Siskin uttering its call-note, male Redshanks performing evolutions in air, and Long-tailed Tits nesting, near Brampton (J. M. Charlton).

17th.—Cuckoo heard at Todhills; two Sand-Martins seen near Gretna (W. H. Little).

18th.—Two Swallows and three House Martins seen at mid-day at Etterby Scaur, Carlisle (D. Losh Thorpe). Saw a flock of six Wigeon near Silloth (W. Nichol). Swallow and two Sandpipers seen on River Irthing, also Oystercatcher; a pair of Ringed Plovers nesting on a shingle-bed, River Irthing, near Brampton (J. M. Charlton). Two Swallows seen near Silloth (W. Nichol).

19th.—Heard Tree-Pipit singing near Wigton (R. W. Barwise). Saw Common Sandpiper at Rockliffe; Wild Geese numerous on Rockliffe Marsh (G. F. Saul). Some Swallows have arrived at junction of Caldew and Eden rivers; cold east winds (T. Hudson). Saw a Willow-Warbler near Brampton (J. M. Charlton).

20th.—Saw a Swallow at Floriston (J. B. Cairns). First Willow-Warbler seen at Westward, Wigton (R. W. Barwise). Saw Willow-Warbler at Talkin Tarn (W. H. Little).

21st.—Saw a nest of Grey Wagtail with eggs, Westward (R. W. Barwise). Lesser Terns arrived on the Solway (W. Nichol). Saw two Swallows at Sandisyke, near Brampton (J. M. Charlton). Swallow and Willow-Warbler first seen near Windermere (Eric B. Dunlop).

22nd.—Saw a Swallow to-day at Westward, Wigton (R. W. Barwise). Saw a flock of ten Wigeon and also two Shovelers near Skinburness (W. Nichol). Redstart seen near Windermere (Eric B. Dunlop).

23rd.—Swallow seen at Blackwell, Carlisle (W. Marchington).  
Swallow seen at Botcherby, Carlisle (W. H. Little).

26th.—A gaggle of sixty Bernacle Geese at Skinburness (W. Nichol).

27th.—Cuckoo heard near Silloth (R. Peat). Swallows on the Eden near the bridge (D. Losh Thorpe). Corn-Crake heard near Aglionby, Carlisle (W. H. Little).

28th.—Saw Redstart, Whitethroat, and Whinchat near Brampton (J. M. Charlton). Heard Cuckoo near Silloth (W. Nichol).

29th.—Cuckoo heard at Troutbeck, Windermere (Eric B. Dunlop). Swift arrived at Etterby Scaur, Carlisle (D. Losh Thorpe).

May 1st.—Heard Cuckoo and Corn-Crake at Silloth, a fine warm day; Wheatear seen (H. H. Hodgkinson).

2nd and 3rd.—A return of the cold weather.

4th.—Whitethroat and House-Martins first seen near Windermere (Eric B. Dunlop). Saw first Swift to day at Westward, Wigton (R. W. Barwise).

5th.—Swift at Eden Bridge, Carlisle (W. H. Little). Heard Cuckoo and Land-Rail to-day at Dalston (J. Reid). Whinchat first seen at Troutbeck, near Windermere (Eric B. Dunlop).

6th.—Corn-Crake first heard at Westward, Wigton (R. W. Barwise).

7th.—Cuckoo first heard near Brampton (J. M. Charlton).

8th.—Four Wild Swans seen flying west from Skinburness (Capt. Penrice). Weather fine and warm again. Two pairs of Jack Snipe on Drumburgh Moss; they appeared to be paired (J. Smith).

10th.—Swifts seen, Willow-Warblers numerous, near Brampton (J. M. Charlton).

13th.—Heat and thunder rain.

16th.—Spotted Flycatcher first seen near Windermere (Eric B. Dunlop).

18th.—Night-Jar heard and seen; heard Grasshopper Warbler at Todhills (J. B. Cairns). Redstart nesting in wall of an orchard near Brampton (J. M. Charlton).

23rd.—Flock of Fieldfares in Morton Park, Carlisle (G. F. Saul).

June 8th.—A Black Tern seen near Silloth (W. Nichol).

10th.—Nest of Hawfinch under observation near Longtown (J. B. Cairns).

July 4th.—Last night at 8.20 p.m. about twenty Grey Geese passed over Lynehow to Rockliffe Marshes, travelling from east (Major S. Ferguson).

6th.—Woodcock flying over in evenings, Sandisyke, Brampton (J. M. Charlton).

10th.—A male Blackcap-Warbler noted feeding on raspberries, also the adults of a brood of Garden-Warblers, at Sandisyke, near Brampton (J. M. Charlton).

11th.—Saw an adult female Dunlin on the River Irthing; it was changing into winter dress, and probably migrating after breeding on the fells; it was very tame (J. M. Charlton).

14th.—Saw a Mole swimming, also a Roe-Deer with her fawn near the Cambeck, Brampton (J. M. Charlton).

16th.—Heard Corn-Crake for last time this season, Brampton (J. M. Charlton).

22nd.—A large flock of Bar-tailed Godwits (about four hundred), in summer dress, on the shore near Silloth; also about fifty Knots; saw a Skua (W. Nichol).

24th.—Many of the Common Terns at Ravenglass have eggs or young, numbers of the latter being marked with a ring stamped "Wetherby, High Holborn, London"; some of the Sandwich Terns still have young, but most of them have departed. There are also Lesser Terns still with eggs (J. M. Charlton).

25th.—A flock of Wild Geese were seen flying north-east over Sandisyke, near Brampton; they were flying low, and were grey in colour; the time was 8.30 in the evening; they were seen by two observers (J. M. Charlton).

30th.—Nest of Song-Thrush in a garden wall; Oystercatchers piping incessantly in the evenings on River Irthing near Brampton (J. M. Charlton).

August 15th.—Saw four Black-tailed Godwits and a Whimbrel near Silloth (W. Nichol).

18th.—Saw two Greenshanks near Silloth (W. Nichol).

22nd.—Saw three Black-tailed Godwits and two Green Sandpipers near Silloth (W. Nichol).

28th.—A brood of young Grouse flushed on "Faulds Brow,"

near Threlkeld, had long tails and flew like Pheasants; none were shot (G. F. Saul).

*September 6th.*—Swift seen at Etterby Scaur, Carlisle; also seen on August 26th, 29th, and September 1st (D. Losh Thorpe). Flock of Wild Geese flying south-east over Stanwix at 2.30 p.m. (L. E. Hope).

*30th.*—A Tern passed flying north over Sandisyke (J. M. Charlton).

*October 3rd.*—A Swallow sitting on a nest with four eggs in a coach-house at Sandisyke, Brampton (J. M. Charlton). Saw a flock of about forty Grey Geese and one of about twenty Bernacle Geese near Silloth (W. Nichol).

*4th.*—Two flocks of Redwings seen passing over Sandisyke flying north-east; several Swallows and House-Martins still remain near Brampton (J. M. Charlton). An immature Common Gull noted sitting in a ploughed field near Brampton, apparently resting on migration (J. M. Charlton).

*6th.*—Only one pair of Swallows and one pair of House-Martins now remain here; the wind is north-east, and a solitary Redwing is flying north (J. M. Charlton).

*7th.*—Grey Plover passing over Sandisyke, flying east and calling (J. M. Charlton).

*8th.*—More Redwings making north or north-east over Sandisyke (J. M. Charlton).

*10th.*—Flocks of Lesser Redpolls passing over Sandisyke. There is a large rookery in a wood on the River Irthing; when the enormous flocks rise the sound is like the roar of the sea (J. M. Charlton).

*11th.*—A flock of about thirty Wild Geese passed over Sandisyke about 3 p.m., wind in west and mild. Flocks of Redpolls are feeding on the seed of silver birch. About 4.30 p.m. a second flock of Wild Geese passed over in the same direction, Sandisyke, near Brampton (J. M. Charlton).

*12th.*—A Short-eared Owl in an alder-grove near Brampton; saw four Swallows flying south-west, also a flock of about sixty Redwings (J. M. Charlton).

*17th.*—The Swallow noted on the 3rd inst. is still sitting on her eggs; the birds are shut in the coach-house each night, Sandisyke, near Brampton (J. M. Charlton).



23rd.—Flock of about fifteen Bernacle Geese passing north over Sandisyke; Herring-Gulls in the fields with Lapwings (J. M. Charlton).

26th.—First Fieldfares (autumn migrants) arrived at Troutbeck, Windermere (Eric B. Dunlop).

31st.—Grey Wagtail at Crosby-on-Eden (E. Hodgson).

November 5th.—Saw a fine male Hawfinch to-day near Lynehow; a great gale blowing (Major S. Ferguson).

9th.—Saw a Whooper Swan crossing over Solport from north-north-east towards Solway, about 2.50 p.m. (Major S. Ferguson).

16th.—Flock of eleven Brent Geese seen near Silloth (J. Nichol).

21st.—Saw a flock of about one hundred and fifty Grey Lag Geese at Skinburness (W. Nichol).

SOME OBSERVATIONS ON THE GLOWWORM  
(*LAMPYRIS NOCTILUCA*, L.)

BY RICHARD ELMHIRST, F.L.S., Superintendent of the Marine  
Biological Station, Millport.

ON the west side of this Station is a rather marshy field, about three hundred yards long, in which Glowworms are plentiful in some years; the southern boundary of this field is a road, outside of which is some rough waste ground about a quarter of a mile across, known as Farland Point. The first indication of *Lampyrus* is generally about mid-April, when larvæ are found crossing the road; this continues during May, and the majority of such larvæ seem to be journeying from the Point to the field.

In June the female Glowworms begin to shine; towards the end of June the males appear, sometimes in swarms. After mating, the female shines less brightly, and soon disappears. In September larvæ are again found on the road, and now the majority seem to head from the field to the Point. A few females may occur quite late in the year; on Nov. 1st, 1908, I found a belated female glowing feebly, the night being mild and close.

Once a female has been located, she can almost certainly be found at the same spot night after night, until she mates; owing to this habit of taking up a stance the same individual can be kept under nightly observation.

The real object of these notes is to record the occurrence of the male Glowworms in swarms, and the results of a few experiments carried out during their presence.

June 26th, 1908, was a bright, hot day, followed by a close evening. On returning home about 11 p.m. I noticed a number of insects outside the window; in my sitting-room I found over fifty male Glowworms on the table, or hanging listlessly on the walls. On one pane (2 ft. by 3 ft.) of a window facing west I counted exactly sixty. On going into the field I could not see some of the females which I had had under observation for

several days, and whose exact locality I knew; however, a pocket electric light revealed them surrounded by often six or more males. The latter shone faintly every now and again, especially when handled. I then put out the lights of the house, and placed on the lawn a red light (photographer's dark-room lantern), a blue light (a candle in a box behind a sheet of blue glass, such as is generally used in laboratories and museums), and an unprotected candle. The males were attracted in dozens by the red light in whatever position I placed it, but ignored the blue light and white light of the candle. On relighting the gas the diffuse yellowish light at the sitting-room window (blinds cream-coloured) became second favourite to the red lamp on the lawn.

The following night there was still a considerable number of males about, but in a few days they had all disappeared, except a few which might be found creeping about the females in the field. My nearest neighbour across the field on the west told me he had been bothered for several nights by dozens of flying beetles coming into his house. I counted over one hundred and twenty females in the course of a single evening in the field to the west of the Station. Yet in the field to the east of the Station, Glowworms were very scarce, three or four at most; this may be due to the presence of hens, or that it is rather further from the Point, which seems to be a wintering ground for the larvæ.

The following summer (1909) I prepared for the appearance of the male Glowworms, and tried them with the red light of a bicycle-lamp; white light of a bicycle-lamp; green light of a bicycle-lamp; blue light of laboratory blue glass; diffuse yellowish white light at window; fluorescent lights got by using screens of (1) fluorescein solution, and (2) 10 per cent. solution of sulphate of quinine.

On June 23rd Dr. Malcolm Laurie joined me, and showed Finsen rays. The lights were thrown through paper cones (rather like the horn of a gramophone), which made landing-stages in which insects could be easily detected on arrival, and which only received those coming direct to the light. I discarded these cones, after one trial, as too cumbersome and too easily displaced by the slightest breath of wind. Dr. Laurie

kept the Finsen rays in operation from 10.45 p.m. to 1.30 a.m., but, owing to unsuitability of the conditions for handling batteries and generating hydrogen, the current was rather intermittent. The only insects which came to the Finsen ray cone were a few small Diptera. This experiment ought certainly to be tried again, and should under favourable conditions succeed in attracting the male Glowworms, since the spectral analyses of Finsen rays and Glowworm light are similar.

In the course of experiments made during June 23rd-29th, both in the dark-room and out-of-doors, I found that red was the most attractive colour to male Glowworms; the fluorescein screen and diffuse white light were the next; quinine solution-screen, blue and green, were ignored; bright white light at close quarters was evidently disliked, and markedly avoided. In the field I set up a long strip of canvas on posts; behind this were placed a number of small stands to support the bicycle-lamps or other sources of light. Within four yards of this canvas screen were seven female Glowworms, five of which remained unmated, after all others which I had located were mated. Several dozen males came close past these females on their way to my red light; the only obvious difference in the conditions surrounding these females being the presence of my experimental lights.

In 1910 the larvæ were late, not appearing on the road until the first week in May; females began to shine about May 20th; by June 16th I had located sixteen, and a few males had appeared. After this I saw practically nothing more of them; possibly a heavy thunderstorm on the evening of June 20th, when 1.18 in. of rain fell in about two hours, may have accounted for this. In 1911 they were very scarce. This year a number of larvæ are already about (April 20th).

In conclusion, the three interesting points are—(1) that female Glowworms often take up and occupy a permanent position; (2) that male Glowworms may appear in flights of at least several hundreds; (3) that male Glowworms, like most insects, show a marked preference for red light, which is curious in this particular case, seeing that the light of the female, which should be specially attractive, is at the other end of the spectrum.

NOTE ON THE OCCURRENCE IN YORKSHIRE OF  
*TRICHONISCOIDES SARSI*, PATIENCE: A WOOD-  
 LOUSE NEW TO THE BRITISH FAUNA.

BY RICHARD S. BAGNALL, F.L.S.

IN his great work on 'The Crustacea of Norway,' Prof. G. O. Sars carefully described and figured a golden-yellow *Trichoniscoides*, which he referred to the *T. albidus* of Budde-Lund, but which Mr. Patience has recently shown to be quite distinct from the true *albidus*, the two most easily determined characters lying in the flagellum of the antenna, which, in Sars' species, possesses four instead of three joints, and in the form of the meral joint of the seventh peræopod in the male. Patience has shown that these characters are amplified by very distinct structural differences in the pleopoda of the males.

I have taken *T. albidus*, B.-L., in several localities, often in some numbers, and the impression it gives me in the field is that of a sluggish *Trichoniscus pusillus*, having its dorsal surface of a similar claret or reddish-brown colour, but dull instead of glossy, and the underside noticeably whitish. But Sars distinctly says that his species is of a golden-yellow colour, and linear in form.

Recently I had the opportunity of collecting for nearly an hour on the cliffs near Whitby, which I devoted chiefly to the *Pauropoda* and *Symphyla*, but met with several woodlice, viz. *Trichoniscus pusillus*, Brandt, *T. pygmæus*, G. O. Sars, *Trichoniscoides albidus*, B.-L., several *Haplophthalmus mengii*, Zadd., *Oniscus asellus*, L., *Philoscia muscorum*, Scopoli, *Porcellio scaber*, Latr., and a linear, golden-yellow Trichoniscid, quite distinct from *T. albidus*, B.-L., on the field, and agreeing well with the *albidus* of Sars, for which Patience has proposed the name—

## TRICHONISCOIDES SARSI, Patience.

*Trichoniscoides albidus*, G. O. Sars (nec Budde-Lund), 'The Crustacea of Norway,' ii. pl. lxxiii. p. 165 (1896-99).

*T. sarsi*, Patience, Ann. & Mag. Nat. Hist. ser. 8, ii. pl. vi. pp. 84-88 (1908).

The species is admirably described and figured by Sars, and compared with the true *albidus* by Patience in the above references.

*Distribution.*—Yorkshire; under small stones embedded on the clayey cliffs near Whitby, March 20th, 1912. Previously only known from Norway, in the neighbourhood of Christiania.

I have not yet had the opportunity of making dissected preparations from my material, but hope to do so shortly.

## NOTES AND QUERIES.

## MAMMALIA.

**Whiskered Bat in Westmorland.**—On April 22nd last Mr. Norman Robinson brought me a Bat which he had caught near Bowness-on-Windermere in broad daylight. I identified it as a female Whiskered Bat (*Myotis mystacinus*), and forwarded it to Major G. E. H. Barrett-Hamilton, who very kindly confirmed my identification. The Whiskered Bat has not, I believe, been previously recorded in Westmorland. The following are the chief dimensions:—Head and body, 48 mm.; ear, 12 mm.; tragus, 7 mm.; hind foot, 6·5 mm.; tail, 30 mm.; lower leg, 17 mm.; longest digit, 51 mm.—D. G. GARNETT (Dalegarth, Windermere).

## AVES.

**Wood-Lark nesting in Norfolk.**—In my “Report for Norfolk” *ante*, p. 131, line 32, “a Woodcock’s nest with three eggs” should be “a Wood-Lark’s nest.” In this district the Wood-Lark breeds regularly in small numbers. Its distribution in Norfolk is rather peculiar; in the eastern half of the county, as well as in the northern part, it is a very rare bird, and here its nest has not been found so far as I know. In winter time, after a fall of snow, two or three Wood-Larks are pretty sure to be heard of on the coast, and an instance occurred only last February, one being seen and heard singing on the 4th by Mr. R. Buxton at the Roman Encampment near Cromer.—J. H. GURNEY (Keswick, Norfolk).

**Merlin (*Falco æsalon*).**—It is perhaps worth recording that a female of the above was brought to me lately\* by one of my sons (A. E. Ll. Pickard-Cambridge). He found it nailed through the head to a “keeper’s gallows,” but it was too far gone to be capable of preservation. It is a rare bird in this district. During a period of many years I have never seen more than three or four examples of it.—O. P. PICKARD-CAMBRIDGE (Bloxworth Rectory, Dorset).

**Long-tailed Duck breeding in Orkney.**—In reply to Mr. F. W. Smalley’s request for further information (*ante*, p. 35) on this subject, I beg to state that the duck was flushed from her nest containing seven eggs by an observer who is well acquainted with this species.—O. V. APLIN (Bloxham, Oxon).

\* This note was dated April 18th.—Ed.

**Flight of the Common Snipe (*Gallinago cœlestis*).**—Although I have spent a good many hours in the field study of the Common Snipe, I was totally unprepared for an amazing experience of this morning (May 2nd). On April 27th I had been timing one bird, and noted that it remained on the wing without a break for an hour and three minutes, and drummed every six seconds at the beginning of the time, slowing down to every eight seconds towards the close of the hour at 1.53. In each case the downward plunge lasted about a second and a quarter. Now, to-day, on the same field, in the western portion of Essex, I watched one bird mounting and plunging in a curious manner. The rise and the fall were about equal in time—say, a little over a second; during the plunge the two outer tail-feathers were outspread apart from their neighbours in the usual way, and the bird dropped at the ordinary angle, but in *perfect silence*. There was no mistake about this, and I appreciated the importance of the observation in its bearings upon the theory of the production of the drumming. In a few seconds the bird began “chipping,” and careering about in the manner familiar to all students of the Snipe. The characteristic rockings during flight were so pronounced that I was actually on the point of taking pencil and paper from my pocket to make diagrammatic notes on the spot, for I had never seen them at so great an angle before. Suddenly it turned and came in my direction at a great speed, flying at an altitude of some six feet above the ground, and calling vociferously, and as it passed me *the bird turned completely over, and sailed along for at least twenty yards on outspread wings, belly upmost!* To say that I could hardly believe my eyes becomes here a bald statement of fact, and not a mere figure of speech, and I felt that this was one of those observations on which one must keep silence; but during the next minute it repeated the manœuvre perhaps half a dozen times, against an excellent background and in the best of lights, and my efforts to convince myself that I had made some mistake were fruitless. Any questions of a trick of light, or an optical illusion, or the possibility of the bird being blotched below with white, were not to be thought of, and I have never been so sure of an observation in my life. I repeat that in its abandoned play this Snipe twisted over suddenly to glide along back downwards—once not more than ten yards from my eyes—and when it mounted again in the air it *plunged back downwards*, although otherwise in the exact posture of drumming, and (as I had noted before) in perfect silence. This negative evidence at least seems to settle the office of the expanded feathers of the tail. Later on I saw it beating its comparatively sedate round, and drumming in the



orthodox manner. I ought to add that as it flew past me the tip of its bill was open.

The habit—and I must call it this, rather than the trick of a single highly abnormal bird—seems so extraordinary to me, and so far beyond the acrobatic movements of Rooks or Hawks that I have known, that I am taking the step of writing this note at once, and not waiting until I have sought records of similar observations by others. In my paper on the Snipe in the last volume of 'The Zoologist' I indicated that I hoped to write at greater length on the subject of voice, but I would like to place this present detail on record at once, and hope that others may be led to observe the same action. Possibly it is usual with the bird, and perhaps it has been recorded before; but, if so, a second note will be in no way overloading the subject. When we stand to watch a Snipe circling its zigzag course above an open field in full sunlight, it may seem to possess a transparent life, but really few birds are more difficult to observe, and fewer still that are worthier of persistent study.—  
FREDK. J. STUBBS.

**Snipe nesting in Bedfordshire.**—No satisfactory instance of the Snipe having nested in this county has ever been recorded. For the past twenty years I have visited the various localities in Bedfordshire, such as at Flitton and Flitwick Marsh, the low-lying meadows of the Rivers Ouse and Ivel, and again at Newnham, where this bird might be tempted to nest. In such localities it is not infrequently observed throughout the nesting period, and many times by their "drumming" and other nesting actions and calls I have been led to think they must be breeding, but many friends and myself have searched in vain. On April 7th last I noticed two pairs frequenting a very favourable stretch of marshy meadow land that has probably only got into such condition in recent years. On May 2nd I revisited this locality in company with a friend, and after a diligent search first found a nest containing an addled egg and the egg-shells from which young had recently been hatched, and eventually the three young themselves, a day or so old, and after that we flushed another bird from her nest containing four fresh eggs.—J. STEELE ELLIOTT (Dowles Manor, Salop).

**Origin of the Social Antics and Courting Displays of Birds.**—In reading the recently issued Section 7 of Kirkman's 'The British Bird Book,' I was pleased to find that Mr. Farren supports me in my view that the social antics of birds, as well as their more formal and elaborate courting displays, have had their origin in those violent and often frenzied movements which spring directly from sexual

excitement, and may be described as blind impulses. This, however, is only one-half of my theory, for I believe that under the ever active force of natural selection the habit of nest-building has also grown out of these movements. It was my observations on the breeding habits of the Peewit, more especially, which led me to this conclusion, and, consequently, my paper in 'The Zoologist' (vi. p. 133, 1902)—in which the facts and arguments are more fully stated than in my "Bird Life Glimpses"—should be read from that standpoint, rather than as an attempt to give a full account of the bird's spring activities. I describe minutely certain very significant actions on the part of these birds, which I saw, and endeavour to arrive at their essential character, together with the direction in which, through natural selection, they may have led, or be leading. My views, in this respect, were, if I remember, so fortunate as to win, at least, the tentative approval of Mr. Howard. Otherwise I have heard no further word of them, yet I hope that fellow field naturalists will not allow them to be quite buried alive, for, since this is a fate to which our fraternity, generally, is much exposed, we should stand together against it.

In regard to the hen Peewit's appreciation, or otherwise, of the chestnut feathers of her mate, my paper contains the following note, which I think goes farther than anything which Mr. Farren refers to in this connection:—"The bird now rises and goes a step or two farther off, then again, throwing itself forward, stands, almost perpendicularly, on the breast, at the same time pecking at, and, I think, seizing the bits of grass, near, in the beak. The other Peewit" (the female, as I judged her to be, but, in my opinion, the sexes cannot be distinguished with certainty in field observation) "now comes right up to the rolling bird, and appears to examine the lower tail-coverts, or parts adjacent. I cannot say for certain whether it actually touches them with the bill, but it appears to do so. Upon this, the rolling one flies off, and the other, falling forward, presses with the breast (I think also pecking), not in exactly the same place, but just near it." Here we seem actually to see both the nest-building habits and those of sexual display emerging out of blind sexual movements, but, in regard to the former point, I have not relied solely on my own observations (they include a few other birds), but have quoted, from 'The Zoologist' (i. p. 97, 1897), some of Mr. Cronwright Schreiner's highly suggestive ones on the nest-making of the Ostrich.

As to the female Peewit having herself chestnut-coloured under tail-coverts, I do not consider this a difficulty in the way of sexual

selection. Darwin supposes that, in such cases, the adornment of the male has been transmitted, through inheritance, to the female. Sex, we may suppose, would direct the admiration, and, thus supported, the beauty should not pall, through being shared. Also, on my hypothesis of purposeless actions, due to sexual excitement, being the raw material out of which display, more properly speaking, has sprung, one might expect admiration (by which I mean sexual response, through eye-dazzlement), on the part of the female, to precede any consciousness of exhibition in the male, so that selection might well have proceeded some way before this latter element began to dawn.—EDMUND SELOUS.

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## NOTICES OF NEW BOOKS.

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*Reptiles, Amphibia, Fishes, and Lower Chordata.* By R. LYDEKKE, J. T. CUNNINGHAM, G. A. BOULENGER, and J. A. THOMSON. Methuen & Co., Ltd.

THIS book is more largely evolutionary in principle and bionomical in treatment than any work of the kind which has appeared in recent years; it marks the trend of modern biological conclusions, and should satisfy the aim of Mr. Pycraft, who projected the series, but owing to ill-health was compelled to hand over the editorship to Mr. Cunningham.

The chapter on the coloration of reptiles and its interpretation is a cautious and well-reasoned summary of a subject which is too often treated with a wealth of theoretical imagination. The solution of the coloration problem cannot be achieved by the study of its appearance in the Insecta alone and in Lepidoptera particularly; it must be studied in a wider field, and will then obtain a wider interpretation. The coloration of fishes is still, in all its phases, a question which has not yet reached a demonstrative explanation.

The evolutionary record of the animals treated in this book is not divorced from palæontology; by a knowledge of the past we can understand the foundations of the present fauna of the planet; when we know it thoroughly, if the past will ever be unravelled, the future will also be divulged. This volume is one

to be read rather than criticised; it contains much information that is not easily accessible, and is written from a sound evolutionary purview. The illustrations are to the point.

---

At the meeting of the Zoological Society of London (April 23rd, 1912) Mr. Julian S. Huxley read a paper containing an account of the courtship of the Redshank (*Totanus calidris*).

The first purpose of this paper was to draw attention to the many valuable results to be obtained by simple watching of very common British birds; and the second was to show how the facts observed in the Redshank bore on the theory of Sexual Selection. In this species there was no rival display between several males at once: a single female was courted by a single male, as in Man. The courtship started with a pursuit, the hen running in a circuitous course, followed by the cock. The pursuit was followed by a display, but only if the hen were willing that the courtship should continue. During the display the cock uttered a special note, spread his tail, raised his wings above his back, and advanced with a curious high-stepping action towards the now stationary female. If the female so wished, pairing followed the display. But in quite ninety per cent. of observed courtships the female rejected the male, either during the pursuit or during the display, by simply flying away, when the cock was quite powerless to enforce his desires. Thus the consent of the hen was absolutely necessary if pairing were to take place, and this consent was usually withheld; in other words, selection by the female was a reality in the Redshank.

Other interesting points were as follows:—The plumage of the two sexes was identical, and was decidedly cryptic when the birds were at rest. During flight the white under side of the wings and the white tail were conspicuously revealed, and probably served as recognition marks. The significance of the red legs was unknown. During display the male drew attention to the underside of the wings by raising and vibrating them, to the tail by fanning it out, and to the red legs by his slow, high steps; besides this he uttered a note heard at no other time. Thus, since the actual colours and structures used in display were found in both sexes, the only peculiarly male possession—the only secondary sexual character of the Redshank—was a special behaviour, devoted to showing off these common colours and structures in a special way.

This seemed to show that secondary sexual differences in birds were originally differences of behaviour, and that only when these were established did differences of colour and structure come to be developed.

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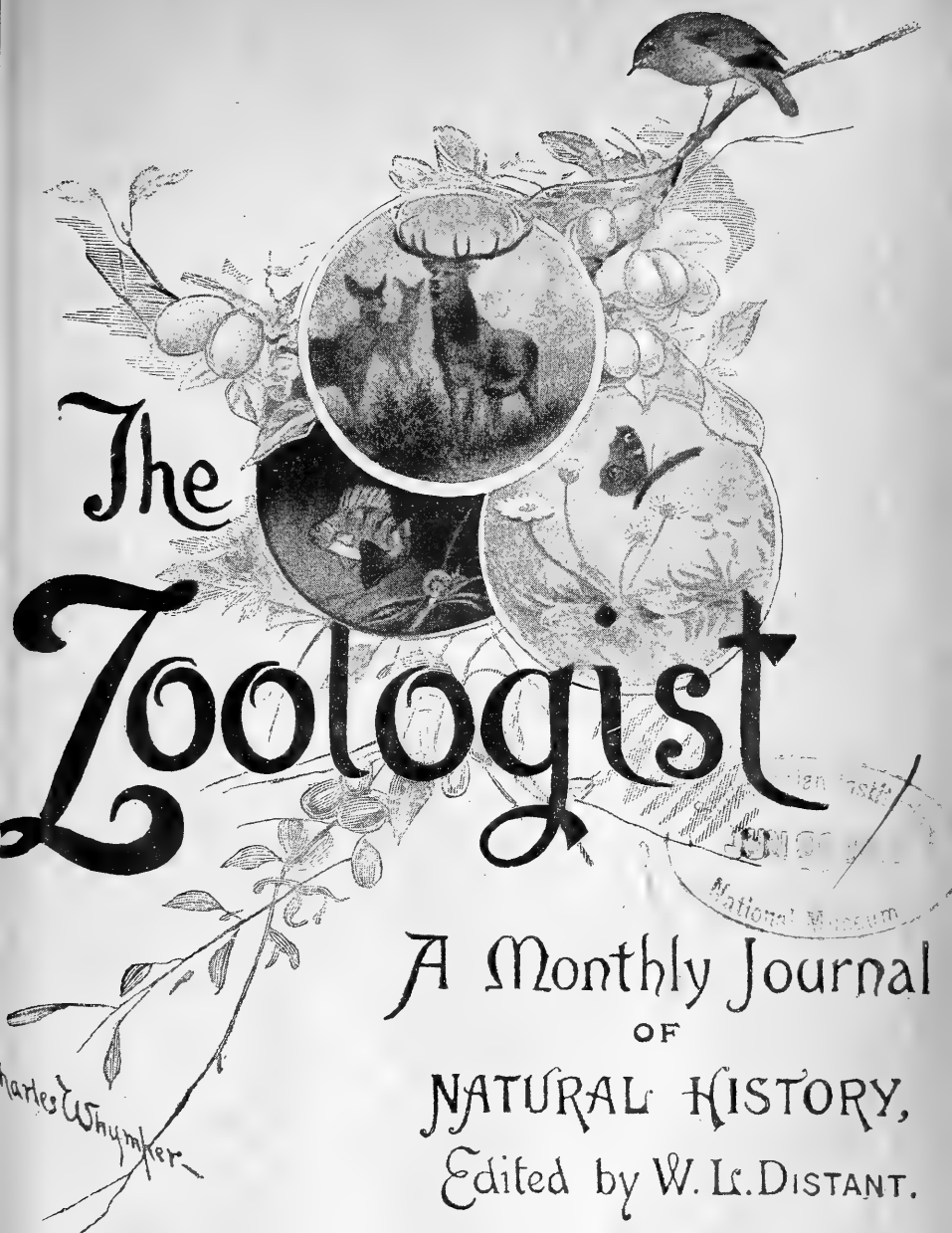
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# THE ZOOLOGIST

No. 852.—June 15th, 1912.

## THE PHARYNGEAL TEETH OF FISHES.

BY COLONEL C. E. SHEPHERD (Indian Army).

(Continued from vol. xv. p. 456.)

### CYPRININÆ. THE CARPS.

IN these, the most numerous subfamily of the *Cyprinidæ*, we have a totally different formation of the pharyngeal teeth and provision of teeth in the buccal cavity to that in the families of fishes already dealt with. The absence of any teeth on the gill-rakers and first four branchial arches is marked, as is also that of the upper pharyngeal teeth. The lower pharyngeal teeth, instead of being on two more or less elongated plates on the floor of the gullet covered with a large number of small teeth, consist each side of one, two, or three series of molariform or unciform (*i. e.* hooked) or cuneiform (*i. e.* wedge-shaped) teeth.

Day, when writing on Indian fishes, describes some of the long tapering wedge-shaped teeth as *plough-shaped*, evidently having in his mind's eye the shape of the Indian ploughshare, which it resembles, and his definition of this shape will be adhered to where necessary in the following descriptions. The lower pharyngeal teeth are deciduous, and capable of being reproduced, there being in the mucous membrane surrounding these teeth a number of embryo teeth evidently intended to take the place of the larger ones in use as they fall off. Many of these spare teeth are shown in the illustrations. These lower pharyngeal teeth in the masticating process to which this family submits its food bite against a hard, horny, callous pad that is attached to the mucous lining of the upper part of the pharynx, and which is strengthened and supported by a concavity of the basi-occipital bone, very much marked in some species, less so

in others. This pad is firmly attached during life, as it takes the thrust of the lower pharyngeal teeth in chewing, but after death it is easily detached, leaving the lining membrane of the mouth seemingly intact. The pad varies very much in size, thickness, and shape in the different species, in some being a fairly solid lump, as in *Cyprinus carpio*; in others, a thin but hard striated cartilage, as in *Cirrhina mirgala*.

CYPRINUS CARPIO. The Carp. Fig. I., 1.

This fish has a number of soft gill-rakers that fit into each

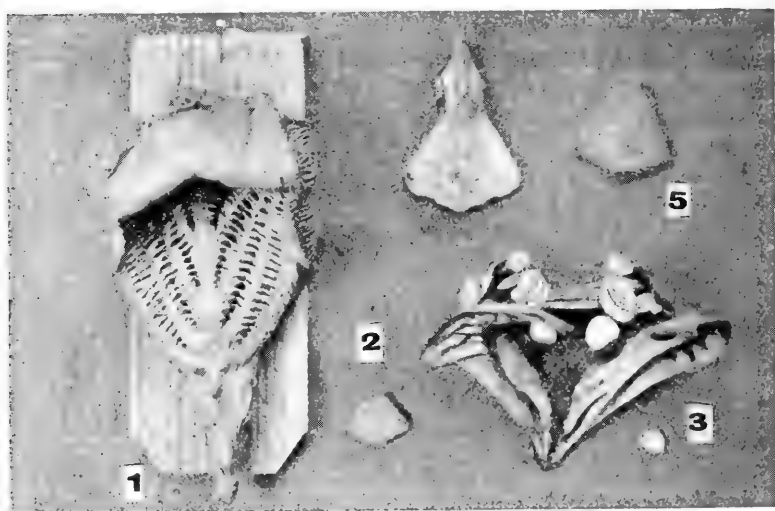


FIG. I.

1. *Cyprinus carpio*; gill-rakers. 2. Callous pad of the same fish. 3. Pharyngeal teeth of another *C. carpio*, and spare tooth. 4. Part of base of skull.
5. Callous pad that fits on same. Food passes through to the teeth in the direction away from the reader.

other from alternate sides and form a very complete filter; in general appearance each gill-arch looks like a frond of a fern. There are eighteen gill-rakers on the first cerato-hypobranchial arch, with eight on the epibranchial; the inner sides look at first sight as if denticulated, but this is due to a number of soft papillæ. The lower pharyngeal teeth are far back, and can with difficulty be seen when looking into the gullet, but can readily be felt by inserting a finger. The teeth are molariform,

arranged in a triple series. The illustration (Fig. I.) shows a gullet on the left; at the right-hand lower corner of the gullet is the callous pad belonging to this fish. On the right of the illustration is shown the lower pharyngeal teeth of another and larger fish. The molariform dentition is very clear; at the lower right-hand corner is a spare tooth found in the membranes surrounding the teeth. The upper right-hand figure (No. 5) is the callous pad against which the teeth bite, its ventral aspect, and on its left (No. 4) is shown part of the basi-occipital bone, widened out and curved, on which this pad fits. The upper part

## CYPRININÆ.

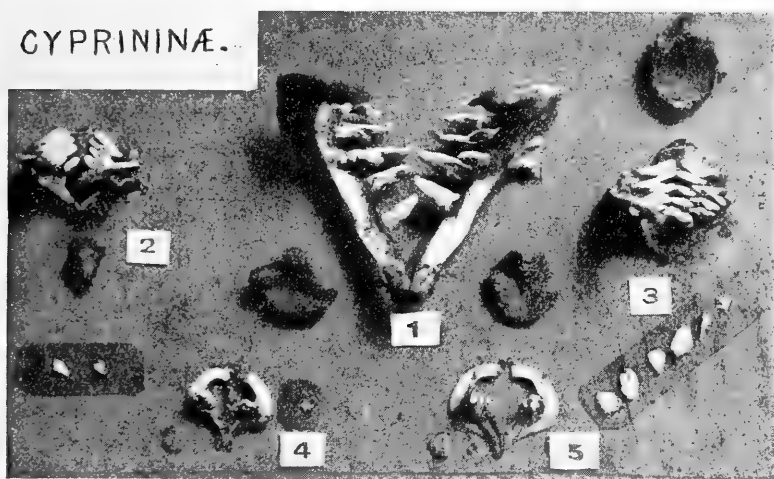


FIG. II.

1. *Leuciscus cephalus*; on left part base of skull, on right its callous pad.
2. *Catla buehanani*; with pad and spare teeth below.
3. *Labeo rohita*; pad above, spare teeth below.
4. *Carassius auratus*; pad, and one spare tooth.
5. Hybrid *C. auratus* × *Cyprinus carpio*; and pad.

of the pharynx is covered with a smooth, thick, mucous membrane, said to be, by gastronomic epicures, appreciated when properly stewed, and spoken of by them as the "carp's tongue." The fifth branchial arch that carries the pharyngeal teeth is curved, the concave arc being towards the front; it is very strong, channel V-shape in its middle portion, and divided up by bony diaphragms into a series of cells, combining strength with lightness. The food of the Carp is principally vegetable, but they occasionally eat worms and insects.

## CARASSIUS AURATUS. The Goldfish.

The pharyngeal teeth of this fish are in a single series and of a wedge-shape, or perhaps would be more accurately described as like the cutting edge of an axe. Fig. II., 4, shows a set viewed from the back. Its pad and a spare tooth are also shown.

HYBRID CYPRINUS CARPIO  $\times$  CARASSIUS AURATUS.

This cross between a Carp and a Goldfish shows in the specimen examined that the dentition followed that of the *Carassius* parent (Fig. II., 5) in being in a single row, and of the axe-shape. It is of interest here to note that in this case the barbel of the Carp was wanting, as also the golden colour of the Goldfish, the colour of the hybrid being dark, as seen in some Goldfishes.

## CATLA BUCHANANI. An Indian Carp. Fig. II., 2.

The general aspect of the gullet of this fish is more like that of a Clupeoid than a Cyprinoid fish, owing to the numerous long, thin, horny gill-rakers. On the first cerato-hypobranchial there are 179, and 74 on the epibranchial. The closeness and fine quality of these will be recognized when it is noted that in one inch of length at the centre of the arch there are 60 gill-rakers. The length of the gill-rakers at the angle is about the same as that of the gill lamina below them. The gill-rakers on the outer side of the first arch all slope forward. Similar thin gill-rakers, but standing straight up, line the inner and outer edges of the other arches; their tops, however, curve towards each other, those on the outer edges towards those on the opposite inner edges, forming a vault over the gill-slit, but by their length adding to the filtering area. At the back of the buccal cavity there is a hiatus in this gill-slit vaulting; there the gill-rakers do not bend towards each other, but leave three pronounced elliptical openings parallel to each other on each side of the mouth. The pharyngeal teeth are plough-shaped. Two spare teeth were found, and many of the functioning teeth were loose. The illustration shows a specimen with pad and loose teeth below it. For the size of the fish the lower pharyngeal bones are small, so consequently is the opening into the teeth. The upper lining of the gullet has a thick mucous pad with

marked corrugations that fit into the depressions caused by the upstanding gill-rakers.

**LABEO ROHITA.** The "Rohu" of the Indian bazaars. Fig. II., 3.

The thin, horny, short gill-rakers are very numerous, set closely together, and covered with a mucous secretion that obliterates them individually, and that gives to the gill-arches the appearance of having a fringed band on each side. The pharyngeal teeth (see illustration) are in three series, plough-shaped, and work against a projection of the basi-occipital that is covered with a thick, hard skin, which is striated. The arrangement of the teeth is such that they present a flat surface. The worn surface of the functioning teeth shows well in the illustration; two of them were found to be loose. Six extra teeth were found embedded in the tissues surrounding the working teeth. The lower pharyngeal bones have holes through them, and no diaphragms as in the Carp.

**LABIO NILOTICUS.** A Nile fish.

Has thirty-two straight, very fine, horny gill-rakers on the first cerato-hypobranchial arch, with twelve on the epibranchial. The inner and outer surfaces of the other gill-arches are set with similar gill-rakers that interfold, forming a complete filter. The pharyngeal teeth are conically pointed.

**BARBUS BYNNII.** A Nile fish.

Has fourteen horny, slightly curved gill-rakers on the first cerato-hypobranchial arch, with three on the epibranchial. The other arches covered with soft gill-rakers that fit closely together and make a complete filter. No callous pad was observed, the teeth working against the lining membrane of the back of the gullet.

**BARBUS VULGARIS.** The Barbel. Fig. III.

There are seven short, stout, horny gill-rakers on the first cerato-hypobranchial arch, with three on its epibranchial. The longest one, at the angle, is one-third the depth of the gill lamina below it. The gill-rakers on the other arches are much more numerous, and the general appearance is like that of a Carp's gullet (see *ante*), but each one is covered with papillæ,

and with a knob-like papilla at its extremity. In the direction of their length these gill-rakers have an S-like curve. They form a very close filter. The lining of the top of the gullet is a thick mucous membrane, covered with papillæ in the centre, and at the sides has longitudinal corrugations, where it is pressed down on to the gill-slits between the arches. The pharyngeal teeth are in three rows, 5-3-2 and 2-3-5, slightly hooked at the ends. There is no callous pad, the teeth biting against the thick membrane mentioned above.

LEUCISCUS CEPHALUS. The Chub. Fig. II., 1.

Has seven small horny gill-rakers on the first cerato-hypobranchial, with one on the epibranchial. The other arches are furnished with similar gill-rakers, but placed rather far apart and interlocking. They do not form such a good filter as in the fishes already described. The pharyngeal teeth (Fig. II., 1) are in two rows, mostly uncinatè (*i. e.* hooked) at the point, and bite against a horny pad that fits against a portion of the basi-occiput shaped to receive it. The lower pharyngeal bones are strong, but lightened by their hollow shape stiffened with cross diaphragms. Food is mostly vegetable, but this fish devours insects, and can be caught with worm-bait.

LEUCISCUS ERYTHROPHthalmus. The Rudd. Fig. III.

Has seven very short horny gill-rakers, about one-fourth of the depth of the gill lamina below it. There are three on the epibranchial. The other arches have short stumpy gill-rakers that form, however, a close filter. The pharyngeal teeth are in a double row, 5-2 and 2-5, with a slight hook at their ends. As many as eight loose teeth were found, some embedded in the tissues round the teeth, and others occupying places where they would eventually become solidly attached. A thin, hard pad, shaped like the "spade" in playing-cards, was on the under side of the skull for these teeth to bite against.

LEUCISCUS RUTILUS. The Roach.

The pharyngeal teeth of this fish are in a single row each side, and slightly curved at the point; they bite against a horny callous pad.

## LEUCISCUS DOBULA. The Dace. Fig. III.

Has five short, thin, horny gill-rakers on the cerato-hypo of the first branchial arch, with two on its epibranchial. The longest one near the angle is half the depth of the gill lamina below it. The other arches are furnished with but comparatively few gill-rakers set at a distance apart. The pharyngeal teeth are slightly hooked at the extremity, and are set in a double row, 5-2 and 2-5. They bite against a callous pad.

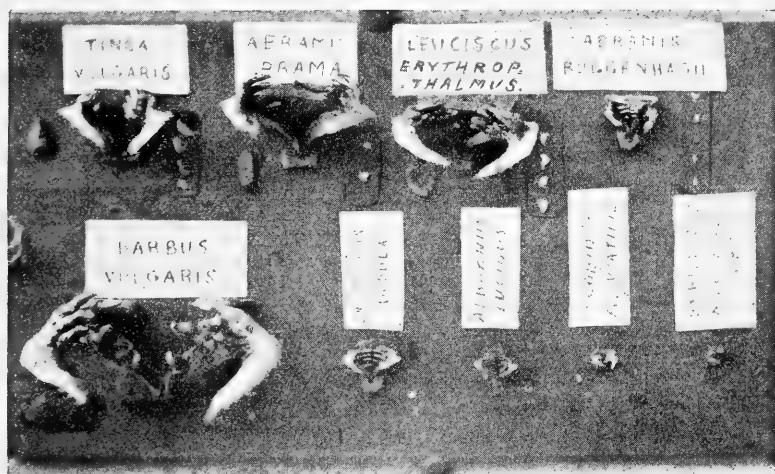


FIG. III.

## TINCA VULGARIS. The Tench. Fig. III.

Has nine short, horny gill-rakers, the longest a little less than half the depth of the gill lamina below it; they diminish in size as they get away from the angle—these are on the first cerato-hypobranchial arch. There are three on the epibranchial. There are similar gill-rakers on the other arches, and the whole forms a very efficient filter apparatus. The pharyngeal teeth are in a single row of wedge-shaped teeth, with a slight hook at their ends. The upper back part of the gullet has a thick mucous lining, and a callous pad for the teeth to bite against. Four loose extra teeth were obtained in the specimen examined, and figured.

## ABRAMIS BRAMA. The Fresh-water Bream. Fig. III.

Has nineteen horny gill-rakers on the first branchial arch in its hypo-cerato portion, short and broad at their base, terminating, however, in a fine hair-like point; the last two gill-rakers are rudimentary. The largest is only one-third the depth of the gill lamina's depth below it. There are three small gill-rakers on the first epibranchial. On the other arches there are numerous gill-rakers that fit alternately and make a close filter; those on the inner sides of the first, second, and third arches resemble little fleshy lumps, terminating in a fine hair at the apex. The teeth are in a single row, five each side, and slightly curved at the extremity; they bite against a small callous pad of an elongated oval shape. The whole of the upper part of the gullet is covered by a thick mucous membrane.

## ABRAMIS BUGGENHAGII. A hybrid. Fig. III.

This is a cross between the *Abramis brama* and the *Leuciscus rutilus*. Its pharyngeal teeth are slightly curved at the extremity; as, however, this is also the case with both its parents, there is no favouring one or the other side in this, as was noted in the cross between the Carp and the Goldfish mentioned before.

## GOBIO FLUVIATILIS. The Gudgeon. Fig. III.

Has minute gill-rakers on all the arches. The teeth are curved at the extremity; they bite against a callous pad, and are in two rows, 4-2 and 2-4.

## BARILIUS NILOTICUS. A Nile fish. Fig. III.

The teeth are curved at the point.

## ALBURNUS LUCIDUS. The Bleak. Fig. III.

Has eight long, thin, horny gill-rakers on the first hypo-cerato portion of the first branchial arch, with two on the epibranchial; the other arches have very small but numerous gill-rakers. The longest ones on the first arch are about four-fifths of the depth of the gill lamina below it. The teeth are curved at the extremity to the extent of being slightly hooked. They are in a double row, 5-2 and 2-5. No particularly hard callous pad was noticed for the teeth to bite against.



## CIRRHINA MIRGALA. An Indian fish.

Has numerous short, horny gill-rakers on the first branchial arch; there are some fifty-six on its hypo-cerato portion, and twelve on the epi-portion. The longest is only about one-sixth of the depth of the gill lamina below it. Similar gill-rakers are on the inside of the first branchial arch and both sides of the other arches. The upper surfaces of the arches themselves are flattened, and the membrane over them is much corrugated. The mucous membrane at the top of the mouth is covered with papillæ. The pharyngeal teeth bite against a thin cartilage that is striated, and that covers the lower part of the basi-occipital bone, where it widens out into a broad surface to afford a base for this cartilage. This base protrudes backward, but is widened out horizontally into a broad leaf-shaped mass, thus materially differing from the similar prolongation in a Carp (*Cyprinus carpio*), for instance, where the projection takes a vertical form. The pharyngeal teeth are in three rows, 5-4-2 and 2-4-5; they grow upon stalks, and widen out at their tops, providing a flat chewing surface. Five spare teeth were found in the mucous membrane, and two clinging to the base of the teeth. The pharyngeal bones are not channelled and stiffened with bony diaphragms, as in so many of the other *Cyprininæ* (see illustration of Carp), but are solid and made lighter by a large triangular opening in the bone, where it is widened out to afford a seat for the teeth, which are supported on a base of honeycombed bone stretching across the open triangular space. These pharyngeal bones, the fifth branchial arch, are fairly straight up and down in this fish, and have not that concave set as seen from the front, as is the case with many others of the *Cyprininæ* subfamily.

AN OBSERVATIONAL DIARY ON THE DOMESTIC  
HABITS OF THE RED-THROATED DIVER (*CO-  
LYMBUS SEPTENTRIONALIS*).

BY EDMUND SELOUS.

(Concluded from p. 180.)

*July 27th.*—*In situ* at 10.50 a.m., and see, at first, only one chick by itself, some way out from the bay. It swims up the loch, and I then see the other chick at the farther end. After a little the mother bird, as I take her to be, comes out of the bay and joins the chick, and shortly afterwards the male (certainly the larger bird) flies in with a fish, which he gives to the chick—the mother's chick as I take it to be—the latter taking it from the bill. Both parents now stay about, for a little, on this part of the loch, they being either with the one or the other, or a little apart, and whilst the male now several times utters his deep guttural quack, as one may call it, the female responds with a hoarse, strained note which I have not heard before. Nothing comes of this, however, and, at about 11.40, the female—that is to say, the smaller bird—flies away.

All this is very revolutionary. In the first place, the mother's chick—as I have hitherto considered it—swimming out into the body of the loch whilst the mother is in the bay is unusual, and now the male, instead of going, with his fish, to his own chick, who remains alone at the upper end of the loch, feeds the mother's chick, and remains with this one after the mother has flown away; for it is now within a few minutes of 1, and he has not left it, keeping with it on the lower part of the loch, as the mother used to before she moved to the bay.

Some time between 1.30 and 2 p.m. the female returns, and probably feeds this same chick again, as the three birds are all together when I see her at what can only be a few moments after her arrival, though, not feeling very well, I miss both this and the other. It is the female, too, I think, who, a little while afterwards, flies off again, leaving the male with the same chick, and, after awhile, these two swim into the bay. A constant wind has driven me into my old place, which is more sheltered, and

from here I cannot see them. At 3.15 p.m., however, the parent flies out, up the loch, and away, and, walking to the bay, I see the chick there alone. All this time—since 10.50 a.m., when I arrived—the second chick has been by itself at the far end of the loch.

4.10.—Parent and chick appear in that part of the bay which I am able to see. From the appearance of the former I take him to be the larger one—the male—and he must have flown in behind the rise, so that I did not see him. He now swims out into the loch, and, again, back into the bay, still accompanied by the chick. The whole thing appears most strange to me, for all this time the other chick remains invisible at his end of the loch, and he has not been fed for five and a half hours, as a minimum.

About 5.15 the male and chick come out of the bay, and swim up the loch to the other end of it. No second chick, however, comes out to join them, although the parent bird passes along the shore where it has hitherto almost always been, several times, seeming to be looking for it, and at 5.20 the female flies in with a sand-eel, and gives it to the other chick—the one she fed before—the only one that has been fed since I came at 10.50 a.m. The male, shortly after, swims into the bay, and is soon followed by the female and chick, and I then hear from the bay the curious, wild, skirling note which these birds utter when together, and not domestically occupied. In some ten minutes or so they swim out, and, about 5.45, the male—as I think it is—flies away. But no trace of the second chick all this time—it is now past 6—and I fear something has happened to it. In order to verify this, I, a little later, begin to walk round the loch, and as I get to the point round which it and one of the parent birds have used constantly to disappear, all of a sudden it runs from a yard or two off from the brink (five feet, at least, I should say) and takes the water. It ran quickly, with its body craned forward at an angle. What the angle was I cannot quite say, but certainly it did not go upright, like a Penguin. Thus, then, this one chick, as far as I have been able to observe, has not been fed between 10.50 a.m. and 7 p.m.—for it is that now, as I leave—and, to judge by its not appearing on the water, it has been lying the greater part of that time on the bank. Also,

since yesterday, at any rate, the male bird's habit of sitting at a certain spot by the water's edge, in company with one of the two chicks, has been discontinued. This chick, which has to-day sat for eight hours unfed, is noticeably smaller than the other one. The question arises, Is it sickly and going to die, and has the parent transferred its attentions to the healthier one, because it divines this?

Whilst walking round the loch, to-day, I came upon the nest of these Divers. It is some halfway along it, and instead of being just on the edge of the water—as is the case with the other one I found—it is some four or five feet away from it on the top of a fairly high hillock, at the foot of which is the loch. These facts seem remarkable, and explain my not having seen the nest before, since I only looked close along the water's edge. This nest is not a mound, as was the other, but a mere shallow depression amidst the grass, and in this some moss and heather had been laid. The height of the bank where the birds, whilst incubating, had ascended, to climb up the hill, was some six or eight inches, and the exact place was instantly seen, since it had been worn into a sort of sloping slide, very much like those made by Otters where they enter and leave the water, which I have often seen.

*July 28th.*—*In situ* about 12.40 p.m., and just see one of the birds, for a moment, on the water, before it disappears. After awhile I see one of the chicks at the upper end of the loch, and at 12.50 the male (I think) swims out of the bay with a long eel-like fish, as all the others have been—a sand-eel, I suppose—in his bill. He dives up the loch, feeds the chick with it, and then, as it were, brings the latter down the length of the loch into the bay. The chick, I think, would not have come of itself, for it is a very windy, though a very fine day, and the loch is all in waves. But which chick is this? Is it the one which used always to stay at the upper end of the loch—in the little basin there—and rest with one of the parents behind the point, or the one which used to stay as constantly at the other end of the water? Whichever it was, I saw only one chick, at intervals, during the day. At about 7 p.m. I saw it for the last time, and I then, before leaving, walked round the little basin at the upper end, expecting to see the other—the one that has always kept

there—run into the water at the same place that it did yesterday, but in this I was disappointed, and I now fear the worst.

*July 30th.*—*In situ* at 11.45 a.m., and find the female—that is to say, the smaller Diver—with one of the chicks, the other having now, as it would seem, permanently disappeared. The two are in the bay, or just at the entrance of it, as usual, and, at about 12, the male flies in only just over my head, and, coming down by them, gives the chick a fish—taken by it from the bill—which does not this time look like a sand-eel, and which, as far as I can make out, in a good view through the glasses, has no head. The three then float about together, but a little sundered, the male sometimes uttering a few deep quacks, and the female that other strained note I have spoken of—a sort of “quew-oo-oo,” plaintive and wild in its character. She bends her head slightly forward, to make it, and, all at once, this action becomes more emphatic, and the note louder and longer. Her head and neck are now stretched along the water, her body almost submerged in it, and, in this manner, she advances, in a series of little plunges, towards the male, who comes to meet her, uttering now the same cry, and also his deep guttural quack. It is a sudden outburst of excitement between the two, either of a sexual or social character, and has a strange, wild appearance, infinitely delighting to see—to see, too, at very close quarters, amidst full sunlight, on the darkly sparkling waters of this little lonely loch. Each time, in making the cry, the birds raised their heads from the surface of the water, arching the neck, somewhat, as they attained their height, and now these lovely necks were no longer smooth, as before, but creased into long rigid wrinkles, as though the skin covered several pipes—all was now tense, strained, and rigid. Thus they advanced and met each other, and so continued, for a little, floating in one another’s proximity, then gradually quieted down—a strange, wild, interesting scene. To the wild feelings of the birds’, something deep down in my own human organism—stifled and overlaid, but felt now, again, with strange yearnings—seems to correspond. This may be real or imagined, but how predominant is personal proclivity! I would sooner see a thing like this than a dozen coronations, with processions and appurtenances, though sitting in a good front seat all the while. And

then imagine old Pepys' feelings, had such an exchange been proposed to him !

The female, after this, swam halfway up the loch by herself, and then, a little after 12.30, flew off it, leaving the male and one chick swimming together in the bay. About 3.5 the female returns, but unfortunately, though I was looking at the male and chick, a moment or two before, I miss both her arrival and probable feeding of the latter, only seeing her just after this.

At 3.20 the male flies away.

44.8.—Male returns, his wings making a sonorous swish as he slants down, holding them raised and steadfast. He carries a fish which looks like a small herring—about twice the size of a Cornish pilchard or “sardine”—and, swimming to the chick, the latter takes it from his bill.

I have now watched the two birds for half an hour, at a fair distance, with and without the glasses, in sun and shade, and can say that the neck—using the word inclusively—is a most conspicuous feature, without any quality of “concealing coloration” that I can discover, and that the red, or deep chestnut-red mark, on the throat, is so far from this that it looks as though the bird's throat were cut, and streaming, or rather suffused, with blood. It is not, indeed, blood-colour, but sufficiently near it to suggest this, and almost as lurid. The bird that I take to be the male is the more ornate, as well as the larger of the two. The white of his throat, under the chestnut, is more brilliant and strikingly contrasted with the latter, and the chestnut itself deeper, though, perhaps for this reason, not of quite so bright a tint. It seems, however, to be a step or two farther on the road of its natural development.

The notes of this date—*viz.* July 30th—appear to be the last that I made on this pair of Divers. I can find in them no entry of having found one of the chicks lying dead on the bank of the loch, in the neighbourhood of the place where it (assuming it to have been the same one) had been accustomed to sit ; yet it is clearly impressed upon my memory that I did so find it. In fact, I remember it so distinctly, with the feeling of regret which the discovery produced, as also that there were no marks of violence on the body, but only of emaciation or meagreness, that

I can only account for the omission by supposing that I meant to put it down, on my return to the cottage, but omitted to do so, and that my vivid remembrance of the incident made me suppose that I had. It would seem, then, as though one of the chicks had never been healthy and robust, like the other, and that it showed this deficiency by persistently sitting on the bank, instead of swimming in the loch with one or both of its parents. One of these—the male, as I believe—fed it, under these conditions, for a considerable time, but, at last, appeared to divine that it was doomed, and then neglected it, and helped feed the other. The fact of this neglect, or transference of attention, at any rate, whilst the chick was still living, is, I think, established by my entries, and it is an interesting fact, for useless attention to any sickly offspring is in nature a waste of affection, and the species should gain by the transference of such affection to where it would not be so wasted. Thus natural selection should tend to discourage parental devotion beyond a certain point. But the fact of one of these two chicks having been weakly may make my observations of less value as a presentment of the ordinary domestic habits of these birds.

*July 31st.*—I had been thinking, hitherto, that these young Divers stayed on their native loch till able to fly, and then left it with their parents, but now I find that, in some instances, at any rate, while still quite young and in the fluff stage—presumably, therefore, unable to fly—they can get from one loch to another. In my entry of the 24th inst., I note finding two chicks on a quite small peaty loch, and a day or two afterwards, whether entered or not, I found, as I thought, yet another pair in a loch of the same kind, quite near it, which, before, had seemed empty. It seems likely, at any rate, that these were the same pair that were, at first, in the neighbouring loch, but have since, for some reason, migrated from it.

To-day I came to this last-mentioned loch, late in the afternoon, and, about 6, one of the parent birds flew in with a fish, and fed one of the chicks, both of them being together on the water. I propose now to watch this family for the next two days—Monday and Tuesday—which will be all I can do, since I must leave on Wednesday morning early. My object will be to see if what I observe accords with my observations on the birds I have hitherto been watching.

August 1st.—*In situ* at the small loch, mentioned in last entry, by 10.40 a.m., and find the two young Divers there alone. I waited the livelong day—a particularly fine day, but unfortunately equally so for the midges—and it was only at 6.7 p.m. that one of the parents flew in with, presumably, a fish, for the two young ones hurried up, and the dam made as though withholding it for a little before giving it to one of them—but I could not actually see either the fish or the delivery. From his size and gamey appearance this parent looked like the male. A few minutes after feeding the chick he flew off again. Thus for about seven and a half hours, as a minimum, these young Divers have been left alone, and unfed, by their parents. Somewhere about the middle of this long period they dived several times in a brisk and active manner, but, supposing them capable of catching fish for themselves, this mere pool amidst the surrounding turf, with spongy banks and a muddy or peaty bottom, is not likely to contain any. If fed entirely by the parents, then when, and how often, are they? Perhaps each morning and evening, for the parent has come in to-day, at the same time, within ten minutes, as yesterday.

6.37.—Bird in again, and there is just the same scene, but the distance is too great for me to make out the details, and the splash made by the bird, as it came down on the water, hid everything for a little. Evidently he brought in a fish, and gave it, presumably, to the other chick. His whole air and manner was as coming with a special purpose, and he was off again almost, if not quite, within the minute.

In again about a minute before 7, and off at 7. He came down with great impetus, so that he skimmed almost the length of the little pool, right to the shore. This time I saw the fish plainly—a sand-eel, I think—and one of the chicks, scurrying forward before the other, received it from the bill of the parent. As for the sex of the latter, however, all I can say is that it is a fine large bird, and looks like the male. I have not the other, now, to compare him with. These chicks are older than the ones I have been watching. How much older I do not know; they seem still woolly, and have much the same general appearance, but when they stand up in the water, and flap their wings, the breast at once strikes one, for it is on the way to being white.



It is, perhaps, in relation to their more advanced age that the system of feeding them seems different to that employed with the ones I have been watching.

*August 2nd.*—Rose at 3 a.m., in order to get to the last-mentioned pair of young Divers in the quite early morning. It was then not light, nor did it become so till much later than I had expected here. I could have found my way, however, but for a heavy mist, which obliged me to stop and wait a long time, so that I was only *in situ* at a few minutes past 6. At 6.40 the parent bird flew in with a large fish, which he gave to the chick first up. Then, for a little, he swam about in a somewhat *affairé* or conscious manner, and the chicks followed excitedly, putting their heads down on the water, and ploughing it, thus, in swift little rushes. At 6.48 the parent flies off, and the next visit is at just a minute before 7. No doubt a fish was brought and given, as before—at least, I suppose so—but this time I see nothing, as all three birds get close under the bank nearest me, and are thus quite hidden. After they come out I notice the dam several times lower its head to just above the water, the neck stretched out, and in this attitude swim several times excitedly up and down before the chicks, going but a little way, each time, and whilst he does this he utters a short double note which I find myself unable to transcribe. The exit is at 7.12.

I stayed till 8, and then, supposing that the morning visits had come to an end, having probably commenced much earlier, I walked to the pool, and, whilst standing on its margin, the dam came whizzing just over my head, and came down on the water but a few yards away from me. Whether it had dropped or swallowed it, in alarm, upon seeing me, I do not know, but it had no fish in its bill after pitching, and the chicks were left unfed when it, shortly afterwards, flew off in affright. This was an unfortunate incident, for when I returned in the evening, hoping to see the feeding renewed, I found only one chick on the pool, and, though I waited till 7, the parent bird did not come in. It seems as though the one chick had left the pool—probably under the auspices of the parent, in consequence of the fright given to the latter. I have no doubt that, otherwise, the feeding would have gone on as usual, but the parent bird may now have feared to return, or may have been attending

to the other chick, somewhere else. But this explanation is hardly satisfactory, for, why then with such ample time, should both chicks have not been removed? These small pools in the peat or turf are so open, and the young chicks so unaccustomed to hide themselves, after the manner of Moorhens, when frightened, that, if not seen before long, their absence from the pool may be assumed. Fear would only be shown by their keeping as far off as the size of the pool allowed. One could not well miss them in such a place for long.

My reason for going to the pool was to see if there was a nest upon its banks, and contrary to my expectations, for I had not before seen any birds here, I found not one merely, but two unmistakable ones, whether this or last year's I cannot say, but the moss that had been laid down, and once, no doubt, formed a thin layer, had now become scanty wet tufts, distributed sparsely, like the kinks of a Hottentot's hair. Both these nests were very near the edge of the water; one was on a little turfy projection of the bank—almost an island—and had the peculiarity of there being two well-marked slides, from it to the water upon either side of the peninsula, each of which, from their appearance, must have been equally made use of by the birds. It would have been interesting to see whether the two were used indifferently, either in leaving or getting on to the nest, or whether the bird always ascended by one and came off by the other. Owing to the tendency of constantly repeated actions to become uniform, and pass into a sort of routine—as with ourselves—I have little doubt, myself, that this latter was the case. The two nests were only a few paces apart. I could not, however, though I walked several times round the pool, find anything like a depression where the old bird had sat with the chicks, and so, as these places are almost, if not quite, as conspicuous as the nests themselves, I feel sure that there was none.

It would seem, *prima facie*, that one or other of these nests had been the birthplace of the pair of chicks now on this pool; yet the fact remains that two young birds are gone from the pool where I most certainly saw them—it being a very distinctive one, with peculiar and unmistakable features—whilst two, that I had not noticed before, on another one (this, namely) so near to it that, had they been there, I could hardly have

helped seeing them, were upon this other one *pari passu* with such disappearance; and, further, one of these two has now gone, again, since the morning. It appears, then, as if these young Divers, before they can fly, and whilst still fluffy, are accustomed to get from loch to loch, or at any rate, from small pool to pool, with or without the guidance of the parents. It is certain, too, from the one I saw do so, that they can run both quickly and easily, but how far they may, or are accustomed thus to travel—whether, for instance, to the sea—I do not know. It would seem, too, from the nest of the pair I watched, being some little way from the water, and on the top of a hillock, that the grown bird, too, can progress upon the land without any great difficulty, but what is the fashion of such progression I do not know.

Before leaving, this evening, I saw one of these Divers come down upon a rather large loch (as lochs go here, where the largest is but a mile long), and, having struck the water, it footed it, for a little, towards another one—its mate, doubtless—maintaining, with the help of its wings, that upright Penguin-like attitude which I have described in the pair watched by me.

The Red-throated Diver is known here amongst the people as the “Rain-Goose,” as was told me by an old woman of over eighty, who was trudging briskly, though shakily, along the road. This is because they are supposed to foretell rain, the cry uttered on such occasions being interpreted as “warse weet! warse weet!” (“worse wet! worse wet!”)

## NEW BRITISH OLIGOCHÆTS.

BY THE REV. HILDERIC FRIEND, F.R.M.S.

At the end of 1911 I prepared a "List of Native Oligochæts," so far as they were then known,\* and found that they numbered almost exactly two hundred species. In round numbers we have up till the present recorded forty species of *Lumbricidæ*, eighty *Enchytræidæ*, thirty *Tubificidæ*, nearly thirty *Naididæ*, and about twenty species belonging to four other families. Already several new worms have been discovered, and in the following pages some of these will be placed on record. In one or two instances the species have been noted by previous observers, but have been relegated to a position among uncertain species, or assigned to a genus or species to which they did not belong.

1. *SÆNURIS LINEATA*, Grube (*Lumbricus lineatus*, Müller), has been the despair of helminthologists. Beddard, Michaelsen, Vaillant, and others have all tried their hand at placing it, but never having seen the living creature they have only added to the confusion. We have two doubtful records for this worm, but they both relate to that period in the study of Oligochæts when characters were uncertain and definitions were vague. Dr. Johnston records it ('Catalogue of Worms,' p. 66) for Ferne Isles, Northumberland, while it is also mentioned as having been found in Plymouth. Beddard alludes to it in an account of *Clitellio*, and Michaelsen at one time placed it under *Pachydriilus*, and at another under *Tubifex*.

I have had the good fortune to find the worm on the north bank of the Tees near Middlesborough, and, although the month of February does not seem to be the right period of the year for finding it sexually mature, I have been able to determine its position, and make some additions to our knowledge of its structure. For the present I propose to retain the name *Sænuris lineata*, Grube, because neither *Clitellio* nor *Tubifex*, *Lumbricus*

\* 'The Naturalist,' pp. 76-81, March, 1912.

nor *Pachydrilus*, is correct. While the worm is an undoubted Tubificid, it is the only species yet discovered in Britain which has setæ like *Pachydrilus*. In this respect, therefore, it is a link between the red-blooded Enchytræids and the Tubificids. *Pachydrilus lineatus*, which is entirely distinct from *Sænuris lineata*, will be dealt with later. My notes show: Length about 20 mm.; segments 65; *Tubifex*-like in character, coiling up, and not swimming or crawling like *Pachydrilus*. Head and tail pale, body in the middle ruddy brown, owing to blood-vessels (red) and chloragogen cells (brown). Absolutely no capilliform setæ, and no forked setæ, but all (2-4) of the *Pachydrilus* type. Hearts, as in *Clitellio*, in 8th and 9th segments. Nephridia in  $\frac{6}{7}$  and  $\frac{7}{8}$ , with glandular cells, clear, as in *Limnodrilus*; also in segment 12 and later. Chloragogen cells begin in 6; no strong pharynx as in Enchytræids, but cephalization exactly as in Tubificids. Pores on segment 11 without ventral setæ. Brain convex in front, incised behind. No girdle, no clearly defined ova; and, as the specimens were not adult, certain important organs could not be studied. Possibly the testes occupy segments 9-13. Some problematical glands were seen in segments 4-5, such as are not found in any other known Tubificid or Enchytræid.

2. *ILYODRILUS MEGANYMPHUS*, Friend.—My recent researches show that the Tubificids have to be revised. Authors have hitherto confused the issues by generalizing on too slender a knowledge. It is certain that the *Tubificidæ* of Great Britain are much more numerous than has generally been supposed. While Eisen, Stolc, and others have written much about *Ilyodrilus*, the differences between this genus and the true *Tubifex* have not yet been clearly defined. For the present I take *Tubifex* to have three different kinds of setæ, while *Ilyodrilus* has but two, *viz.* capilliform and forked. Pectinate setæ, which are said to be present in *Tubifex*, are wanting in *Ilyodrilus*. If ultimately it is found that the length of the duct is a truer genus-character, we shall have to put some species of *Ilyodrilus* under *Tubifex*.

The species now recorded was found for the first time in a little runnel which flows through the Alexandra Park at Hastings. The description will duly appear, with that of other new species,

elsewhere. I turn from the *Tubificidæ* to record certain Enchytræids which are either new to England, Britain, or science.

3. *MARIONINA SEMIFUSCA*, Clap., was first described from the Hebrides. It was afterwards found in Scotland and Ireland, but until the present year its occurrence in England had never been noted. I have, however, recently received some material from Purfleet, through the courtesy of Mr. C. S. Todd, and amongst other interesting species this occurs. It is straw-coloured, about 10 mm. in length, with 4-5 setæ in front, and usually 3 (rarely 2 or 4) behind. The brain, as is most usual in this group, is incised posteriorly, the funnels of the sperm duct are three to four times longer than broad, and there are large pores at the extremity of the duct. This same species, or one closely resembling it, was also found on the banks of the Gelt at Gilsland, Feb. 12th, 1912. The species of *Marionina* and *Pachydrius* (= *Lumbricillus*) so closely resemble each other that they need very careful study for their differentiation.

4. *MARIONINA RIPARIA*, Bret.—This small annelid, first described by Bretscher in 1899, has been found by me hitherto but once only. I collected three examples in a little Derbyshire stream near Hartshorne at the end of 1911, and find they agree in all important details with the original description. Length, 4-6 mm. Segments 28 as a rule. Brain deeply incised behind, and slightly concave in front. Setæ usually 3, sometimes 4, in each bundle in the anterior segments, and equal in length; 2 or 3 behind, long; none on the 12th or girdle segment. The intestine, as is frequent in *Marionina*, widens behind the girdle, and gives rise to the dorsal vessel. The coelomic corpuscles are very large and striking, and the nephridia have a large postseptal. The ampullæ were not clearly defined, though Bretscher gives them as three to four times longer than broad. I found a very long, coiled, slender duct attached thereto, but the presence of large numbers of ova obscured the organs here. There is a large heart in front of the girdle, and on segments 11 and 13, preceding and following the girdle, two setæ in each bundle. The vascular system shows the typical arrangement. Found also at Netherseal, Dec. 9th, 1911.

5. *ENCHYTRÆUS HYALINUS*, Eisen.—It will take a long time to disentangle the different species of *Enchytræus*, and I am

now endeavouring as far as possible to go back to the original records and compare the same with living material. Recently I have found annelids at Hastings in Sussex, Gilsland in Cumberland, and elsewhere, which can for the present best be referred to *E. hyalinus*. In some respects Eisen's account might be taken to apply to *E. albidus*, Henle, and *E. pellucidus*, Friend. But there is every reason to think these are all distinct. *E. pellucidus*, Friend, is the form found in rich soil and fat manure. It is quite distinct from *E. albidus*, Henle, if the worm which I found at Hastings belongs to that species. I have found *E. hyalinus*, Eisen, in the same locality, and the two are distinct. The specimens taken at Gilsland, however, differ from the sea-coast forms, and I have determined to distinguish the latter by calling it *E. hyalinus* var. *densus*, Friend. It may be described as follows:—

A white worm, 12–15 mm. in length, with about 45 segments. It is opaque, even dense. The salivary glands are somewhat large and unbranched, like those of *E. pellucidus*, Fr. There are four pairs of nephridia in front of the girdle. The body is full of oil-cells. Chloragogen cells begin in segment 5. The brain is oval, about one and a half times longer than broad. The setæ, which are of about equal lengths, number 3–4 in front, and nearly always 3 (rarely 2 or 4) behind. The spermathecæ have an ampulla which is the same length as the duct, but about one and a half times as wide, attached to the œsophagus. The funnel of the sperm-duct is about two to three times longer than broad.

The worm, as is usually the case in this family, is subject to much variation. One specimen examined was 16–20 mm. in length, and had 50 segments, which were annulated. There were large pores on segment 12, and the creature flung itself violently about when irritated. In another I saw the dorsal vessel arise in  $\frac{1}{2}$ , and in this case the brain was slightly notched or concave behind. The postseptal portion of the nephridia in the hind segments had no distinct duct.

6. *PACHYDRILUS LINEATUS*, O. F. M.—This worm, as already stated, is distinct from *Sænuris* (*Tubifex*) *lineata*, Grube. I have had the good fortune to find it in England, and have been able to compare and contrast the two. Michaelsen ('Das

Tierreich,' x. 80) gives the description and synonymy, but includes therein the synonymy of *Tubifex*. Any helminthologist who had the two living worms side by side would instantly see that one was a Tubificid and the other an Enchytræid. *P. lineatus*, O. F. M., is widely distributed on the Continent. It is found in Denmark, Germany, and Switzerland, and is probably to be regarded alike as an estuarine and a freshwater form. Bretscher found it in fresh water in Switzerland, as I have done in Derbyshire, whereas *Sænuris lineata*, Grube, is at present only known as estuarine. Now that the two have been disentangled it will be easy to follow up their distribution.

7. ENCHYTRÆUS ALBIDUS, Henle, is a very perplexing worm. This is due to the fact that different species have been confused under the common term. Dr. Stephenson has recently contributed some useful notes on Scottish specimens which he attributes to this species. I found specimens at Hastings, Dec. 21st, 1911, which I think must also be placed here. The length is 15 mm. or more when stretched, with about 65 segments. A fairly stout, somewhat opaque, yellowish-grey worm, with tail smaller than is usual in proportion to the diameter of the middle portion of the body. The brain is fairly large, somewhat convex behind, and extends into the 2nd segment. There are usually 4 setæ in front (rarely 3), and 3 in the middle and hindmost portions of the body. Girdle with small glands, large pores, long ducts, no ventral setæ, ampulla slender, about three times as long as broad. The spermathecæ are rather short, stout ducts, without glands or diverticula. The nerve chord is enlarged in segments 2-3, and the dorsal vessel in one specimen seemed to arise in segment 15. Here, again, variations occur. One specimen was 20-24 mm. in length, with 70 segments. The salivaries resemble those of *E. pellucidus*, Friend. The postseptal of the nephridia is large, as are also the nephridiopores.

During a visit to the North of England in February last I had the good fortune to find many very interesting annelids at Middlesborough and Gilsland. Some of these are evidently new to science, and I am able here to give details of two of the species.

8. MARIONINA SIALONA, n. sp.—This is the first species which I have as yet found possessing salivary glands. I therefore call it *sialona*, from the Greek term for saliva. The following is the



description :—Length, 10–12 mm., transparent, almost white to the naked eye. Brain not incised behind as is frequently the case, but rounded, one and a half times longer than broad. Long, unbranched salivary glands, resembling those of *Enchytræus pelucidus*, Friend. Setæ 2–4 in front, hooked within. Cœlomic corpuscles large, oval, nucleated, clear or light brown. Nephridia brown; large postseptal, with duct short, and apparently rising near the posterior extremity. Dorsal vessel rises in  $\frac{1}{14}$ , where the intestine enlarges, pulsing. Chloragogen-cells warm brown. Funnel of sperm-duct narrow, somewhat long, and usually curved round, so that the length cannot be accurately judged; estimated at four times longer than broad. Duct of the spermatheca about as long as the ampulla, which is pear-shaped.

This species seems to be a link with *Enchytræus*. The salivaries, setæ, spermathecæ, rounded brain, and almost or quite colourless blood are all *Enchytræus*-like, yet the whole worm is decidedly *Marionina*-like. These discoveries show the difficulties of the systematist in drawing the line between the different genera. Along with the foregoing I found another and a smaller species, which agrees with none of the descriptions which I have been able to consult. I therefore proceed to its description.

9. MARIONINA GLANDIFERA, n. sp.—Length about 8 mm., with 36 segments. Of a pinkish white colour. Setæ usually 5 in front (rarely 4 or 6), about equal in length; from 3 to 5 behind. A small delicate worm, but very active, in which it differs much from the last, though found in the same habitat. Spermatheca long, oval or elliptical sacs, without distinction of duct and ampulla; attached to œsophagus, and in February full of spermatozoa. The spermathecæ often assume an  $\epsilon$ -shape when at rest. The body is glandular all over, the clear glands being in transverse rows, often as many as fifteen in number behind the girdle in each segment. Cœlomic corpuscles large, brown, numerous, somewhat oval discs. Glands of girdle fairly large, with correspondingly large open spaces. Here also we find large pores and glands, a duct which extends back as far as segment 16, with ampulla about two or three times longer than broad. There are a few chloragogen-cells in 5, the full number in 6, 7, 8, then few or none until the girdle segment is passed. There are usually three setæ in the dorsal bundles of the girdle. Three

pairs of septal glands normally placed ; dorsal vessel arising in a kind of heart at  $\frac{1}{4}$  xi. The brain incised behind and apparently straight in front, narrowing somewhat towards the anterior portion. Girdle covers  $\frac{1}{3}$  xi— $\frac{1}{2}$  xiii, sharply defined. The vascular system is of the simple type. The special features are the glandiferous epiderm, the very long duct, the dark brown cœlomic corpuscles, and the spermathecæ. Adult in February.

During a brief visit to the South of England in December last I found several species of *Enchytræidæ* new to science. I may here mention the *Henleas*, the description of which will in due course appear elsewhere.

10. *HENLEA MARINA*, Friend.—No œsophageal glands. Spermathecæ *with* glands.

11. *HENLEA CURIOSA*, Friend.—No œsophageal glands. Setæ, as in the last, not exceeding 4 per bundle. Spermathecæ *without* glands.

12. *HENLEA ARENICOLA*, Friend.—No œsophageal glands. Setæ 3–6 per bundle. Length about 15 mm.

13. *HENLEA HETEROTROPA*, Friend.—One pair of œsophageal glands in segment 7. Setæ 3–6. Length, 12–15 mm.

14. *HENLEA TRILOBA*, Friend.—œsophageal glands in segment 8. Setæ not exceeding 4 per bundle.

*Addendum*.—Aided by a Government grant, I have been able, since these notes were sent to press, to still further extend our knowledge of this group of animals. The true *Haplotaxis gordioides* has been found at Hastings. It is quite distinct from *H. curvisetosa*, Friend. The *Enchytræids* have proved to be very numerous. *Henlea variata*, Fr., and *H. attenuata*, Fr., have been found in Notts, with *Fridericia diachæta*, Bret., *F. glandifera*, Fr., and *F. reversa*, Fr. *Fridericia maculata*, Issel, *F. clara*, Fr., and *F. valdensis*, Issel, are now to be recorded for Derbyshire, while a number of other species or well-marked varieties have been found in these and other places.

## NOTES AND QUERIES.

## MAMMALIA.

**The Noctule (*Pipistrellus noctula*).**—‘East Anglian Daily Times,’ May 8th, 1912:—“On Monday, May 6th (time, 7.30 p.m.), counted ninety-one large Bats flying out of the end of cottage on this estate. I think this must be record. — ALFRED TAYLOR (Ixworth Abbey Estate Yard).”

“Your correspondent, Mr. Alfred Taylor, asks if ninety-one large Bats seen flying out of a cottage is not a record? There is a colony of large Bats (Noctules) here, and I went this evening to count them as they came out. I was rather late, but I counted 125. One evening last summer I counted 196, and many times numbers between 170 and 190. Bell, in his ‘British Quadrupeds,’ says the Rev. Dr. Buckhouse saw 185 taken in one night from the eaves of Queens’ College, Cambridge, but it was a question if they were all one species. —R. H. EVE (Maldon, May 9th, 1912).”

The above instances of unusually large assemblages of this species at their diurnal retreats, the one in East Essex, and the other in North-west Mid-Suffolk, may be worth recording. In both counties the Noctule is fairly abundant, especially in the river valleys. On April 18th two of these Bats were flying, and to all appearance hawking for insects, over the River Alde, near Langham Bridge, at between 11 and 12 a.m., in brilliant sunshine. Again, on the 20th of that month, I noticed one at the same place and at about the same hour, the sky being cloudless and the sun particularly bright and glaring. Possibly some insect for which these Bats have a special liking may have been on the wing just at that time, affording sufficient attraction to tempt these animals out by day. It is no uncommon occurrence for the Pipistrelle to come abroad in the daytime in pursuit of gnats, especially in the winter, instances of which appear year by year in country newspapers. It seems wonderful that the eyesight of Bats should be so adjusted as to enable these animals to catch their prey on the wing, both in the dim twilight and in the full glare of the sun at midday.—G. T. ROPE (Blaxhall, Suffolk).

## AVES.

**Nesting of the Grey Wagtail (*Motacilla melanope*) in West Sussex.**—It is a welcome task to record the nesting of the Grey Wagtail in West Sussex, another high compliment on the part of the bird to the locality chosen for such distinction. Searching in the records of 'The Zoologist' from the present time back to the dark ages of natural history which its pages illumined, few instances of such an interesting occurrence in the southern counties of England seem to be chronicled. That good observer, W. Jeffery, Jun., of Ratham, near Chichester, mentions having seen a nest of the Grey Wagtail containing young near Petworth in June, 1867. It was my good fortune to find a nest with three eggs on April 30th, and on May 3rd the hen bird was sitting, and was not disturbed. For obvious reasons the site of the nest may be vaguely described as *near* Midhurst. The eggs were very faintly marked with washed-out greyish spots on a dirty-white ground, there being no trace of hair markings. The position chosen for the nest was a ledge between ten and twelve feet above the water, the materials used being dry grass, fibres, and root-lets on the outside, well-lined with black horsehair.—H. MARMADUKE LANGDALE (Compton House, Compton, Petersfield).

**Food of the Tawny Owl (*Syrnium aluco*).**—For the sixth year in succession Tawny Owls have occupied the same place in our church-tower, and probably owe their lives to the owner of the adjoining estate, who, in addition to being churchwarden, is a strict "owl-warden." This year three eggs were laid and all safely hatched. The following is a list of the food I have found in the nest:—April 15th, two Field-mice, one House-mouse, one Mole, one young Thrush; April 19th, one Field-mouse, one House-mouse, one young Rat, one Mole, one cock Blackbird; April 23rd, one half-grown Rat, one adult Thrush; April 25th, one Mole, one adult Mistle-Thrush, one young Thrush; April 26th, one Shrew, one small Rabbit, one young Blackbird; April 27th, two small Rabbits; April 29th, one Field-mouse, one Rat; May 1st, one small Rabbit, one young Blackbird; May 3rd, two small Rabbits; May 4th, 7th, 10th, 11th, 15th, 16th, nothing. It would seem that, as the owlets get bigger and stronger, they clear off all food brought to them without any assistance from the parents. One of the young birds left the nest some days before the others, and I have noticed the same thing with another brood of four in a nest-box here.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

**Flight of the Common Snipe.**—Although I have seldom had opportunities of studying the Common Snipe, yet I have observed on more than one occasion the flight referred to by Mr. Stubbs (*ante*, p. 196). Peculiar it undoubtedly is, and differs from the corresponding behaviour of the Raven or Buzzard in that a horizontal direction is maintained.—H. ELIOT HOWARD (Clareland, Stourport, Worcester-shire).

**Flight of the Common Snipe.**—Observing Mr. F. J. Stubbs's notes upon the above subject, I take the opportunity of adding some remarks and a copy in part of a MS. at present in my hands, and by permission of the writer, Mr. P. Anderson, one whose personal intimacy with the habits of the Common Snipe I believe to be unrivalled by any other observer in Britain, and that round the whole circle of the seasons during the past (over) twenty-five years in Tiree (he went to Tiree in the summer of 1886), and in many other parts of Scotland previously. Before doing so, let me say that I also have remarked the "plunging" flight of the Snipe many, many times, accompanied by the well-known "drumming"; and on more than one occasion I have witnessed the same "plunging" flight without the least accompaniment of sound, shortly afterwards followed by the twisting, erratic flight horizontal with the ground and close to it, and then its alighting. *But* I never had the opportunity of witnessing this phase of flight as described by Mr. Stubbs—*belly upwards*. I by no means cast any doubt upon the correctness of Mr. Stubbs's observation; I only regret that a similar opportunity has not been afforded me of clearly seeing the same. Indeed, from my experience and observation of those curious and erratic phases of flights and other habits of *this* species and of others during the spring and summer, or courting and nesting seasons, I am *not* surprised at the erratic movements described by Mr. Stubbs. The *backward plunge downwards* I have also, I feel very sure, seen, but though I recall it, I do not find that I have *noted it down*, perhaps at the time distrusting my own correctness of vision on one or two isolated occasions. Truly, as Mr. Stubbs remarks, it is *well* to walk warily in all such observations. Perhaps the following notes may throw some light upon the subject, quite apart from what has previously been recorded from the early writings of Herr Meves, of Stockholm, and the illustration of the experiments of Dr. Bahr, as well as of others who have written on the well-known subject of the sound of the "bleating" of the Snipe.

Beginning with other matter regarding the bird in his general paper upon the "Birds of Tiree," Mr. Peter Anderson has the follow-

ing passage:—"The Snipe, called 'Gobhar Adhair'—in Gaelic literally, 'Air-Goat,' from the similarity of its 'drumming' to the bleating of a goat. The birds from early spring to August (in fact, there was a Snipe drumming over my garden yesterday evening, March 26th, 1912) continue to utter a drumming sound at intervals. This sound, *which is emitted from the nostrils* [the italics are mine, J. A. H.-B.], can be heard nearly a mile away on a calm evening, or down wind on a light breeze. Immediately before drumming the bird seems to fill the lungs with air by blowing out the chest, and by closely observing it one can see the bird's throat working. When drumming, the wings, tail, and whole body is vibrating. When descending to alight the bird has another note, which sounds like 'kep-ik, kep-ik,' uttered sharply, and when suddenly startled its note is 'scape, scape,' in a squeaky voice. It has still another note when feeding its young along a ditch—a note like 'nem, nem,' or 'mem, mem,' uttered hard and low." Mr. Anderson goes on to say that he is aware that there is a controversy as to whether the drumming sound is produced by the actions of the wing and tail-feathers; "but," he adds, "as everyone is entitled to his own opinion, the above is *mine*, based on a lifelong experience and close observation. Such controversy I will leave," he concludes, "to more learned and scientific men."

I have had the above MS. in my possession—as will be gathered from the date of March 26th, 1912—since the latest observation was made by Mr. Anderson. I wrote asking for further information, and I received a letter in reply, dated April 19th. After a few general statements as to his lifelong experience as a gamekeeper in Central Scotland and the Highlands before going to Tiree in 1886, he proceeds:—"On nearly all these estates scattered pairs of Snipe bred, even on Glenartney, which is very high ground; a good many breed there in the 'spritty' hollows . . . Of course, there are far more Snipe breeding in Tiree than in any other place I know." Then comes an interesting passage:—"Some people imagine that Snipe only drum when flying high in air, but *this is a mistake*. They often *begin drumming when rising off the ground* [these and other italics are mine, J. A. H.-B.], and *continue while they ascend* as long as their 'wind' lasts, when they take in a fresh supply and *go at it again*, and so on. It is not at all uncommon for a Snipe to get up within two or three yards of one *drumming as it rises*. If any ornithologist happened to be within three or four yards of a Snipe drumming when rising he would discard the feather theory for ever. The sound is very hard, as if coming from a bone instrument."

I will not add much of my own notes to the above, except to say this: I would hesitate to discard the "feather theory," even if I did witness the Snipe rising and hear it drumming simultaneously, and for one reason, *e. g.* that it has been *proved by experiment, with the tail detached from the body*, as by Drs. Meves and Bahr; and for another reason—or, so far, *belief*—that the same inhalation of air and inflation by the bird till the lungs are filled, and the air-cells which communicate with the lungs are fully distended, causes these curious vibratory sounds by the action of *escaping of the air, whether from the throat and bill or from the nostrils, or upon its contact with the outer air, and its influence upon the peculiarly formed outer tail-feathers*, as has been illustrated by Dr. Bahr. But I have no desire at my time of life to get beyond my depth, so will leave the actual proof to "more learned and scientific men," along with Mr. P. Anderson. And perhaps I may be pardoned if I suggest that that proof may be within the grasp, before long, of an experienced anatomist and a thoughtful physiologist, who, should he see this passage, will remember witnessing Dr. Bahr's exposition of the "tail theory," and also consider other facts and observations related above.\*—J. A. HARVIE-BROWN (Dunipace, Larbert, Stirlingshire, N.B.).

**Flight of the Common Snipe.**—With regard to Mr. F. J. Stubbs's communication concerning the Snipe's extraordinary trick of gliding upside down through the air (*ante*, p. 196), I may say that my brother and I have on several occasions seen Snipe behaving in a similar way. The locality was in the Wey Valley, a little above Godalming, in Surrey, and the time was April, in more than one year. Our birds did not behave in the identical manner described by Mr. Stubbs. What we saw was this: when performing the trick the bird flew in switchbacks, just as it does when drumming, but with this difference—on the down stroke of each switchback (where drumming would of course normally take place) it threw itself right over on to its back, just as described by Mr. Stubbs. In this position it reached the bottom of its curve, righted itself, and flew up once more, repeating the process a number of times. If I can lay hands on my notes, I may be able to supply some more details regarding the position of

\* A still further interest may evolve, should these facts be placed beyond doubt, which is closely connected with the *ancient past* of the species, but it would be premature—on my part, at least—to say more now. Let us walk warily lest there be a stumble and fall! I think "The Heavenly Snipe" might prove a more expressive name for the *Gallinago gallinago gallinago* (L.). In this, at present, I incline to follow Fenzell, Yarrell, and Saunders.

tail, wings, &c. ; but the facts that I have described are vividly impressed on my memory, and certainly bear out Mr. Stubbs's contention that there are many remarkable things to learn about the Snipe! On one point I should, however, like to join issue with him. The fact that the tail-feathers were seen spread in the familiar way at a time when no sound was being produced does *not* necessarily prove that the feathers have nothing to do with the drumming sound. What it proves is merely that the spreading of the feathers alone is not the cause of the sound. It may well be that they must first be spread, and then all or a single pair turned in a particular way so as to catch the wind. This, on the evidence he brings forward, is still a logical possibility. Something of the sort must occur in the Peewit, which can produce the buzzing sound with its wings at will, apparently by altering the angle at which the feathers strike the air.—J. S. HUXLEY (Balliol College, Oxford).

**Eider Duck breeding in France.**—It may interest English ornithologists to learn that the Eider Duck (*Somateria mollissima*) has nested (and probably continues to do so) on a certain island off the coast of Southern Brittany. This fact was recorded by Dr. L. Bureau as long ago as 1906, but the notice appeared in a somewhat obscure 'Bulletin,' and has, I believe, been generally overlooked. The author was unwise enough to publish the name of the island, with the inevitable result that the nest was interfered with in 1907 and 1908, and possibly since. Apparently the island was never tenanted by more than a single pair. For many summers Dr. Bureau had observed Eider Ducks in the vicinity of the island, so that the ultimate discovery of a clutch of five eggs came as no surprise to him. The incubating female was caught on the nest (by hand), so that there can be no question as to the identity of the bird. I have examined the eggs, which are typical in every respect. This discovery is of great interest, as it is, I believe, a considerable extension of its breeding range as at present known. — COLLINGWOOD INGRAM (Sussex Mansions, Westgate-on-Sea).

**Common Gull (*Larus canus*) numerous in Bedfordshire.**—By far the largest immigration of any species of Gull into Bedfordshire of which I have record took place during the spell of severe weather in February last. At the Sewerage Farm at Newnham they were to be seen in several hundreds, as well as more or less commonly in other localities along the River Ouse. They were said to be most plentiful on Feb. 5th, but many had been seen previously, and others remained until Feb. 10th. Many were shot and taken to the local taxidermists,



three of which I saw in the flesh on Feb. 3rd. It would be of interest to know if this immigration was observed in any other inland counties.—J. STEELE ELLIOTT (Dowles Manor, Shropshire).

**The Ringed or Bridled Variety of the Common Guillemot.**—While watching the breeding Guillemots on our (Dorset) coast a few days ago I discovered amongst a small colony of ten one of the ringed or bridled variety on its egg. It was quite by accident I found it, but my interest was aroused when I noticed the conspicuous white rings round the eyes and the white streak running backwards from the eye. I recently read an article by Mr. Geo. A. Emery, of Newcastle-on-Tyne, about his discovery of the breeding of this species (?) in Shetland, and, judging from the title, "A New British Breeding Bird," I should imagine it has not been discovered breeding elsewhere in the British Islands. Now, I think it will be agreed that no error in identification could have occurred, because viewing the bird from about twenty-five yards with a powerful pair of Ross's prism binoculars would be as good as having the bird in one's hand. A man descended with the aid of ropes and brought me up the egg, upon which the bird remained until he was within a very few feet of it. The egg is of a greenish white ground, with spots and splashes (chiefly at the large end) of brown, with greyish underlying marks. The shell feels particularly rough to the touch, and there appear to be a number of raised spots scattered over the surface. This bird does not appear to be generally accepted as worthy of specific rank, and I shall be pleased to hear anything respecting its breeding. However, if the white rings and marks serve to distinguish it, as I imagine they must, there can be no doubt that I have discovered it breeding here, and that the egg in my possession belongs to that bird. I hope to visit the spot again in a week or so, and to forward any further information that may be of interest.—W. J. ASHFORD (Market Place, Blandford, Dorset).

**Slavonian Grebe in Bedfordshire.**—A Slavonian Grebe (*Podiceps auritus*) was reported to me by Mr. H. Hawkins as having been picked up alive but slightly injured on Feb. 6th, at Newnham, by one of the men on the Sewerage Farm. After being purchased by my informant it was released, but what was evidently the same bird was shot on the River Ouse at Cardington (the adjoining parish) a few days later. Upwards of a dozen previous occurrences of this species in this county are on record.—J. STEELE ELLIOTT (The Manor House, Dowles, Salop).

## AMPHIBIA.

**Destruction of Toads in the Breeding Season.**—For many years past I have been at a loss to account for the great destruction of Toads that takes place during their spawning period, and I should be glad to hear if it has yet been satisfactorily proved what preys so freely upon them, and to what extent such occurs in other localities. Throughout practically the whole course of the River Ivel, in Bedfordshire, Toads spawn in considerable numbers, and during the present year I made several visits to this locality for further investigation. Altogether I must have examined the remains of many hundreds of Toads, and in every instance the victim had been taken some few feet away from the water's edge, invariably eviscerated, and the softer fleshy portions and spawn devoured, and frequently some of the larger bones bared of their flesh. The skin, with head and feet attached, was always discarded. Such remains were usually singly, but two or more together were not infrequent. The prey having been taken on to the grassy bank of the stream, tracking was very difficult, and in only one instance could I find any excrement that might have been left by the depredator. I found similar remains of the Frog, but in a few instances only. My friend Mr. C. Oldham informs me that he has seen similar remains of Toads about the sides of the marlpits in Cheshire, and in one instance those of the Great Crested Newt.—J. STEELE ELLIOTT (Dowles Manor, Shropshire).

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**Batrachians.**—Can any reader of 'The Zoologist' assist by original suggestion, or kindly refer me to any published account of the reason for Frogs and Toads making merry, and vocally proclaiming their whereabouts, *after* and not before or during the period of sexual activity? Also, do both sexes croak, and, if one only, which?—M. C. H. BIRD (Brunstead Rectory, Stalham, Norwich).

## NOTICES OF NEW BOOKS.

*Aristotle's Researches in Natural Science.* By THOMAS EAST LONES, M.A., LL.D., B.Sc. West, Newman & Co.

THE name of Aristotle is a household word to men of letters ; it is also one frequently referred to by philosophical naturalists, but to few indeed are his scientific conclusions really known, and to still fewer are his writings really familiar. Dr. Lones, in this volume, has earned the gratitude of most scientific men by giving a digest of Aristotle's teachings in distinctive subject chapters, and with full footnote references, so that both verification, and, if necessary, amplification, are obtainable. Although many subjects are beyond the purview of this Journal, such chapters as are devoted to "Distinction between Animals, Plants, and Inanimate Matter," and their "Constituents," "Animal Motion," "Generation and Development," and the "Classification of Animals" are of the highest interest to zoologists, and their perusal will show that many of the pre-notions of Aristotle have proved in a sense almost prophetic. Two terms of classification employed by Aristotle, viz. *genos* and *eidos*, are often translated as *genus* and *species*, and, although the latter is fairly representative, *genos*, as Dr. Lones points out, "usually signifies a class, an order, or a family," and, as an opinion of Agassiz is quoted, "Aristotle already considers fecundity as a specific character." Again, his two divisions *Enaima* and *Anaima* correspond with the terms *Vertebrata* and *Invertebrata* used by Lamarck and Cuvier.

Aristotle was an embryonic evolutionist. He is quoted as saying, "the young animal is not at once a horse or a man, but that its life is at first like that of a plant, and that the characteristics of each kind of animal are the last to be developed." As Dr. Lones well observes: "This seems to foreshadow the modern theory that the history of the development

of the individual is an epitome of the history of the evolution of the species." But these evolutionary conceptions of the most illustrious disciple of Plato did not prevent him receiving a very considerable imprimatur of the Church; and, as remarked in this volume, "the adoption of Aristotle's methods of reasoning was followed by the adoption, in part at least, of his system of philosophy, and the resulting alliance, if it may be so called, between the Church and Aristotelianism became so close that an attack on one was considered to be an attack on the other."

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*A Catalogue of the Vertebrate Fauna of Dumfriesshire.* By HUGH S. GLADSTONE, M.A., F.R.S.E., &c. J. Maxwell and Son.

DUMFRIESSHIRE will always be remembered by British naturalists as the land of Robert Service, and Mr. Gladstone is now recognized as its vertebrate historian—excluding *Homo*.

In the Introduction we read:—"The Solway Firth is remarkable for the rapid rise and surging flow of the tides, now filling up the whole basin with a flood of turbid water, and then ebbing slowly back, till only a mere thread of water is left running down the Firth. The prevailing shallowness, combined with the swiftness of the tides, makes the Firth at times a trap for Cetaceans; and in their northern migration uncommon fish, usually confined to deeper waters or more southern latitudes, occasionally enter the narrow Firth and become victims to its intricate channels and ever-present nets."

The Mammals and Birds are fully recorded, the latter having been previously described by Mr. Gladstone in 'The Birds of Dumfriesshire.' In the enumeration of the Marine and Fresh-water Fish, we notice an entry of a Pike: "Hightae Loch, April, 1830, forty-five pounds; and another at Castle Loch, June 10th, 1835, forty-three pounds." Any authentic instance of a Pike of over forty pounds being taken at present times is a very desirable record.

## EDITORIAL GLEANINGS.

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THE game prospects of the East Africa Protectorate are dealt with in the 'Empire Review,' and the following digest of the same is taken from the 'Pall Mall Gazette' (April 29th, 1912) :—

"The number of sportsmen's licences last year were 124, compared with 117 in the previous year; residents' licences were 191, compared with 140. The increase of revenue from this source was nearly £2000.

"There are two game-reserves, one lying to the south of the Uganda Railway, between Tsavo and Nairobi, and extending to the Southern Uaso Nyoro and the Anglo-German boundary; the other including the country to the north of the Northern Uaso Nyoro.

"The stock of game in the Southern Reserve is very satisfactory, and there has been little or no disease this year.

"An attempt will be made to acclimatise the wild water-melon of the Kalahar Desert in this area. It is regarded as excellent food for game and cattle, and, if grown successfully, will do away with much of the trouble experienced in obtaining food and water for the Masai cattle and the game during the droughts.

"A certain number of dams will also be made in suitable places in the Reserve. There is a splendid stock of Ostriches in the Reserve at present, and if the Hyenas, which are very numerous, are killed off with poison, the Ostriches should increase rapidly, and stock the surrounding country, to the great advantage of Ostrich farmers.

"The Athi Plains district is mainly visited by sportsmen for Lion-hunting. In spite of this, and the fact that the local settlers kill every Lion they can, these animals appear to be as numerous as ever, and more troublesome. With the exception of Wildebeest and Rhinoceros, the usual game of the plains is still abundant in the district.

"On the whole, the game prospects are most satisfactory. There has been much less disease, and the rains which fell early in 1911 will produce abundance of food and lead to a rapid increase in stock. Eland and Buffalo are showing in larger numbers all over the country, and Wildebeest are also becoming more numerous. Ostriches have increased considerably in the southern parts of the Protectorate. The Rhinoceros is decreasing fast, as is inevitable with so slow a breeder.

"Regarding Elephants, the herds of cows and young appear to

be holding their own, but the larger bulls are getting scarce, and Elephants with heavy tusks are now rather difficult to find.

“The following is a return of game killed in the Protectorate on all licences during the year :—

“Elephant, 46; Rhinoceros, 227; Hippopotamus, 55; Buffalo, 141; Eland, 84; Zebra (Grevy's), 67; Zebra (Common), 646; Oryx (Callotis), 12; Oryx (Beisa), 236; Water Buck, 310; Giraffe, 17; Sable Antelope, 7; Roan Antelope, 29; Greater Kudu, 1; Lesser Kudu, 49; Topi, 159; Coke's Hartebeest, 643; Neumann's Hartebeest, 24; Jackson's Hartebeest, 227; Thomas' Kob, 27; Bongo, 5; Palla, 419; Wildebeest, 183; Grant's Gazelle, 445; Waller's Gazelle, 57; Duiker, 108; Dik Dik, 162; Oribi, 191; Suni, 1; Klipspringer, 59; Ward's Reedbuck, 247; Chamber's Reedbuck, 44; Thompson's Gazelle, 618; Peter's Gazelle, 69; Bushbuck, 178; Colobi Monkeys, 271; Marabout, 124; Egret, 13; Steinbuck, 5; Paa, 2.”

“THE large New Zealand Snail (*Paryphanta*) is an interesting native mollusc. It is, probably, one of the most handsome Snails in the world. In some parts of New Zealand it is fairly plentiful, but in other parts it is rare, and to the average New Zealander it is unknown, or, at any rate, is not nearly as well known as the hosts of introduced Snails that inhabit gardens and cultivated fields. Some of the species perpetuate the names of men who have taken some part in the history of the country. The first species discovered was *Paryphanta busbyi*, named in honour of Mr. James Busby, the first Resident Agent of the British Government in New Zealand. The next species discovered was given the specific name of *hochstetter*, after Dr. Von Hochstetter, who visited New Zealand in the Austrian frigate ‘Novara’ in 1858. The vessel was fitted out under the orders of the Archduke Ferdinand Maximilian for a voyage round the world, and Hochstetter was appointed geologist to the expedition. He found the first specimen of the species that bears his name near some ponds on the Dun Mountain Pass, between Nelson and the Pelorus Valley. Other shells of *Paryphanta* have been found in the north of Auckland district, Collingwood, Stephen Island, in Cook Strait, Manawatu, Picton and on Mount Rochfort, near Westport. This Snail lays a comparatively large calcareous egg. It is exclusively carnivorous in its diet, and lives mainly on earthworms and small snails. Its favourite method of preying on other molluscs is to bore a hole in the shell, insert its long, pointed tongue, and draw out the occupant. The anatomy of *Paryphanta* has been dealt with very elaborately by Beutler, a German scientist, and, less compre-

sively, by Mr. Murdoch, of Wanganui."—(J. DRUMMOND, F.L.S., &c., 'Lyttelton Times,' March 2nd, 1912.)

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"THE record of fish (freshwater) caught last season has been compiled by Mr. A. R. Matthews, and from this list, which appeared in last week's 'Angler's News,' we note that the best Salmon last season weighed 45 lb. and was caught in the Wye, though five Salmon over 40 lb. were caught on the Shannon in Ireland. The best Trout weighed 14 lb. 8 oz., and was taken from Lough Corrib. The largest Pike, a fish of 32 lb., was caught on Lough Conn. The best Roach came from Horsey Mere (Yorkshire), and weighed 2 lb. 11½ oz. A fine Bream of 7 lb. 8 oz. was taken at Drayton, in Norfolk. Cheshunt Reservoir yielded the best Carp, 17 lb. 2 oz., and a fine Tench of 6 lb. 2 oz. was caught in Daventry Reservoir. A Perch of 4 lb. 13¼ oz. was had in a pond in Derbyshire, and the Trent yielded the largest Barbel of the season, a fish of 8 lb. 13½ oz. In regard to angling feats, it may be mentioned that Miss Kathleen Olliver, aged only six, caught a Trout of 10 lb. on Lough Corrib, whilst Mr. Greenhill caught a 43 lb. Salmon on a light trout-rod and fine line, only securing the fish after having played it for six hours!"—('Shooting Times,' April 6th, 1912.)

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THE above record applies to the freshwater fishes alone. In the 'Angler's News' for May 25th the subject has extended to "Rod-caught Specimen Sea-fish for 1911-12." The largest Bass was taken at Eastbourne by Mr. E. R. Warner, and weighed 12 lb. 8 oz. A 29 lb. Cod was captured at Lowestoft by Mr. Nash. A Conger of 43 lb. was caught at Valencia by Mr. Murmann. The largest Dab recorded was one weighing 2 lb., and secured at Aldeburgh. A Dog-fish (species not mentioned) weighing 62 lb. was taken by Mr. Drew at Herne Bay. Dr. Huxtable, at Hastings, took a Flounder weighing 2 lb. 8½ oz. A Grey Mullet which weighed 5 lb. was caught at Portland by Mr. Fall. The largest Gurnard, weighing 4 lb. 8 oz., was taken by Mr. Travers at Hastings. A Haddock of 7 lb. 8 oz. was secured at Plockton by Mr. Hawkings, and a Hake weighing 17 lb. 8 oz. was captured at Penzance by Mr. Ashby. The largest Halibut in the record was one weighing 91 lb., taken by Mr. Killick at Ballycotton. A Ling weighing 45 lb. fell to the rod of Mr. Nicoll at Penzance, and at the same locality Miss Heane captured a Mackerel weighing 1 lb. 12 oz. At Eastbourne a Pollack weighing 15 lb. was taken by Mr. Wood, and at the same neighbourhood a Pouting of 3 lb. was caught by Mr. Tarrant. The largest Sea Bream

in the list weighed 4 lb. 10 oz., and was secured by Mr. Perry at Penzance. A Skate weighing 166 lb. is placed to the credit of Mr. Falcon at Ballycotton. A "single gut hook" used by Mr. Dalton at Eastbourne proved the destruction of a Turbot weighing 10 lb. 8 oz. An immense Whiting, weighing 5 lb., was caught by Mr. Nicoll at Penzance. The largest Wrasse was one of 4 lb. 4½ oz. taken at Weymouth by Mr. Russell. It must be remembered that the above were rod-caught specimens; in several instances bigger fish have been taken by anglers using hand-lines.

AN Official Guide has been appointed by the Trustees of the British Museum (Natural History) to conduct parties of visitors round the Collections. No charge is made for his services, and no gratuities are to be offered. The Guide starts from the entrance of the Gallery to be visited at 11.30 a.m. and 3 p.m. daily, except on Sundays. Each tour lasts about an hour, and the Museum is divided into sections, which are taken respectively at the times mentioned below:—

	MORNINGS, 11.30 a.m.	AFTERNOONS, 3 p.m.
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TUESDAY .....	Reptile Gallery. Fish Gallery. Starfish Gallery.	Bird Gallery. West Pavilion. (British Vertebrates.)
WEDNESDAY .....	Whale Gallery. Shell and Insect Gallery. Coral Gallery.	Fossil Mammal Gallery. East Pavilion. (Fossil Birds, &c.)
THURSDAY .....	Fossil Reptile Gallery. Special Palæontological and Stratigraphical Col- lections.	Central Hall. North Hall. (Domesti- cated Animals, &c.)
FRIDAY .....	Galleries of Fossil Fishes, Invertebrates, & Plants.	Mineral Gallery. Meteorites.
SATURDAY .....	General Tour—Zoology.	General Tour—Geology, Minerals, and Botany.



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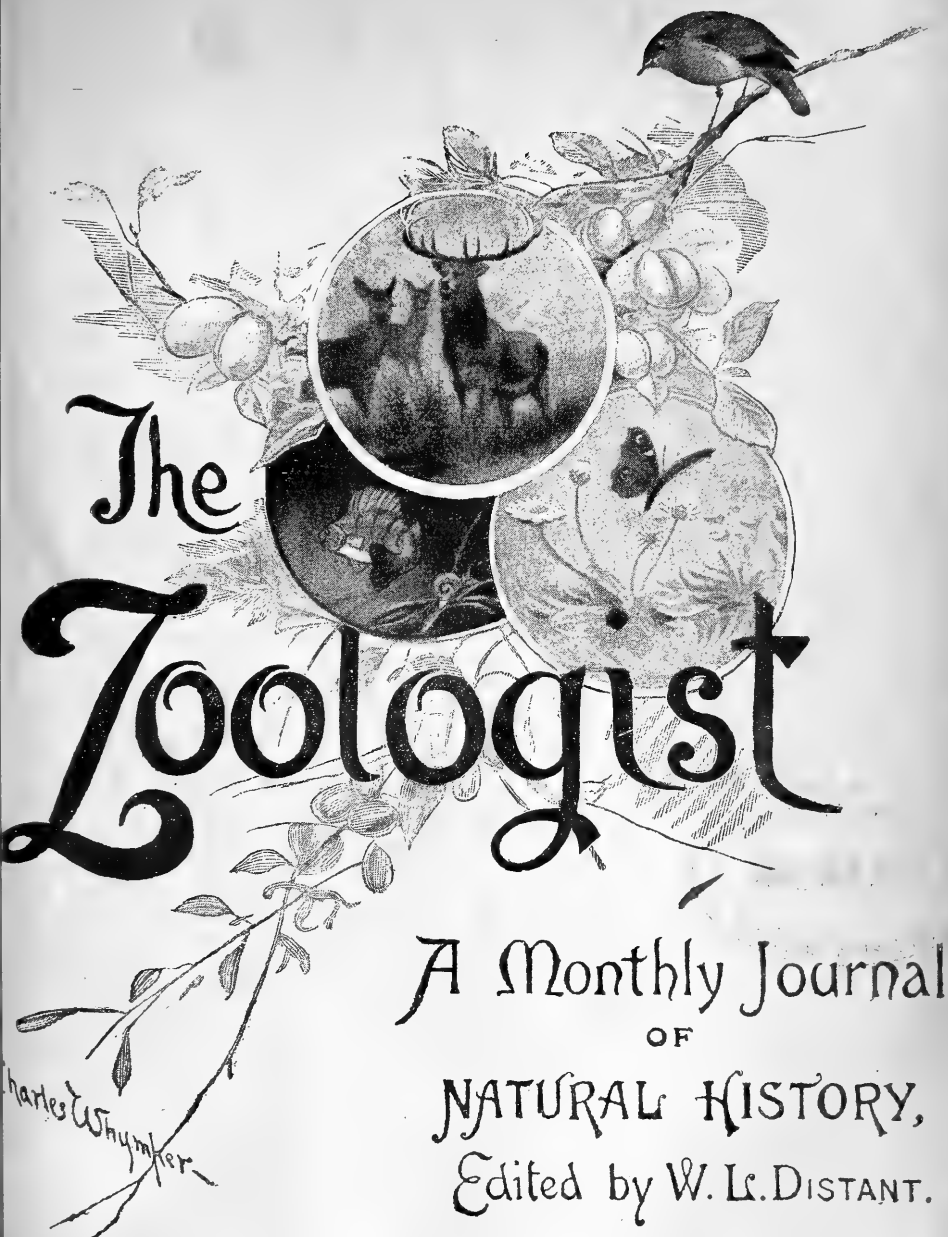
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# THE ZOOLOGIST

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No. 853.—*July 15th, 1912.*

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## HABITS OF THE WHIMBREL (*NUMENIUS PHÆOPUS*).

BY J. A. HARVIE-BROWN.

WHEN visiting many of the islands of the Shetland group in 1890, I had opportunities of observing the Whimbrel at its nesting haunts. On July 1st in that year I witnessed a phase of flight which I have no recollection of seeing described before.\* As that day's experiences provided me with some matters of interest, in the hope that it may interest others I may perhaps be permitted to speak at some length of them.

In a large circular hollow a pair of Whimbrels were evidently nesting. Supposing the nest—in this case it was the young, recently hatched—be anywhere situate on the great flat, central portion of this saucer, which is about half a mile in diameter before the land rises gradually to the circumference—the moment the sky-line shows the figure of a man breaking its continuity, it may be considered certain that the birds have instantly realized danger, and that the female is off the nest, or running from her young, doubtless after uttering a low note of warning. When a nearer approach is made the cock springs into the air, and, with loud warning cries, comes straight towards the intruder on their solitudes. Then he circles round, continually crying, but occasionally pitching on a ridge or hummock. As the human intruder approaches still nearer, then the hen will be

\* Unless, indeed, Mr. E. Selous says aught regarding it in his 'Bird Watching in Shetland,' which I do not have beside me to refer to.

seen to spring and fly *away from you* some two hundred or three hundred yards off. She, too, circles around, and both birds float high in air, and alight at various points north, east, south, or west in the hollow, or on the surrounding slopes. The floating flight, with slightly down-curved wings, head gracefully poised and turning from side to side, is certainly well worthy of admiration; but never did I observe that they exercised that alternate soaring upwards with heavy flappings of the wings in silence, and the dipping descent, accompanied by the tremulous, weird cry so characteristic of their bigger brother, the Curlew, when at peace with all surroundings. These phases of flight of the Whimbrels are counterparts of the festive flights of the Grey and Golden Plovers we have described elsewhere ('Ibis,' 1876).

When both birds are on the move, and if the eggs be expected, it is of course desirable, after identifying the hen by her actions, never to lose sight of her. But it should be remembered that after the young are hatched off the parent birds reverse or exchange their habits at the nesting-place, as our experiences have proved in the case of Grey Plovers and other species, and as proved by dissection of such birds as are shot for identification purposes. Indeed, those peculiarities which are found applicable to the one sex before hatching apply to the other sex after the young are freed from the shells. How far the male Whimbrel assists in incubation I am not aware, but it is well known that the male birds of other species do so, often to quite a large extent, as, for instance, Red-necked Phalaropes, Black Guillemots (male shot with the hatching-spot on the belly, and also taken by hand on the eggs), and many others. This being the case, the difficulties attendant upon watching birds of species where little or no difference exists in plumage between the sexes become accentuated.

When the eggs are not yet hatched off, and the female is incubating, the following are some of the more noticeable actions when *both* birds are off the nest: The hen usually alights in a depression, or behind a hummock or ridge—even at times in a deep peat-hag—and then, running rapidly, head down if necessary for concealment, pops up some distance off, and remains perfectly still and silent. The male, on the other hand,

alights more prominently, *on* the ridge, as if courting observation. But—and note the fact—both birds at times exercise the reverse actions. Then it becomes still more difficult to locate the nest or eggs or partly freed young. As ascertained, the hen or incubating parent may run from the nest—or young, if hatched off—quite a hundred yards in some instances, before rising, and the rise off the ground often takes place when the human figure has advanced some distance from the sky-line, and some little time after the first loud warning notes from the bird acting sentry. It may, or may not be, that the young are secreted prior to the first loud warning-note of the sentry. That may, and probably does, depend upon the relative positions of the two birds, &c.

In the great circular hollow I treat of, there is scarcely a place of concealment or cover enough to conceal a man either during approach down its long sloping sides, or anywhere in an upright pose, and especially is this the characteristic of these Whimbrel-haunted saucer-like depressions of the Shetland Isles generally frequented by the species. So long as the intruder shows himself boldly and walks about, both birds are *comparatively* silent (both birds can see!), but when he lies down both birds are at first full of challenge and alarm. (My clothes were of a bad colour for this sort of work—blue serge—and may well have added to my unsuccesses.)

In the close neighbourhood of where I believed now the young to be—and as I afterwards knew them to be—I dropped into a natural hollow or dry “swallow”-hole. My horizon was now from fifteen to twenty feet only, and, on the other hand, I could not be seen by the birds except from the sky above. Around the rim was a thick growth of green and long grass. I thought to tire out the (? *incubating*) bird—as had been done before with other species—spring up and surprise her (or him) off the eggs. But I soon saw that was futile. The male bird came over me at intervals, saying: “I see you! I see you! Ha, ha!” &c. A Lesser Black-backed Gull came over, and from the bullying he got till he passed the charmed circle, I feel sure I was very near *the young!* I gave in, and walked away a good quarter of a mile. I looked back, and saw one bird floating in the air and *tumbling*, as if in gladness. I dropped into a handy

peat-hag, and, getting my eye on the other bird on the ground, I watched with my binoculars. At last, as the parent crossed a bare patch of ground *close to my former place of concealment*, I saw two and then another young bird following her. I walked back rapidly. The birds behaved as before, and I again took up my position—the young had concealed themselves. The other parent bird had risen quite one hundred and fifty yards off from where the young were.

And now comes the most interesting part of the observations I made on this occasion. On the first occasion when I hid in this hollow I had not thought it necessary to conceal myself from above. This time I cut and pulled over me the long grass, and lay full length.

The male bird came *some little time after*, and began to circle and float round with the graceful poise of the head already described, but, as I judged, with less carefulness in surveying the ground (I think the young had been removed further away?). And now, as he floated, circling round, suddenly whilst high in air he turned a complete somersault sideways, and descended head first, with a strange *corkscrew*—or rather, let me describe it, zigzag—phase of motion (it could scarcely be called flight). When close to the earth he recovered his normal position, and either skimmed away horizontally or momentarily alighted. This I had observed before at a distance, but too far off for me to satisfactorily note its peculiarities. Now I had the bird close to my place of observation, and I believe I was in a *greater measure concealed from above*. On the second repetition of this curious antic, the bird not being more than thirty yards from the hollow where I was lying, I clearly and distinctly saw it deliberately *fold the left wing to its side* as it turned in the air just before the descent was performed, and the wing was retained in that strange position during the whole time occupied in the descent. But on approaching the surface of the ground the folded wing was *unfolded*, and a twisting horizontal flight ensued for a short distance. Then, either the bird flew away at once, to return and again mount and float, or—as I observed on one or two occasions—momentarily touched the ground with its feet before doing so, or even alighted.

I lay a long time in the hollow studying this curious



and, to me, quite fresh experience, as it was repeated over and over again, though the bird sometimes pitched on the ground and rested before resuming its upward flight. The wing, when folded to the bird's side, also appeared to droop a little at the points of the primary feathers—*i. e.* it was not drawn in tight to the body, but hung loosely, thus undoubtedly giving some assistance to the zig-zagging effect of the downward plunge.

When I came out of the concealment again I searched for the young, but the other bird rose quite one hundred yards away, and the young had no doubt been ably concealed; and there was plenty of long heather and other cover around, *i. e.* cover enough effectually to conceal the fluffy youngsters. But I enjoyed the hour I spent in that friendly little hollow near to the nesting-site of these interesting Waders.

## ANNELID BIONOMICS.

BY REV. HILDERIC FRIEND.

So little is known of the life-history and bionomics of our indigenous annelids that any facts which will lead us along right lines, or give us clues, are of value and should be made public. It is many years since my attention was first directed to the observation of one branch of this subject, *viz.* the Seasonal Order of Appearance. It seems perfectly clear that among the smaller annelids, especially the Enchytræids and the Tubificids, there is an ordered appearance, and that certain genera or species follow each other in a sequence which is significant. Sometimes different species of the same genus appear in a locality at different times. In other cases one genus leads the way and another genus follows. Under certain conditions it would appear as if genera which are members of different families and orders had a special relationship to each other, while at other times the relationship is confined to members of the same family or genus. I can best make my subject clear by adducing a few concrete illustrations, the result of researches undertaken by aid of a Government grant.

I go back, in the first instance, to an experience I had many years ago in my own garden. I had planted a row of celery, but found it did not thrive. This led me to seek for the cause, and I soon discovered that certain white worms (Enchytræids) were at the roots of the plants. They may possibly not have been the original cause of the sickness, but it was very evident that they were doing their part in carrying out the work of destruction. I studied the species carefully, and wrote some account of the matter for publication. Some time later I examined the plants again, and was surprised to find that a new species of Enchytræid was now at work upon them. This led me to inquire whether there might possibly be such a thing as a larval form of Enchytræid, or whether the annelids belonging to this group ever showed different stages in their life-

history. Do Enchytræids moult, or is there ever a marked difference between the young and the adult? I put this question in one or two scientific papers, but have never seen any attempt at an answer. So far as my own researches, extending over two decades, are a guide, I find that there are often very striking differences between young and adult, but nothing which can be described as a larval condition or a moulting process.

That being the case, one had to look for another explanation of the fact. When some time later I received the same forms from Ireland under similar conditions, the explanation seemed clearly to be found in assuming that one form acts as the pioneer, and another appears upon the scene when the stage of decay has somewhat more fully advanced.

This theory, which is perfectly in harmony with what we know to be the case in other departments of life, has just received such striking confirmation that I hope to be able to accumulate facts for its confirmation or refutation. In August, 1911, I spent some time, through the courtesy of Mr. Robert Gurney, in his laboratory on Sutton Broad. The *débris* on the shores was carefully studied, and a full list made of the different species of Enchytræids which were then engaged in breaking up the vegetable *débris*. On leaving the laboratory I collected (August 25th, 1911) a quantity of the *débris*, and kept it for further study. In this gleaning were a number of the Enchytræids which I had tabulated, and they carried on their work during the winter. As the summer came on, however, and the work of the annelids progressed, I found the material contained new species of white worms, such as were nowhere to be found in the previous autumn. Their eggs had clearly been deposited in the locality, and the parents had disappeared. Eventually the cocoons had ripened, and the worms emerged to take up the work at the stage to which the other species had brought it.

Some twenty years ago I worked, one February, along the banks of the Eden near Carlisle, and found some tiny *Fridecias* at work among the decaying vegetable matter. I now find that these species may be successfully looked for at this time of the year, whereas they will be sought in vain in such localities at other seasons. Evidently they have their particular mission, a mission which must be discharged at the time when

the need arises. I have elsewhere called attention to the fact that if one turns over large stones which have been lying sufficiently long to cause the grass to decay, it is no unusual thing to find that such a worm as *Lumbricus rubellus* is attended by a species of *Fridericia* or other Enchytræid. I believe that later on, as the process of decay advances, other Enchytræids put in an appearance and carry on the work.

If now we take a definite view of the matter we see how reasonable it is. And if it should prove that many or all of these minute worms are annuals, the explanation will be all the simpler. Suppose that in autumn the process of decay in vegetable life sets in. The living annelids on the spot take up the task of breaking down the waste. In time their eggs are laid, and they cease to work. But now the annelids emerge from the cocoons which were deposited some time before, and they find themselves surrounded by vegetable matter which has already been prepared by their predecessors. These now take up the task and carry it forward another stage, until possibly a third or a fourth relay of Enchytræids of different species or different genera come to the fore. When these have completed their task, the autumn has again come round, and the group of worms whose task it is to begin the attack on new *débris* is now emerging from the cocoons which were deposited some months before.

Evidently much needs to be done in order to place these surmises on a scientific basis. The only way to place the matter beyond doubt would be for the naturalist to map out a suitable field, and work it steadily and systematically for a couple of years. He would record all the species of annelids which he discovered, note their relative number, the times of their appearance and disappearance, the state of decay as the seasons advanced, and the condition of the material in the intestines of the annelids at different times.

It need hardly be said that this unexplored field is one of the most vital importance in relation to agriculture and horticulture, when we remember that the oozy matter on our river banks, and the alluvium which is so valuable an asset, is in large measure passed through the bodies of annelids, and probably owes much of its value for agricultural purposes to that fact.

It is sincerely to be hoped that the means may be forthcoming which will enable some institution or expert to carry out the research which is necessary in order to solve some of these problems in Annelid Bionomics.

It will readily be seen that the best way to carry out research in this subject would be in the field rather than in the laboratory. If an expert, possessed of the necessary knowledge of indigenous species, and a good working acquaintance with the facts already accumulated at home and abroad, could be set apart for work on purely independent lines, under the control of the Board of Agriculture, he might in some three years be in a position to present a report such as no country hitherto has received on the subject of Annelid Bionomics.

It would probably be discovered that many more Oligochæts exist in certain soils than we have in the past suspected. I have been greatly astonished at the variety of species which occur in certain clays and loams, gravelly and other soils, where formerly it was thought that they were entirely wanting. Most of these species are at present little known, and their life-history (as in the case of *Helodrilus oculatus*, Hoffm.) is wrapped in obscurity.

## A DAY IN THE ESTEREL HILLS.

BY COLLINGWOOD INGRAM.

TO-DAY (March 22nd) I made an excursion into the Esterel Hills in search of some of my old bird friends. I was especially anxious to renew my acquaintance with that most attractive species, the so-called "Dartford" Warbler. By the way, "Dartford" is rather a misleading prefix, and I think "Furze Wren" is perhaps the better name—for this bird is no longer common near the old Kentish town, as it doubtless was a hundred and twenty years ago, when Latham described it from Bexley Heath. Besides, the western portions of the Mediterranean basin are more properly its headquarters. Furthermore, the bird found in the South of England and North-western France differs in several minor respects from the typical bird, and has rightly been recognized as a subspecies by modern ornithologists, who now call it *Sylvia undata dartfordensis*.\* But all this does not concern us on this bright sunny day in the Esterel Hills—we are looking for the living bird, whose habits we know are the same, whether we meet it on the gorse heaths of Surrey or the thyme-scented slopes of Provence. But even in the Midi it is very local—often inexplicably so. For instance, to-day I spent the whole forenoon without seeing a single Furze Wren, and I was obliged to push on to a certain little corner of the hills, where I knew from experience, now many years old, I would be sure to find it tolerably abundant. Nor was I disappointed. Very soon I espied the slender form of a Furze Wren flying with a jerky, "flickering" effort to an outstanding tuft of tree-heath, whence it immediately commenced to pour out a pleasant little "Whitethroaty" ditty. This song is perhaps not so impulsive as that of its ally, and the brief tune is, I think, more often terminated by a pretty little

\* In a future number I hope to make some critical remarks on the Furze Wrens of Western France.

flourish. In the dazzling sunlight I get a good view of this sprightly bird, and can note his long tail, his slightly raised crest, and, as he turns, even his peculiar orange-coloured eyelids. All these features, coupled with his maroon-coloured breast, make him a very distinctive bird, and I think only a stranger could confuse him with the shorter-tailed Subalpine Warbler (*Sylvia subalpina*), a tree-haunting species, sometimes, by the way, found breeding in the same range of hills.

At the slightest provocation our songster dives into the undergrowth, and, as he worms his way through the dense scrub, I hear his deep, cross little "pe-tcher-tcher-tcher"—and it is easy to understand why the French call him "Pitchou."

If rare elsewhere in our small patch of "maquis," the Pitchou is certainly common enough, and in the space of a couple of acres or so I come across at least four or five pairs. As the sun lowers and the afternoon becomes cooler, the rival males commence to sing one against the other, tossing themselves up into the air, and sailing back again to their favourite bushes; and every now and then I catch a glimpse of their less obtrusive mates, evidently in close attendance upon their lords and masters.

Although fairly early breeders, I do not fancy nesting operations have commenced yet (March 22nd). The few nests I have been fortunate enough to find have always contained eggs by about the middle of April, four being the average clutch. In size these resemble Whitethroat's eggs, but are always more distinctly spotted with a darker shade of greenish-brown, under which are slate-grey shell markings. But, apart from the eggs, the nest itself can be distinguished from that of the commoner Warbler, being a bulkier and more compact structure, composed—in France, at any rate—almost entirely of dried grasses, finer stems being used for the lining. It is placed in the midst of the scrub or "maquis" that forms the bird's home, and in our experience is usually about a couple of feet from the ground.

This "maquis," that covers the sides of so many of these Esterel Hills, is here exceptionally fine, and puts one much in mind of Corsica. It is, indeed, representative of the typical drought-resisting vegetation of the Mediterranean region.

For the most part this scrub grows no higher than a man's waist, and is composed almost exclusively of broom, and tree-heath (*Erica arborea*), and such well-known aromatic plants as *Cistus albidus* and *monspeliensis*, rosemary, thyme, myrtle, *Euphorbia*, and lavender, and many more that I am not botanist enough to name. The sun's rays seem to liberate their delicately pungent scents, and as one forces a passage through the dense growth the hot air is filled with their sweet perfume. But on these arid tracts of land, so interesting from an entomologist's and botanist's point of view, bird-life is sadly deficient, and to-day the Black-headed or Mediterranean Warbler (*Sylvia melanocephala*) was the only other species I met with in the "maquis" proper, and even this southern bird seems to prefer the outskirts of the cork-woods and the more shady fringe of the pine-forest. With his plush-black crown and snow-white throat the male is a very handsome fellow, but he is shy of showing his beauty, and I fancy the best way to observe him is to stand stock-still, when his curiosity will almost certainly bring him into view. On seeing the intruder he always utters a low, scolding "cher, cher," which is taken up by his mate in a slightly different key—"char, char." Most likely they have already got a nest in a clump of broom or heath, for I have frequently seen eggs by the beginning of March, though, like many sedentary birds, they are very irregular in their nesting habits, and some pairs do not lay until much later. Two, probably three, broods are reared in the year.

On my way home I explored a portion of the woodlands, and found a couple of Short-toed Tree-Creepers (*Certhia brachydactyla ultramontana*) feeding on some cork-trees. These birds, as well as Tits, appear to be greatly attracted by these trees, no doubt on account of the abundance of insect-food they find ensconced among the corrugations of the rough bark. Last year, in the same district, I found a Creeper's nest containing six beautifully marked eggs; these were much more heavily and richly spotted than any I have seen taken in England, but I believe this is invariably the case with the eggs of this "Short-toed" race. By the way, even at a distance, the dappled backs of these birds appear to be conspicuously greyer than in our British Tree-Creeper (*Certhia familiaris britannica*,



Ridgway), and if one climbs up to about four or five thousand feet into the mountains behind Nice—I can see their snow-capped peaks from where I stand—one finds that this bird meets (and is found with) a paler and still greyer form, often so broadly streaked and diffused with whitish on the back that certain individuals have an almost hoary appearance. This is the *Certhia costæ* of the older French writers, but now we are told to call it *Certhia familiaris macrodactyla*. “Short-toed” and “*brachydactyla*,” be it remarked, are both misleading names, for it is the *claws*, not the *toes*, that are usually shorter in this group.

Jays are not rare in the Esterels, and as I move homewards they advertise my progress with harsh screeches of annoyance. But not until I get among the umbrella pines that make Valescure so beautiful do I meet with the Magpie. Here this bird is very numerous, as it also is along the dry pine-covered slopes of the Montagnes des Maures. I would not mention this fact were the bird not so comparatively rare along the Riviera. With a few exceptions, indeed, it is uncommon in most parts of the Alpes Maritimes, which is probably the only French department of which this can be truthfully said, for, thanks to its unpalatable flesh, it is very generally distributed throughout the country.

THE BIRDS OF THAT PORTION OF THE NORTH-EAST COAST BETWEEN TYNEMOUTH AND SEATON SLUICE, NORTHUMBERLAND.

BY J. M. CHARLTON.

(Concluded from p. 146.)

**LITTLE GULL** (*Larus minutus*).—An occasional autumn and winter visitant. The first I have a record of were three, which were shot by a poulterer and purchased by Mr. Hancock about 1840. Numbers occurred in the winter of 1869–70, when a great immigration was noticed on the entire east coast of England (Howard Saunders, 'Manual of British Birds'). At St. Mary's Island an immature specimen was shot on Oct. 2nd, 1895. Mr. J. Wright informs me that two passed through his hands in the autumn of 1905, which had been shot at St. Mary's Island, and Mr. Taylor set up one which was shot near Tynemouth Pier at the same season. Two are mentioned by Mr. H. S. Wallace in the 'Newcastle Weekly Chronicle' as being observed by him off the coast at Hartley in the autumn of 1910.

**BLACK-HEADED GULL** (*L. ridibundus*).—This is the commonest Gull we have with us in the autumn and winter, but in spring all depart inland except a few immature birds. Their favourite feeding place is the water above the extremity of the sewer-pipe which is opposite the cliffs at Whitley, and of course numbers follow the plough.

**COMMON GULL** (*L. canus*).—Fairly numerous in winter and early spring, and also seen in summer, but only occasionally.

**HERRING-GULL** (*L. argentatus*).—A fairly common winter and spring visitant, occasionally seen in summer. In life the feet and legs of this species are a beautiful pink, but a few minutes after death they turn a dull flesh colour.

**LESSER BLACK-BACKED GULL** (*L. fuscus*).—This species is resident, but most numerous in early spring, just before building operations have begun at the Farne Islands further north. In

winter this species gives place to the Herring-Gull, and adult birds are by no means numerous. This has been noticed by Selby, in his 'Catalogue,' as being true for all the Northumbrian coast, but no mention is made of it by Hancock. Immature birds are present all the year round. It is extraordinary how incapable this Gull is of being able to immerse itself in water when swimming on the surface. I remember one day I observed a pinioned bird, at Tynemouth Park lake, which was trying hard to get a piece of bread lying on the bottom. It tried to duck, sink, and, by leaping up, plunge down, but all in vain, and the object of its desire was not twelve inches beneath the surface!

**GREATER BLACK-BACKED GULL (*L. marinus*).**—A winter visitor, at which season adult individuals are quite as numerous as those of *L. fuscus*. My brother and I have examined numbers of this species in various stages of plumage, and the results of these investigations, although previously omitted, I include with all reserve: The male in most cases is a trifle larger than the female when both are the same age. The size of the immature increases year by year until the year before moulting into the mature plumage, probably the fourth; then the bird seems to have attained its largest size, and on the moult to full mature plumage the former looseness in the build disappears, and the feathers become more compact and close fitting. The difference in this character of the plumage between the immature and adult can often be discerned when in flight. The following table of average measurements from birds shot by my brother will illustrate the above:—

	IMMATURE.			ADULT.	
	1st year, ♂.	2nd year, ♂.	4th year, ♂.	About 8th year, ♀.	About 6th year, ♂.
Length .....	26·5 in.	28·0 in.	29·5 in.	27·0 in.	28·5 in.
" of wing .....	18·0 "	18·0 "	19·0 "	18·5 "	18·7 "
" of beak .....	2·0 "	2·2 "	2·7 "	2·0 "	2·4 "
" of gape .....	3·5 "	3·5 "	4·05 "	3·5 "	4·0 "
" of middle toe.....	3·0 "	3·0 "	3·0 "	3·0 "	3·0 "
" of tarsus .....	3·0 "	3·0 "	3·2 "	3·0 "	3·0 "
" of middle tail feather	6·9 "	7·0 "	7·7 "	7·0 "	7·0 "
Length from tip to tip of wings.....	60·0 "	65·0 "	66·0 "	63·0 "	64·0 "
Weight .....	3 lb.	3½ lb.	4½ lb.	4 lb.	3 lb. 9 oz.

This cannot, of course, be taken as being a standard of the measurement of this species, as individuals of the same age differ greatly. However, it seems to be a broad outline of the changes of size. Among the number of examples my brother has examined, the young bird in the last year of its immature plumage most frequently was larger than an adult of the same sex. In the immature birds the colour of the iris, of course, is brown, and all the adults we have examined have had very *light yellowish* irises, not *red*, as is stated by Saunders in his 'Manual' as the usual colour of the eye of this species. H. V. Charlton once observed a Greater Black-backed swooping at a Guillemot which was on the water close by the shore. The assailant would rise up and come skimming near the surface at a great speed towards the Guillemot, which, on its almost striking it, would suddenly dive. This continued for some time, and a gentleman standing by asked if it was a Sea-Eagle! Eventually it departed, and the Guillemot was left in peace.

GLAUCOUS GULL (*L. glaucus*).—A rare winter visitant; immature birds occasionally pass along the coast. I have record of two mature birds, which Mr. J. Duncan informs me he examined, and which had been shot at St. Mary's Island in 1872; and on Jan. 22nd, 1911, H. V. Charlton observed an immature bird feeding with immature Greater Black-backs at the sewer-mouth at Whitley Bay. A wave broke over it once, and completely immersed it, but it rose immediately and shook itself. Its body and wings appeared longer than the other Gulls, and it was creamy in colour. It kept more or less to itself, and flew round the others several times. The first occurrence was in the year of the great influx of this species on the east coast of Scotland.

ICELAND GULL (*L. leucopterus*).—A rare winter visitant; two immature birds presented to Newcastle Museum by Selby were shot at Cullercoats in January, 1830. My brother, H. V. Charlton, shot a very fine immature specimen, in the third year, in the fields behind Cullercoats on Feb. 10th, 1906.

KITTIWAKE GULL (*Rissa tridactyla*).—A not uncommon resident, but keeping well out to sea. It breeds at the Farne Islands, to which the adults depart for the summer months. This part of the coast is indebted to the close proximity of the

Farnes for many of the birds which visit here, journeying to and from their breeding stations on these islands.

**GREAT SKUA** (*Stercorarius catarrhactes*).—A winter visitant of irregular occurrence. The bird figured by Bewick in his 'British Birds' is mentioned by him as having been shot near Tynemouth in September, 1820. About the year 1859 Mr. Hancock says, in his 'Catalogue,' that while shooting at St. Mary's Island he observed a Tern, which had been wounded and fallen into the sea out of reach, eaten alive by a Great Skua which had settled in the sea beside it. Mr. C. M. Adamson, in his 'Scraps about Birds,' mentions a specimen in his possession which was shot at sea, near Cullercoats, on Jan. 24th, 1863.

**POMATORHINE SKUA** (*S. pomatorhinus*).—An irregular autumn visitant on migration south, of which there are but four records. The first were two shot near Tynemouth on Oct. 21st, 1837, by Mr. Duncan's father; a mature female shot at Tynemouth on Sept. 14th, 1846; another in full adult plumage was shot by Mr. J. Duncan at St. Mary's Island on Oct. 16th, 1887.

**ARCTIC OR RICHARDSON'S SKUA** (*S. crepidatus*).—An occasional visitant on migration in autumn. The first record I have is one mentioned in the Catalogue of the Allan (Old) Museum, Newcastle-on-Tyne. There it is called the "Black-toed Gull," which is the immature of the Arctic Skua. It was killed at Cullercoats about 1810, and presented to the museum by Mr. H. Edmonston, of Newcastle-on-Tyne. In October, 1893, an adult male was procured at St. Mary's Island; and on Sept. 24th, 1895, a mature male of the dark variety and an adult female of the light variety were also procured at the island. Several more have also been shot on migration. On Oct. 25th, 1909, my brother observed six Skuas flying past St. Mary's Island in company with some immature Lesser Black-backed Gulls. By the fishermen this bird is called "Dort-bord" (Dirt-bird), from its habit of catching the food disgorged by Gulls when it chases them.

**BUFFON'S SKUA** (*S. parasiticus*).—A rare autumn visitant on migration. I have three records of this species. The first, an immature bird, shot at Tynemouth on Sept. 30th, 1841; the second specimen, a fine adult, was shot by Mr. Ewen in 1892, at St. Mary's, and is now in his possession; the last, an im-

mature, was shot by Mr. J. Duncan on Whitley Sands on Sept. 24th, 1896, and is now in Mr. Coxon's collection. The year of the second occurrence was that of the great invasion of this species along the British coast.

**RAZORBILL** (*Alca torda*).—An occasional winter and early spring visitant.

**COMMON GUILLEMOT** (*Uria troile*).—A winter and early spring visitor of fairly common occurrence. Several specimens of the variety, the Ringed Guillemot (*U. lacrymans*), have been shot near St. Mary's Island and off Whitley Sands. This and the preceding species, as well as the Shag, go by the name of "Divers" among the less versed of the fishermen, and thus much confusion is apt to arise, especially with reference to the Divers proper which go by the same name.

**BLACK GUILLEMOT** (*U. grylle*).—A rare winter visitant, of which I have but two records. Mr. C. M. Adamson, in his 'Scraps about Birds,' mentions a young bird which was shot near Cullercoats in October, 1836. A second, Mr. J. Wright informs me, was shot at Whitley in 1905, and passed through his hands.

**LITTLE AUK** (*Mergulus alle*).—An occasional winter visitor of irregular occurrence. Mr. Hancock, in his 'Catalogue of Northumberland and Durham Birds,' mentions that in November, 1841, large numbers passed along the coast, and many were procured. A similar occurrence took place in January, 1895, when many were picked up along the coast during the very severe gales we had during that month. They had been overwhelmed by the force of the storm. This large influx of these birds was observed all along the coast, and several hundreds were taken, as is mentioned by Howard Saunders in his 'Manual.' The winter of 1910-1911 was also notable for a visitation of numbers of these birds all along the north-east coast. About twenty examples were picked up in this district, and many of them were lying in the fields inland in such an exhausted condition that they were totally unable to escape, and were easily caught. This occurred during the last week in December and the first in January, and the gales were heavy at the time. When they have settled on the level fields these birds have great difficulty in rising, because they cannot use their feet

as a means of propulsion in the same manner as on the surface of the water.

**PUFFIN** (*Fratercula arctica*).—Occasionally seen off the coast at all times of the year. Visitors from the Farne Islands are to be seen in summer. One was caught on Cullercoats rocks on May 11th, 1903, and brought to me by some boys. It seemed much exhausted, and had probably been stunned by being driven against the breakwater by the heavy sea running at the time. It only lived for a few hours afterwards. A similar occurrence happened in 1911. The fishermen call this bird "Tammy," or "Tommie Norie."

**GREAT NORTHERN DIVER** (*Colymbus glacialis*).—An uncommon winter visitant. Of the adults I have but two records, namely, one in winter plumage, shot at St. Mary's Island in October, 1901, and one which I myself saw fly close in front of Beverley Terrace on Dec. 15th, 1909. The former passed through the hands of the late Mr. J. Jackson, birdstuffer, of Newcastle-on-Tyne. It measured 33 in. in length, and weighed 10 lb. From this size, which is exceptionally large for a British specimen, it must be concluded that it was a male bird. The second occurrence mentioned took place during a storm. The bird was flying south, and was probably on migration, and had been driven into the shore by stress of weather. The immatures occur very occasionally.

**BLACK-THROATED DIVER** (*C. arcticus*).—A rare winter visitant. In 'The Zoologist' (vol. vi. p. 2067), T. J. Bold, Newcastle-on-Tyne, mentions a specimen which had been shot at Cullercoats on Feb. 5th, 1848. It was in a very interesting dress, the black throat characteristic of the summer plumage being nearly complete. With this exception the few specimens I have knowledge of were immatures.

**RED-THROATED DIVER** (*C. septentrionalis*).—A fairly common winter visitant, which is often seen diving near the coast. It is of infrequent occurrence in the summer plumage, *i. e.* with the red throat. The best example I know of this stage is in the hands of Mr. Richardson, taxidermist, Holywell. In January, 1911, a Diver arrived on Whitley Reservoir, and remained several weeks there.

**GREAT CRESTED GREBE** (*Podiceps cristatus*).—A specimen in

complete summer plumage was shot in Easter week, 1860, at the mouth of the Tyne; this is now in the Hancock collection, Newcastle-on-Tyne.

RED-NECKED GREBE (*P. griseigena*).—J. Hancock mentions a specimen in summer plumage, which was “found alive a few years ago on Cullercoats sands” (probably about 1870); another occurred in 1891.

[Another specimen I observed stuffed in a shop at Tynemouth, together with a Marsh Harrier, and which on inquiries I learnt had been shot off Tynemouth in about 1820.]

SLAVONIAN or HORNED GREBE (*P. auritus*).—A very rare spring visitant. A bird in full summer plumage was shot on April 26th, 1830, off Cullercoats. On April 30th, 1860, another was shot near Cullercoats, also in summer plumage. A mature male, in winter plumage, was shot at St. Mary’s Island on March 8th, 1894.

LITTLE GREBE (*P. fluviatilis*).—A casual visitant in winter. Mr. J. Wright informs me that a bird passed through his hands which had been shot at Holywell Dene in October, 1909. I am informed by Mr. Taylor that when the cobbles were at the herring-nets in the autumn of 1909, the crews observed numbers of these birds which swam and dived all round. They occasionally occur on Whitley old reservoir in spring and summer, and breed there in some years. In 1910 two pairs arrived in the beginning of March, and bred among the willow-stems submerged in the water. They remained with their young until the end of September and then departed, probably for the sea-coast, returning on March 10th in the following year (1911). They dived and swam about in all parts of the reservoir, the respective pairs occasionally chasing each other about, flapping along the surface, but never rising completely off the water. They frequently gave their call, “whit,” repeated several times very rapidly, and becoming lower in tone at the end. They appeared to find abundance of food, the reservoir being known to abound with large numbers of sticklebacks and minnows.

STORM PETREL (*Procellaria pelagica*).—A winter visitor of irregular occurrence, only observed during the prevalence of heavy storms, when it is driven to the coast. In his ‘Scraps about Birds,’ C. M. Adamson states that: “In the end of June,



1836, many Storm Petrels appeared on the coast. Some were killed near the shore at Cullercoats, and at Pape's game-shop several were sold." One of these birds was killed by a stone. One was caught on the lantern on St. Mary's Island on Nov. 19th, 1898, and is in the possession of Mr. Crisp, who lives there. There are many more occurrences of this species here. I am informed that recently a Petrel was noticed swimming about in the bay north of the island for several hours during a heavy gale.

MANX SHEARWATER (*Puffinus anglorum*). — Probably occurs more frequently some distance out to sea than is generally supposed. J. Hancock says: "I know of the capture of but two individuals within the district [Northumberland and Durham coast]; one was killed off Cullercoats on 20th May, 1870." In the 'Field' (June 4th, 1870), C. M. Adamson says of this specimen:—"When on the coast of I bought a Shearwater Petrel, which I was told had been drowned by having got entangled in the fishermen's nets. It was saturated with salt water and dirty. I washed it in fresh, soft water, and next morning it was as clean and dry as it probably ever had been. It was the first I have seen recently killed; and what a singular bird it is, apparently approximating to various genera. In form and colour, when lying dead, it resembles a foolish Guillemot in its winter dress, but it is smaller. The plumage, particularly the primaries and other wing-feathers, instead of being harsh to the touch, as in the Auk's, are soft, more like some land bird's, and resemble in some degree those of an Owl; the beak, which is black, resembles that of a Cormorant (Willughby remarks this). The feet and legs resemble those of the Red-throated Diver, and the leg-bone, which joins the thigh-bone, is elongated, as in the Diver. The colour of the legs is singular, the outside being pink, irregularly spotted black, with a hard outline. The wings, which are placed further back than most species, when extended, resemble those of an Albatross. From the formation of this bird one is led to suppose that it can dive for food as well as take it from the surface of the sea when flying, as other Petrels are said to do, and this bird's having been taken as it was rather confirms this supposition. [This theory has been proved correct within more recent years; *vide*

‘Manual of British Birds,’ H. Saunders.] Its congeners, the Fulmar and Stormy Petrel, have not the legs placed so far behind, nor so flat; and they in general appearance more nearly resemble Gulls in shape, and from their form would appear to be unable to dive. The question arises as to what this bird was doing on our coast at this season. Hewitson says it breeds in June and July in Shetland; probably it is a regular migrant past our shores from its winter home to its breeding stations in numbers, but keeps far out to sea or flies quickly past, as it is rarely procured.” Since the author of the above has not definitely stated that he meant by “Shearwater” the Manx Shearwater (*P. anglorum*), the editor of the ‘Field’ has evidently taken this note as referring to the Great Shearwater (*P. gravis*), as in a footnote he remarks on this latter, calling it the “Shearwater or Greater Shearwater”; and, since the article is headed “The Shearwater,” it is rather confusing. However, there is no doubt that the bird obtained by Adamson belonged to *P. anglorum*, owing to its small size, and also because Hancock has identified it as being of this species in his ‘Catalogue.’ Besides which, Adamson evidently meant the Manx Shearwater, by several references from various authors from descriptions of this species. Mr. Robert Duncan informs me that this specimen was procured from the fishermen by his father, and sold to Mr. Adamson. My brother observed a bird of this species in the autumn of 1907 off Tynemouth Pier, flying close over the surface of the water.

LEVANTINE SHEARWATER (*P. yelkouanus*).—J. Hancock mentions a specimen, somewhat resembling the Manx Shearwater, only larger, as being shot off Cullercoats on May 20th, 1870, and Howard Saunders says, in his ‘Manual,’ that he believes this specimen was an example of the *P. yelkouanus*. J. Hancock describes the bird as being larger in size, with the bill a quarter of inch longer, the wings from the carpal joint to the end of the primaries half an inch at least, and the tarsi and middle toe also a quarter of an inch longer than in *P. anglorum*. He also says:—“The colour also differs considerably, the back being two shades paler, and the whole of the under parts having the feathers tipped with ash colour; whilst in the true *P. anglorum* these parts are pure white.” This agrees with the description

of *P. yelkouanus* given by Saunders. The particular bird, presented by Mr. Duncan, is in the Hancock Museum.

FULMAR (*Fulmarus glacialis*).—A very rare winter visitor in stormy weather. J. Hancock says: "Many years ago I found a specimen washed up on Whitley Sands." This was probably about 1842. Another was shot by Mr. J. Duncan at the mouth of the Tyne in 1895.

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In addition to the gentlemen mentioned in the Introduction, I have also to thank E. Leonard Gill, Esq., Curator of the Hancock Museum, Newcastle-on-Tyne, for some notes with respect to the geology of the district; and specially T. H. Nelson, Esq., of Redcar (author of the 'Birds of Yorkshire'), for reading through some of the MS. and advising me on certain points.

(An "Addenda et Corrigenda" will follow.)

BRIEF RECORDS OF *CHÆTECHYLENE VESUVIANA*,  
NEWP., AND OTHER MYRIOPODS NEW TO THE  
BRITISH FAUNA.

BY RICHARD S. BAGNALL, F.L.S.

(Hope Department of Zoology, University Museum, Oxford.)

SOME years ago Dr. Randell Jackson sent me a collection of Chilopods made by him at Sidmouth, in Devonshire, amongst which were four specimens of a large Geophilid. I recently submitted these to Mr. Edw. Ellingsen, of Kragerö, Norway, who reported that he had not seen the species before, suggesting that it might be *Chætechylene vesuviana*. Prof. Verhoeff has since seen the specimen, and writes that they are undoubtedly that species.

CHÆTECHYLENE VESUVIANA (Newp.).

*Geophilus vesuvianus*, Newport, Trans. Linn. Society, London, xix. p. 435, 1844.

The species is described fully by Latzel in his 'Die Myriopoden Osterr.-Ungar. Monarchie' on page 201, from which it will be seen that the species differs in many particulars from *C. montana*, Meinert.

*C. montana* rarely exceeds 30 mm. in length by 1·4 mm. in breadth, whilst *C. vesuviana* measures up to 52 mm. by 2·5 mm. in breadth; the former possesses 57 to 61 pairs of legs in the female and 55 to 59 in the male; and the latter 63 to 75 in the female, and 61 to 77 in the male. Other points to note in Latzel's description are as follows:—

C. VESUVIANA.

*Pori anales duo, minimi. Spiracula sat magna, rotunda. Pedes anales . . . femina tenues, maris crassissimi.*

C. MONTANA.

*Pori anales evanidi. Spiracula sat parva, rotunda. Pedes anales . . . femina tenues, maris incrassati.*

The species was originally described by Newport from the slopes of Vesuvius, and must apparently be classed in that group

of Lusitanian forms of which examples appear in this country in the south-west of England and in Ireland.

In collecting material towards an account of the Myriopods of Northumberland and Durham, I have brought to light several interesting forms previously unrecorded as British.

The Symphyla and Pauropoda have already formed the subject of several papers, and I now think it advisable to briefly record the following Chilopods and Diplopods:—

#### CHILOPODA.

*Lithobius nigrifrons*, Latz. Two examples from Gibside, Co. Durham, 1906; unfortunately so mutilated as to make the positive identification impossible.

*L. borealis*, Mein. Rests as British on a mutilated specimen found by Mr. Evans on Ben Ledi. Wooler Moor, one male and one juvenile; Skirlnaked, near Wooler, Northumberland, one male and one female, May, 1912; Ben Vorlich, one female, June, 1912.

#### DIPLOPODA.

*Glomeris marginata*, Vill., var. *perplexa*. Two specimens on the Durham side of the Tees, Egglestone-in-Teesdale, and a few from Gibside. A small, purplish form marked with yellow, as in *G. connexa*, C. K.

*Polydesmus coriaceus*, Porat. One male from a mole's nest, Bradbury, Co. Durham. Two young specimens are probably referable to the same species.

*Titanosoma jurassicum*, Verh. Recently described from a single female found at Kelheim, on the Danube. I have found it in large numbers in a dene near Fencehouses, and single examples on the Wear at Penshaw, and in Gibside. Since then I have seen it in gardens at Penshaw, Hylton, Gibside, and Fellside, Co. Durham, Newcastle, and Oxford, whilst Dr. Randall Jackson takes it not uncommonly at Chester.

*Brachychæteuma bagnalli*, Verh. One male, Gibside, Co. Durham. This blind species is the type of a new genus and family. Prof. Verhoeff has already briefly described it in the Zool. Anzeig., whilst a very complete account will appear shortly in

the 'Transactions of the Natural History Society of Northumberland and Durham.'

*Microchordeuma* sp. One female, Gibside.

*Craspedosoma simile* Verhoeff; *C. simile rhenanum* Verhoeff. Both these forms occur in Gibside, where I first took them in the spring of this year.

*Isobates varicornis*, C. K. Common under fir-bark, Gibside, May, 1911, and June, 1912, one female; Harbottle, June, 1911; and Stocksfield, Northumberland, June, 1912.

*Napoiulus* sp. (most probably *palmatus*, Nemeç.). Several females from a dene near Fencehouses, Co. Durham.

British representatives of the genera *Titanosoma*, *Brachychæteuma*, *Microchordeuma*, *Isobates*, and *Napoiulus* were previously unknown.

## NOTES AND QUERIES.

## MAMMALIA.

**Two Habits of the Common Squirrel.**—This last year I have noticed two actions of Squirrels which seem sufficiently curious to publish. The first was in Scotland. One day towards the end of last August, as I was sitting in Barcaldine Woods (Argyllshire), I saw a Squirrel come down from a tree, and then not only saw but also heard it begin gnawing at something on the ground fifteen or twenty yards away. I could not see what the object was, so I contented myself with marking the Squirrel's position and awaiting developments. The substance seemed very hard, and the animal changed its position several times, as if to get into a better position for its gnawing. At length, after more than ten minutes' almost unbroken jaw-work, the Squirrel suddenly took fright and bounded off. I then walked up to the spot, and there saw that what it had been so assiduously rasping at was a fallen antler of a Fallow-Deer. It is before me as I write. Its anterior surface (which was lying uppermost) has fully two-thirds of the outer layer nibbled away, looking like a stick gnawed by rabbits. There are a few small notches on the burr itself, then some untouched surface, then nearly 8 in. where, for a breadth varying from  $\frac{1}{2}$  in. to  $1\frac{1}{4}$  in., no brown outer layer is left. The first and second tines are untouched, but the third is so gnawed away as to look like a bit of whittled stick. In addition two deep hollows, about  $\frac{3}{4}$  in. long, and reaching nearly half-way through the antler, are to be seen, and the expanded terminal part at one place looks as if it were bread-and-butter, and had had a respectable bite taken out of it. The side that was lying on the ground has not been touched. The ten minutes' gnawing that I saw could not have produced a tithe of this effect, and we are forced to believe that this Squirrel (or perhaps several, for there were plenty about) was in the habit of coming regularly to partake of this extremely dry morsel. It would be interesting to know if others have noticed similar proclivities in the Squirrel; I believe the habit is well known among certain other species, such as cows.

Another action of Squirrels, which to me at least was new, I saw a fortnight later on the banks of the Tees above Barnard Castle.

Two Squirrels had been playing their usual game of "tag" on a tree, and now one had gone, and the other was coming straight down the trunk in the characteristic way—body vertical, head forwards, and hind legs spread out and flattened against the tree. I think he then saw us; at any rate, he stopped short, and, after a few motionless moments, suddenly lifted both front feet right off the trunk, and held them out at an angle of  $45^\circ$  with the vertical. I saw this through field-glasses, and a friend also saw it with the naked eye. In this extraordinary position—balanced, no doubt, to some extent by the tail, but actually supported by the hind claws alone—he remained for a time which we agreed was anything from two to five seconds; he then resumed a normal attitude, and proceeded on his downward way. What was the object of assuming this position I cannot conceive. I was chiefly impressed by the revelation of the enormous muscular strength of the hind limbs.—JULIAN S. HUXLEY (Balliol College, Oxford).

#### A V E S.

**An Unlucky Pair of Stonechats.**—Last April I was watching a pair of Stonechats which seemed to be breeding somewhere by a roadside near here, and in due time I noticed that they had full-grown young with them. This was interesting, for I have never found this species breeding here before, though the Whinchat does so every year in considerable numbers. On June 9th an intelligent boy who looks after cows grazing by the roadside told me that he had found a Whinchat's nest just where the Stonechats had been. This was, however, in reality a Stonechat's nest with six typical eggs, and the first I had ever seen. Naturally, I was much disappointed to find two days later, from the same boy, that the eggs had been hatched but had all vanished. Mr. O. V. Aplin visited the robbed nest with me the next day, and came to the conclusion that the robber was a Stoat or Weasel, as the nest itself had hardly been displaced. On June 19th the same boy gleefully informed me that the birds had built another nest, and that there were six eggs in it. The first nest had been placed well out of sight in a hole in a bank some distance from the road, but the new one was not more than two feet from it, snugly placed at the bottom of a little thorn-bush about a foot and a half high. It was a well-built nest containing six eggs, rather less spotted with pale reddish brown than the others. But these plucky and persistent birds were not fated to bring up a second brood this year. A road-mender, having, I suppose, nothing better to do, fell to chopping away the little thorn-bushes by the roadside, and before



he could be stopped had exercised his zeal on the home of the Stonechats without knowing what it contained. The persistence and ill-luck of the pair deserve, I think, a record in 'The Zoologist.'—W. WARDE FOWLER (Kingham, Chipping Norton).

**Little Auk (*Mergulus alle*) in Bedfordshire.**—During the spell of severe weather at the end of January and beginning of February last no fewer than five Little Auks were taken in Bedfordshire. One I saw on Feb. 3rd whilst being preserved by Mr. A. Covington; it had been picked up at Haynes a few days previously. Two others found subsequently at Great Barford and Ickwell were mounted by the same taxidermist. Mr. Young, another local birdstuffer, had two brought in to him from Ravensden and Wootton. Some twelve previous occurrences of Little Auks in this county are on record.—J. STEELE ELLIOTT (Dowles Manor, Salop).

**Red-throated Diver (*Colymbus septentrionalis*) in Worcestershire.**—An adult Red-throated Diver, which from the length of the bill and wings is probably a female, was shot on Feb. 9th last on one of the pools at Spring Grove, Wribbenhall, Worcestershire. It was kindly sent to me by Mr. T. W. Binyon, and it is now in the Worcester Museum.—J. STEELE ELLIOTT (Dowles Manor, Salop).

**Great Crested Grebes nesting in the County of London.**—A pair of Great Crested Grebes (*Podiceps cristatus*) are nesting (if they have not already hatched out) on the easternmost New River Reservoir off Lordship Road, Stoke Newington, in the County of London, and within three miles of St. Paul's. The nest is within sixty or seventy yards of the highway passing over the New River bridge and easily seen, being built up about a foot above the surface of the water, with no reeds or cover to screen it. Yarrell mentions this bird as breeding on the Welsh tarns, the meres of Cheshire, and the Broads of Norfolk, but no record of it appears in Hudson's book on the 'Birds of London.\*' A noticeable feature of the occurrence is the apparent absence of shyness in so shy a bird. The nest is only about fifteen yards from the nearest bank, built on an exposed sheet of water surrounded by gardens, and quite devoid of cover. Yesterday, with a large tripod camera, my photographer took three photos, but the male bird, then sitting on the nest, never left it, while the female swam unconcernedly in the vicinity. If the photos are successful I will send one for your inspection.—WM. F. DEWEY (Metropolitan Borough of Islington, Town Hall, Upper Street, N., July 8th, 1912).

\* Probably breeds on the Penn Ponds, Richmond Park (*cf.* Dalglish 'Zoologist,' 1904, p. 193.—ED.).

Notes from the Avon Valley, Hampshire.— Last autumn and winter were very unprolific in incidents of bird-life worth recording. In the early part of September two or three Greenshanks were shot, and at the same time two other birds were killed, which from description were Bar-tailed Godwits, but I did not see the latter. The wild-fowl shooting opened with very fair prospects of sport; home-bred ducks were in fair numbers, but as the season advanced the frequent rains and weed-encumbered streams caused the river to be in a flooded condition most of the winter, so that a near approach was often impossible. When a suitable occasion presented itself fairly good “bags” resulted, but nothing of any rarity was met with, such species as Golden-eye, Pochard, Gadwall, &c., being entirely absent, on account of the comparatively mild weather. The most abundant visitors were Wigeon, of which one very large flock was seen during the highest water, but comparatively few were obtained. On another occasion a large number of Teal visited the locality, and nearly two hundred were killed, but generally these beautiful little ducks were scarce, although a number of nests—in their season—were reported from a few miles distant. That the Shoveler nested in the locality is a certainty, as more than one brood were seen when quite unable to fly. Snipe were not so abundant as they were the previous winter, and Jack-Snipe were decidedly scarcer. A rather large specimen of the Common Snipe was reported as a Great Snipe, but I may confidently say it was referable to the commoner species. I heard of a single Bittern in two or three places, but possibly it was the same bird visiting different localities (although my experience points to this species abiding generally in the place selected, if quiet and suitable), as I did not hear of its occurrence twice in the same neighbourhood, and on careful inquiry I could not learn that a specimen of this handsome species had been killed.

In the autumn a fine dark female of the Common Buzzard (*Buteo vulgaris*), measuring over four feet across extended wings, and weighing nearly three pounds, was killed on an estate where the *Falconidæ* are supposed to be strictly protected. I suppose if a gamekeeper in his rambles with the gun chances to see a large hawk within range of his weapon, the temptation to kill becomes irresistible, and is not always made known in the country-side generally, except through the gossip at the village inn. In this case the facts reached the ears of the proprietor of the estate, who casually reprimanded his man, whose excuse for murder was that he had seen the hawk pounce upon a young Pheasant, and had partly devoured it when

shot. *October* is not often a period of the year when *young* Pheasants are much in evidence, and on dissecting the hawk the separated limbs, hands and all, of a Mole filled the stomach, and its last mouthful—still in its throat—was the empty, velvety skin of this peculiar mammal, and it was interesting and remarkable how cleanly all the flesh had been extracted, even to the skull. The Great Crested Grebe is by no means a common bird in Hants, but one came to an untimely end in rather a curious manner. One dark night in November a rural postman was returning with his load to the office, when suddenly a large bird (attracted, I suppose, by the light on his bicycle) flew against him with great force, and, being thus knocked down, the bicycle ran over and broke the bird's neck. It was sent to me for identification, with the query, "We think it is a Puffin."

Near a river-keeper's house are a number of semi-wild Ducks, which nest somewhat freely, but during the past two years it was noticed that the broods of ducklings gradually decreased without any very visible cause; Jackdaws, large Pike, and Rats were alike blamed for the depredations. This season, however, the Rats did not appear so abundant and troublesome as they had in previous years; still the ducklings disappeared. It had been remarked by men who were about in the very early morning that for the past two springs a large Heron, always alone, was often seen in the meadows somewhere near, but immediately cleared off on observing anyone, not to be seen again till the following dawn. On closely watching him he was found to be the culprit, and at last was shot, with a whole fluffy duckling in his capacious throat. The man who shot it said he had never seen so large a bird, or one in such grand plumage. It seems rather strange he was not suspected long before he was killed.

Some time ago a person inquired if I had a Thick-knee (*Edicnemus scolopax*) I could show him amongst my few birds, as he had heard and read that the species was not rare in the valley of the Avon from Christchurch to Salisbury. I had heard such a report previously, but, speaking of this immediate neighbourhood, I think a mistake has been made in identification, and some other species must be intended. In a measure I am ignorant of its occurrence farther north, in the vicinity of Salisbury, where the down-lands seem more suitable to its requirements than the damp low-lying meadows between Christchurch and Fordingbridge, and the specimens I have seen here are few and far between. The remark as to its numbers may be far more fittingly applied to the Redshank, which is certainly

on the increase, except for a few weeks in the depth of winter being resident, and nests comparatively freely in the meadows, where a few years ago it was quite unknown. I was told, on their first arrival this year in the early spring, a group of more than thirty birds was seen flying up the valley. They nest near Fordingbridge, and I have known specimens to be killed on the *heath-lands* as far west as Verwood in Dorsetshire, and I am not at all sure of the limit of its western range. On this point our friends in Dorset may speak more freely. In 1911 the Little Owl reared broods in at least two localities a few miles apart, but I think most of the birds have since been shot.—G. B. CORBIN (Ringwood, Hants).

#### CRUSTACEA.

**What is the Maximum Weight of the Edible Crab?**—It has been stated in print (the reference to which I cannot at present remember), and frequently alleged, that on the Cornish coast *Cancer pagurus* has been known to attain the weight of 20 lb. The late Thomas Cornish, in these columns (Zool. 1881, p. 214), stated that a huge Crab was brought to his house at Penzance, *when he was absent*, which was stated to have turned the scale at 16 lb., and he believed that this record was a true one. During a recent visit to Penzance I endeavoured to substantiate these statements, but without success. The first man I interrogated, a catcher and purveyor of Crabs, told me without any hesitation that he had handled a "cock-crab" which weighed 23 lb. ! Another man, who seemed more cautious, assured me he had once seen a Crab weighed at 20 lb. I then had recourse to the kind assistance of the editor of the 'Cornishman,' who undertook the inquiry, and as a result the following paragraph appeared in his paper (June 20th last):—"The largest Crab caught on the Cornish coast of which we have the recorded weight turned the scales at 9½ lb. An 8 lb. Crab, however, is a large specimen." I subsequently consulted our well-known contributor, Mr. A. Patterson, of Yarmouth, as to recorded weights on the east coast, and received the following reply:—"I have overhauled several folk and several stalls, and can only learn that 5 lb. is a big Crab—a very big one, possibly 5½ lb. to 6 lb., may be a record."—W. L. DISTANT.

Since this was written I have learned that a Crab was caught at Brixham, Devon, on Oct. 20th last, which weighed 12 lb., and is now in the Hull Museum. I have the authority of Mr. T. Sheppard, the Curator of that institution, that the statement is correct.—(W. L. D.)

## OBITUARY.

## R. W. C. SHELFORD.

ZOOLOGISTS have heard with great regret of the death, on June 22nd, of Robert Walter Campbell Shelford, the leading authority on the *Blattidæ*, and a naturalist of very broad interests.

Shelford was born at Singapore on Aug. 3rd, 1872—the son of a merchant who was a member of the Legislative Council, and made C.M.G. in recognition of his many public services. There is no evidence that Shelford's taste for natural history was inherited, and it did not appear in any other member of the family. Prevented from taking a part in the games and ordinary outdoor pursuits of a boy and a young man, his active mind turned to observation, and he became a naturalist. He was educated privately until he entered King's College, London, and later Emmanuel College, Cambridge. At Cambridge, where he took a second in both parts of the Natural Science Tripos, he received a solid foundation for the excellent zoological work of his mature years.

After taking his degree he became, in 1895, a Demonstrator in Biology, under Professor L. C. Miall, at the Yorkshire College, Leeds. In 1897 he went to Borneo as Curator of the Sarawak Museum, established by Rajah Brooke at Kuching. During his seven years' tenure of this position he availed himself to the full of the many opportunities for studying the animal life of the tropics, and of making observations in anthropology, a subject which always strongly attracted him. His fruitful labours in the increase and arrangement of the Sarawak Museum naturally led him to take a wide survey of the animal kingdom, and he soon began the study of Mimicry, which unites under one point of view the insects of many diverse groups and their vertebrate enemies. He found Borneo a very rich and imperfectly explored field for the study of this subject, and before long he entered into a regular correspondence with me, sending large consignments of mimetic insects for investigation and determination. The result of this work was the appearance of his important paper in the 'Proceedings' of the Zoological Society for 1902 (p. 230). This interesting monograph is illustrated by five coloured plates showing Bornean mimetic insects of the most varied groups. The outcome of the correspondence was his desire to work in the Hope Department when his seven years in Borneo came to an end in 1905. Towards the close of this period he wrote to me saying that if it was

impossible to provide a salary he must really come without one. Fortunately, at this moment, Magdalen College began to place an annual grant at the disposal of the University for the provision of extra assistance in the departments, and it thus became possible to appoint an assistant-curatorship, with a small income, augmented later on from the Common University Fund. Shelford accepted this position, and entered into residence at Oxford in the autumn term of 1905. After leaving Kuching, and before returning home by way of Japan, Vancouver, and the United States, he spent several months travelling in the Malay Archipelago. On June 25th, 1908, he married Audrey Gurney, daughter of the Rev. Alfred Richardson, vicar of Combe Down, Bath.

Until his long illness, which began in April, 1909, Shelford's work in Oxford was continued uninterruptedly and with the greatest energy. He at once undertook the study of the large collection of Orthoptera in the Hope Department, beginning with the *Blattidæ*, which he brought into a highly efficient state. In the course of his work upon this group he determined and described, in a long series of valuable memoirs, the new species in all the great Continental collections, with the result that the Hope Department now contains by far the finest collection of *Blattidæ* in the world, and includes types or co-types of a large proportion of all the known species. He had also begun to work at the other Orthopterous groups, especially the *Phasmidæ* and *Mantidæ*, and, through his influence, the *Tetriginæ* (*Acridiidæ*) were worked out by Dr. J. L. Hancock, of Chicago, and *Gryllacris* by Dr. Achille Griffini, of Genoa. He was an indefatigable worker, as will be realized by any naturalist who sees what the Oxford collection of *Blattidæ* became after only four years' work. A too brief respite in the course of his illness enabled him to return for a time and carry on the old work, and, up to the end of 1911, he was still able to help the Department in many ways, and also to begin a Natural History of Borneo. It is very much to be hoped that this work, though incomplete, may be published at no distant date. It is sure to be full of observations of the greatest interest to naturalists of all kinds.

When three years old Shelford contracted tubercular disease of the hip-joint, as a result of a fall downstairs, and was condemned to spend many years on his back. A severe operation was performed when he was ten, and at thirteen he was able to leave home and reside with a tutor. He was left with a stiff joint, and from time to time suffered greatly from sciatica. During his residence in Sarawak

a fall from a rickshaw produced an abscess, from which he entirely recovered. During four years in Oxford his leg seemed to give him no trouble except for attacks of sciatica, to which he never gave in, and, in spite of his lameness, he used to find great enjoyment in playing golf. An accidental slip led to the recrudescence of the old disease, and to the terrible suffering of his last illness.

Of all the memoirs which he wrote, Shelford was, I think, most interested in that "On Mimicry amongst the *Blattidæ*"\*—a subject upon which he had reflected and had been accumulating material for some years. It is a pathetic circumstance that the publication of the paper was nearly coincident with its author's death. I shall ever retain grateful memories of pleasant years spent in hard work and constant friendly intercourse, while his efficient control of the Museum and bright, attractive, many-sided personality will be long remembered in Sarawak.

EDWARD B. POULTON.

Hope Department, Oxford University Museum.

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JOHN GERRARD KEULEMANS.

THIS accomplished and unsurpassed ornithological artist passed away on March 29th last, at the age of sixty-nine years, having been born on June 8th, 1842, at Rotterdam.

To the late Dr. Bowdler Sharpe, Keulemans may be said to have owed his introduction to this country, and the family of our deceased ornithologist still possess Keulemans' first drawing, which represents two Tits. He illustrated Sharpe's Monograph of the Kingfishers, and considered no trouble too great in obtaining particular pigments to portray the tints of these beautiful birds. Some of the best judges consider that his finest work was executed in 1874 and onwards in the first volumes of the 'Catalogue of the Birds in the British Museum,' and as an instance reference may be made to the Plates of Owls in volume ii. of that publication. It would be difficult to imagine any finer work of the kind, combining perfection both in drawing and coloration. In later years his pencil somewhat lost its cunning, and he ultimately became to some degree colour-blind. To great energy and capacity for work he seemed to possess an intuitive knowledge as to the natural pose of a bird whose skin was only in his hands, and he was fond of birds as well as being a good ornithologist. He was always helpful to any beginner.

W. L. D.

\* Proc. Zoc. Soc. Lond. 1912, p. 358.

## EDWARD ARTHUR FITCH.

WE greatly regret to learn that Mr. E. A. Fitch passed away at his residence, Brick House, Maldon, on June 28th, after a comparatively brief illness. He was the son of Mr. Edward Fitch, J.P., of Bayswater, and was born at Chelsea on Feb. 23rd, 1854. He was educated at Great Ealing School and King's Cross School, London, and while in his teens passed the Senior Oxford Local Examination with honours. He arrived in Essex in 1871, and began farming, and since 1874, a period of thirty-eight years, he resided at Brick House, Maldon.

Mr. Fitch had strong natural history proclivities, and was early known as an entomologist. We first became acquainted at meetings of the Entomological Society nearly forty years ago, and he succeeded the present writer as Secretary of that Society in 1881, holding the office till 1885. He was a Fellow of the Linnean Society, but we believe the pressure of other engagements terminated his fellowship. As Chairman of the Essex Naturalists' Field Club he did good work, and as Chairman of the Kent and Essex Sea Fisheries Committee for a number of years he was most assiduous in his duties, presiding there as recently as June 10th last. He was also on the Council, and was Local Secretary, of the Essex Archæological Society. His contributions to the topography of Essex are well known; he was the author of 'Maldon and the River Blackwater,' and for years was joint editor of the 'Essex Review.' He was also a member of the old Chelmsford Odde Volumes, a Society well known to the few. His contributions to 'The Zoologist' were always valued. As a farmer, he was a practical agriculturist, and in 1902 headed a party of fifty Essex farmers who went over to Hungary to study first-hand the methods of Hungarian farming.

But it was in public work—a record of which recently appeared in the 'Essex Weekly News'—that his phenomenal activity found the inspiration of his life. He was six times Mayor of Maldon, and seems to have been connected with every public body of his district, from the aldermanic bench to wardenship of his parish church. In politics he was a pillar of the local Liberalism. Without reproach he could have said: "*Homo sum, et nihil humani a me alienum puto.*"

W. L. D.



## NOTICES OF NEW BOOKS.

*Studies in Bird Migration.* By WILLIAM EAGLE CLARKE. 2 vols.  
London: Gurney & Jackson. Edinburgh: Oliver & Boyd.

MR. EAGLE CLARKE is pre-eminently qualified to write on this subject. In 1883 he was elected a member of the British Association Committee on the Migration of Birds as observed on the British and Irish coasts. He was afterwards entrusted with the preparation of the Reports, which revealed to him "that, vast though the data were, much desirable information was still lacking." This led to his special investigations, including a residence of forty-seven weeks in lighthouses and in a lightship, and fourteen weeks spent on the islands of St. Kilda and Ushant. Such, indeed, are no slight credentials, and ornithologists may well consult these volumes with confidence and pleasure.

The author is convinced that the phrase used by the late Prof. Newton, "inherited but unconscious experience," explains the migratory endowment of birds, especially when the journeys are undertaken during the hours of darkness. "The Curlew Sandpiper is perhaps the greatest of all feathered voyagers. This species has its summer haunts in Western Siberia, where it nests on the tundras fringing the Arctic Ocean; yet its winter range extends to Cape Colony, Madagascar, Patagonia, Tasmania, and the Malay Archipelago. To reach these far-off cold-weather retreats, it crosses the lofty Himalayas; traverses the course of the great rivers of Northern Asia, and of the Volga, Rhone, and Nile, and skirts the coasts of Norway, Britain, Western Europe and Africa, and China. Thus, during each year, certain Curlew Sandpipers perform journeys equal to a voyage round the world!" Such statements as these inspire a profound interest, and constitute the knowledge that gives a real meaning to that term so often used, "the romance of animal life."

There is considerable difficulty in defining the exact position of some of our avian visitors, and the movements of these afford another example of the danger of too rigid definitions in bionomical zoology. Thus we read of the Starling: "In the

British Isles it is a resident, a local migrant, a summer visitor, a winter visitor, and a bird of passage." The chapter on the migration of *Sturnus vulgaris* sufficiently supports and supplements this conclusion.

This publication is so full of information and observations that an adequate review would end in almost piratical excerpts. This, of course, is a method neither desired by author nor publisher, nor does it commend itself to the writer of this notice. But this we may say—these volumes are *necessary* to any student of bird migration.

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*The Flight of Birds.* By F. W. HEADLEY, M.B.O.U. Witherby & Co.

THE time had arrived for a new and handy book on the flight of birds. We ourselves had almost lost touch with the subject since 1873, when we acquired and read Pettigrew's 'Animal Locomotion,' one of the "International Scientific Series." The subject is one of a reminiscent nature. When we read Mr. Headley's account of Isaac Newton's experiments with glass globes of equal size but unequal weights which he let fall from the dome of St. Paul's, and by which he established his law (not absolutely accurate) that the resistance of the air increases as the square of the velocity, we may remember Galileo's somewhat similar experiments from the summit of the leaning tower of Pisa, by which he controverted Aristotle's conclusion that the velocity of a falling body is proportional to its weight.

Apart from animal physics, which is treated with considerable amplitude, Mr. Headley's volume contains ornithological information of the greatest interest. He considers that there is good reason to believe that birds while migrating attain far greater velocity than they do in their ordinary flights. He gives an instance:—"The American Golden Plovers breed in Arctic regions from Alaska to Greenland, above the limits of forest growth, and when autumn comes they pass over Nova Scotia, strike boldly out to sea, and, generally leaving the Bermudas well to the west, sail on over the ocean till they reach the West Indies. It is difficult to believe that these are merely stray birds that have been blown out of their course and are sailing on

to death. One witness after another declares that he has seen flocks of them flying southward several hundred miles to the east of the Bermudas, on which islands they alight only if the weather is unfavourable. Flying south from the Bermudas, or somewhere east of them, they must cover some 1700 miles before they land on one of the West India islands. Either they fly at an almost incredible pace or they remain upon the wing an almost incredible time."

The index is open to printer's correction; as an instance, "Pettigrew" is referred to p. 119 instead of p. 19.

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*A Hand-List of British Birds, with an Account of the Distribution of each Species in the British Isles and Abroad.* By ERNST HARTERT, F. C. R. JOURDAIN, N. F. TICEHURST, and H. F. WITHERBY. Witherby & Co.

THIS volume has a double mission; first, its distributional information, and secondly (though perhaps chiefly), its proposed revision in nomenclature. Its distributional element is excellent and trustworthy; its nomenclatorial revision will provoke the greatest attention. That there should be uniformity in nomenclature is admitted on all sides; its revision has been attempted in most orders, especially in the Insecta. But has the last word been said on the subject? That the first or oldest name should be used will be agreed by all naturalists. The use of trinomials has yet to be generally accepted. However, all will be grateful for everything being said, that can be said, in favour of a method which many living zoologists will not follow. These great changes can only win their way in time, that is the universal rule, and although many will follow this lead now, there are as many who will simply be appalled by the proposition, and will remain true to the nomenclature used in our classical text-books. Fortunately, however important and necessary a uniform nomenclature is in faunistic writings, the subject is still only an adjunct to ornithology, and revised names, especially trinomial ones, however they may be desired, will only gain general recognition as they become more universally used in the nomenclature of the future. The old order must first pass away, giving place to the new, and many will not desire this change to be hastened.

EDITORIAL GLEANINGS.

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A NEW NATURAL HISTORY MUSEUM.—A general meeting of the East Africa and Uganda Natural History Society was held on May 6th, at the Society's Museum, Game Warden's Office, Nairobi, the Hon. Mr. C. W. Hobley, C.M.G., being in the chair.

In the course of his address, the chairman said:—"I can confidently state that, properly run and well supported, this society should prove one of the most valuable educational institutions this country possesses, and, if we justify ourselves, I hope the day is not far distant when we may look forward to a small amount of Government assistance in the shape of a grant. I further believe that I am not too optimistic to hope that this small museum will one day develop into a big State Museum, with a skilled director in charge and possibly managed by the society. Even a small Protectorate like Zanzibar has a properly organized museum, and it seems absurd that a rapidly developing country like this should not have a similar institution properly equipped. Libraries and museums, nowadays, are indispensable adjuncts to civilization, and as this is the capital and the centre of the life of the country, its site must undoubtedly be here. We have one of the most marvellous fields for research and collection in the world at our very door. This country may not be so rich in insect life as, say, South America; it may not be so rich in reptile and bird-life as, say, India, but taking it all round, it has one of the most wonderful fauna and flora of any country, and it will be a disgrace to the country if we cannot make a representative central collection of it in Nairobi."—('African World,' June 15th, 1912.)

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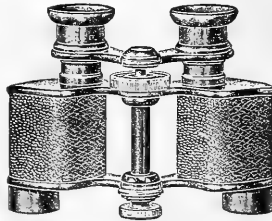
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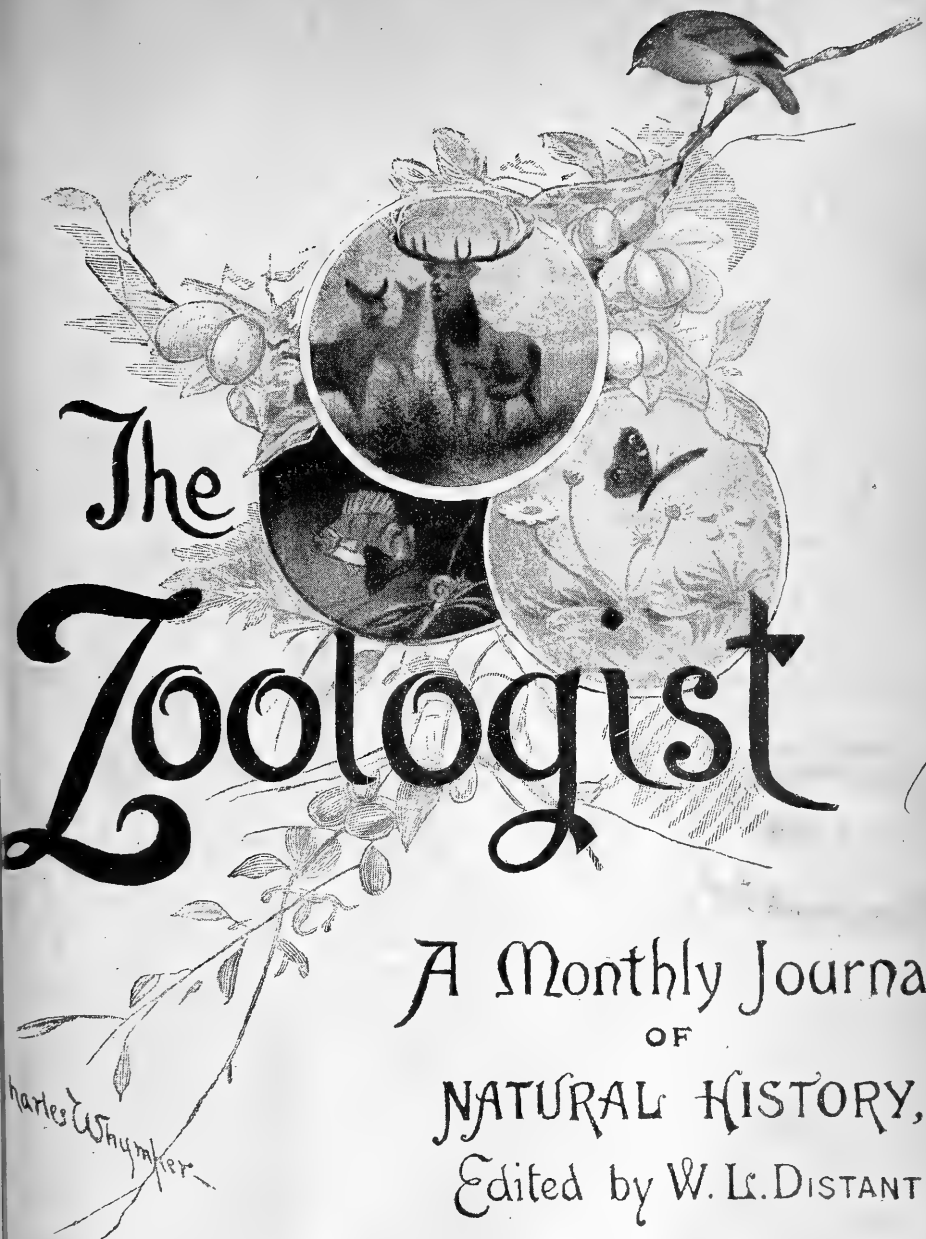
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# THE ZOOLOGIST

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No. 854.—August 15th, 1912.

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## NOTES ON THE HABITS AND THE COLORATION OF THE COMMON STARLING (*STURNUS VULGARIS*).

BY FREDK. J. STUBBS.

As a youngster living on a south-western wing of the Pennines, and familiar with the relations between Starlings and cattle, I could hardly help noticing one little detail of habit in which the bird did not agree with the books—for never, under any circumstances, did I see a Starling perch on the back of either cow or sheep. On railway journeys to other counties we watched for the first exhibition of the habit almost as eagerly as we anticipated the first Sheld-Duck or the first ant-hill, and we even remembered certain counties as places in which the Starling had the normal habit described or referred to so often in our books. I think that in a way we viewed our own birds as abnormally spiritless, in keeping with the uninteresting landscape. Unfortunately, I made few regular notes on the habits elsewhere, and in the course of years my recollections have been tumbled about somewhat. The average adult is sure to find his memory far from safe on this point if he has been in the habit of observing the bird in many localities. One thing, however, I can state with confidence—in that part of Eastern Lancashire extending from Cheshire ten or twelve miles along the Yorkshire border, a district in which I have had exceptional opportunities for observing Starlings amongst cattle, it has never been my experience to see the bird rest even for an instant on any animal. I shall not go so far as to say that it never does so, but during a stretch of years when I often puzzled myself trying to find a solution of the problem I did not once see the action.

During this period, as I have already indicated, I frequently noticed the picturesque habit in other districts, and I have had

abundant reasons for regretting that I did not keep actual written records of all these places. Indeed, I cannot give the range of the peculiarity even in the county itself; I have seen the perching in the Lake District, and I think also in the extreme west of Lancashire. I can be quite definite in giving the Isle of Man, North Wales, and most parts of South-eastern England as localities where the Starling does, either frequently or rarely, perch on living cattle or sheep. The birds are said to search the fleece for "ticks" (*Melophagus ovinus*), but, although watching them very closely, I have never been sure that this is the fact.

This curious difference in habit may appear a most trivial thing, but as a psychological problem it remains insoluble to me, and appears to have a bearing on the wider problem of distribution. It is difficult to imagine that we have on these Pennine slopes a colony of Starlings unaffected by migrants from other localities, and equally difficult to think that the Lancashire birds sink their habits in visiting another county, or that the immigrants alter theirs when they reach Lancashire. Others besides the present writer would be glad to see notes from readers of 'The Zoologist' resident elsewhere in our islands. I can add that in answer to one query addressed to a contributor as to the habits of the bird in this locality I received the reply: "Your question is easily answered. I have never seen a Starling perch on either a cow or a sheep in my life"—a scrap of information that must read strangely to an observer living in, let us say, the county of Surrey.

As a British bird, the Starling has fluctuated numerically and otherwise in a remarkable manner. No one has yet been to the trouble of studying these changes so far as England is concerned, but Scotland has been more fortunate, for there Mr. J. A. Harvie-Brown (*Annals Scot. Nat. Hist.* 1895, pp. 1-22, and map; and a note by Mr. R. Service, pp. 92-96) has carefully described the past and the present status of the bird. "From time immemorial" it has been common in the Orkneys, the Shetlands, and the Outer Hebrides, and apparently unknown on the mainland throughout the whole of Scotland.\* About a

\* Writing now from memory, I fancy it was Sir William Jardine who recorded how he saw his first wild Starling at York, during a coach journey to London; and several non-ornithologists from across the Border, at the latter end of the eighteenth century, have written to the same effect.

hundred years ago, according to Mr. Harvie-Brown, the species began to spread on the mainland, and is now common throughout Scotland. No reason has been given, and we do not know whether the new-comers have arrived from the west, south, or east. I am almost quite certain that I have seen the bird perch on cattle in Scotland, but I would like to suggest now that naturalists domiciled in that half of our island, or in the western islands, place on record the present habits of the bird. Observations from the Orkneys or the Hebrides would be peculiarly valuable.

A superficial study of the copious literature relating to the Starling gives one the idea that its numbers have not always been constant in England. In 1564 it was apparently too common in some parts, for an Act (8 Eliz. c. 15) was then passed, ordering that one penny per dozen be paid for "Stares'" heads: these were Starlings, and not any species of Thrush, for we learn in the Act of their partiality for dovescots.

Gilbert White treats the Starling in such a manner in his "Letters" that we have reason to suspect it was not in his day a common bird near Selborne, but that his knowledge of it was gained in other localities. The only mention I can see in going through one edition, and in examining the indexes of two or three more, is in Letter XI. to Daines Barrington, and this passage read in conjunction with the rest of the book, and especially Letters I. and II. to Barrington, seems to support the suggestion. Bishop Stanley, in his 'History of Birds,' writing (I think from Alderley, in Cheshire) towards the middle of last century, remarks that in former years the Starling was far more numerous; and the ignorance shown by good men like Montagu, Mudie, Knapp, and others (who all at one time or another believed the young to be a distinct species), also suggests that it was not so evenly distributed during the nesting season as it is to-day. As a common breeding bird it is but a recent addition to Cornwall and Devon.

Within the past few years the marked increase of the Starling in Great Britain has led to some notable speculations, especially on the part of the late Dr. R. B. Sharpe. After accumulating a great deal of material he was forced (reluctantly, he confessed) to leave the problem unsolved. Other students were more easily satisfied, and some who were influenced by

popular writers have every confidence in the existence of (a) an "Old English Starling," and (b) a "Siberian Starling" that is rapidly ousting the native race. I will deal with this question of subspecies shortly, but would first like to draw attention to the roosting habits. To-day, in England, the bird is best known as passing the night in trees, bushes, or reed-beds; occasionally I have seen them congregating in ivy-covered cliffs, but never in buildings until the present spring, when I discovered that large numbers spent the night in the stonework at the summit of the Nelson Monument in London—a strange sight and an unusual chorus for Trafalgar Square. Macgillivray describes Starlings roosting in winter in caverns in the Hebrides, and Montagu and other old authors speak of them congregating in winter in dovecots for the sake of the warmth.

In returning to the question of the races of the Starling, I cannot do better than quote the words of Dr. R. B. Sharpe (Cat. Birds B. M., vol. xiii. p. 29):—"The Common Starling of Europe is easily distinguished by its colours—green head, green ear-coverts, green throat, green scapulars and wing-coverts, and steel-blue or greenish flanks. The Siberian Starling (*S. menzbieri*), which visits India in winter, and which has always been called *S. vulgaris*, differs from the English bird in having a reddish-purple head, ear-coverts, and throat, and also in its violet-purple flanks. In the British Islands, and doubtless in other parts of Europe, intermediate examples occur, more frequently in winter, when a large immigration of foreign Starlings into England takes place. These intermediate specimens vary to any extent as regards the amount of purple on the head and throat, but they are never, so far as my experience goes, true *S. menzbieri*, as they have always green ear-coverts. It may well be that a species exists in Eastern Europe which has a purple head and throat and green ear-coverts, and that this bird migrates southwards and westwards in winter, and that numbers of them stop in England and mate with our indigenous birds, which have in consequence been made to vary more or less in the direction of a purple head and throat."

Writing sixteen years later (Hist. Coll. Brit. Mus. (N. H.), vol. ii. p. 480), Dr. Sharpe refers again to the subject, and speaks of the course and extent of his observations. He writes :

“No practical result came from all this trouble and expenditure. . . . The conclusion arrived at was that, while Starlings from Western England were apparently true *Sturnus vulgaris*, indistinguishable from the typical Swedish bird, a number of those from the east and south of England were intermediate between the true *S. vulgaris* and *S. menzbieri*, being much more purple than green on the head. The inference was that the Siberian Starling, extending its range westward, interbred with the ordinary *S. vulgaris* of Western Europe, and that the result was a mixture, just as in the case of the Carrion Crow and the Hooded Crow.”

No observer can deny that the Starling in England to-day is, for good or for bad, directly or indirectly, a tremendous factor in agriculture and forestry. Its yearly increase in most districts (if not in all) is obvious to everybody. We can hardly collect too much information relating to its range, habits, or past history, and we cannot too greatly deplore the way in which most students have neglected these questions. Perhaps the country is now too well colonized for us to discover the sources and the paths of the invaders, or even to be certain that the present hordes are descended or not from the indigenous stock. Something may be derived from a study of the psychology of the bird, as I have indicated in the first part of this paper, but I shall endeavour to prove that we can get but equivocal results from the consideration of colour, or of races or subspecies that are based on colour.

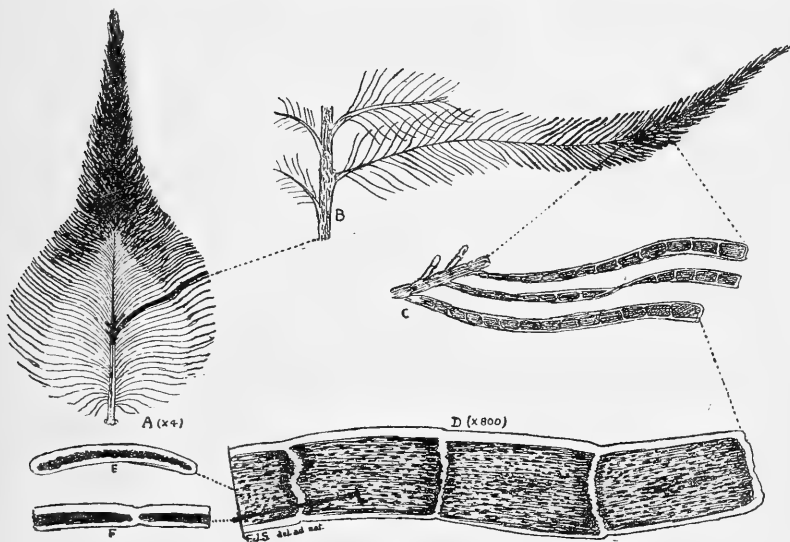
The plumage of the Starling offers a good example of what have been not very happily called “metallic colours,” but the term is a well-known one, and it is not necessary here to present a substitute. A Kingfisher’s feathers, although they change in accordance with the positions of the observer and the light, are not metallic in the ordinary acceptance of the word (*cf.* Zool. 1910, pp. 462–470), but the feathers of the Peacock, Humming-Bird, the speculum of a Duck’s wing, &c., are metallic. Several attempts have been made to solve the problem of the cause of these changing effects, and two distinct explanations have been given, but only one has been generally accepted by British ornithologists. Unfortunately, this one suffers from two defects: it is based upon the presence of structures that have never been

seen in any feather, and upon a complete reversal of the laws governing the action of a prism upon a beam of light. This theory, which originated more than half a century ago with Prof. B. Altum ('Naumannia,' 1854, pp. 293-304; and 'Journal für Ornithologie,' 1854, p. xix.), suggests that the colours of metallic feathers are due to the action of a series of prisms in the structure of the feather; but his papers were not based upon any rigorous microscopical examination, and his views could never have attained their present currency in England had they not been repeated in 1882 by Dr. H. Gadow (P. Z. S., 1882), who was cautious enough to add (p. 418): "There are, however, several *observed facts* which need an explanation, since they seem rather to upset this theory." Unfortunately, this caution was not extended to the more widely circulated article in Newton's 'Dictionary of Birds,' which is marred by several faults—obvious enough to the thinking reader or the original observer, but likely to be overlooked by the general ornithologist. In the earlier paper a diagram of a "prismatic" feather is properly termed "hypothetical," but in the 'Dictionary' article the figure is reproduced above the inexcusable title, "Diagrammatic Section through the Barb of a Metallic Feather."

I have examined some hundreds of sections of metallic feathers under the microscope, and have never seen anything even remotely resembling this figure; and it should be obvious that, even if these prismatic layers did exist, their spectra would be projected inwards and so be quite invisible. Too much stress is laid on the assumption that these metallic colours are always those of the spectrum; yet in the eyed feather of a Peacock's train we can easily isolate sage green, raw sienna, burnt sienna (I use these well-known names advisedly), and other impure tints. It will thus be seen that the objections to the "prismatic theory" are very great: (1) the prisms have never been seen; (2) if they did exist, their spectra, according to the laws governing the path of light through a prism, would be invisible; and (3) other colours besides pure prismatic colours are conspicuous on many metallic feathers.

The true explanation is that the colours are *thin plate* or interference colours. This is no new discovery, and the fact seems to have been accepted without question by physicists for

many years ; but the first discussion by an English-speaking ornithologist is that by Mr. J. Amory Jefferies in the ' Bulletin ' of the Nuttall Ornithological Club (vol. vii. 1882, pp. 123-135). In 1895 B. Walter discussed the interference colours of feathers in ' Die Oberflächen oder Schiller-Farben,' and Prof. Victor



FEATHER FROM THE NECK OF STARLING.

The sketches were made by transmitted light from a purple hackle taken from the neck of a Starling, but, so far as I have been able to discover, there is not even the faintest difference in microscopical appearance between a green and a purple feather, and this is also the case when feathers have been treated with caustic potash, and altered in colour. The metallic effects are produced only by the specially modified barbules (figs. c and d). In figs. a and b their distribution is indicated by the heavier shading. The line sketch does not give the happiest idea of the appearance of the pigmented segments. Viewed under the microscope these have almost the exact appearance of tiny panels of polished oak or teak. They are deep brown in colour, and somewhat transparent, but the outer sheath is perfectly colourless and quite transparent. In the Starling these segments are by no means "overlapping compartments," and I have shown their form in figs. e (a transverse section) and f, which is a longitudinal section taken along the heavy black line on d.

I see no reason to doubt that the brown centres to each segment are nothing but pigmented areas, for we get the same appearances in tracing the commencement of the pigmented parts on the rachis of the feather, and the granular structure is confined to the dark central layer, and not, I think, to the outer transparent sheath. The changing tints of the Starling are thus due to the glossy segments of the barbules, and some readers may be interested to know the result of a calculation as to the number of facets visible on the living bird : there are between 45,000,000 and 70,000,000.

Fatio, in his interesting and suggestive paper on "Des Diverses Modifications dans les Formes et la Coloration des Plumes" ('Mémoires' Soc. Phys. et H. N. de Genève, xviii. 1866), quotes briefly other Continental authors who have held this theory of thin plate colours. Mr. C. E. Benham has been good enough to put me on the track of work by the late Mr. Lewis Wright, an interesting writer on the science of colour and light, and far better known as an expert on the economical aspects of the Common Fowl; but, although I have not been successful in seeing any long study of metallic feathers, he was clearly a believer in the colour being due to thin plates.

Many insects and molluscs exhibit interference colours. The shell of *Halotis* gives wonderful effects, and responds to light in exactly the same way as does the plumage of the Humming Bird (see Dr. Gadow's diagram of "Positions for viewing Prismatic Feathers," P. Z. S., 1882). In the case of the shell it is easy to demonstrate, by the simple test of using alternately transmitted and reflected light on a minute flake under the microscope, that the colours are really due to thin plates and not to prisms. Quite recently (*cf.* 'Nature,' May 17th, 1912, p. 272) it has been proved that the iridescent colours of insects are due beyond any question to thin plates, and may be altered by the application of pressure.

Perhaps I might digress a moment to state that "thin plate" colours are produced by the action of thin films of any transparent substances on ordinary light. Speaking roughly, we only get these colours when the thickness of the film does not exceed  $\cdot 000015$  of an inch or thereabouts, and every alteration in thickness alters the colour of the light reflected or transmitted. A simple experiment is to drop a minute quantity of turpentine on the surface of warm water, and then observe the changes of tint as the film spreads and evaporates. When we hold the water in a shallow black japanned tray the effects are wonderfully brilliant, and everybody must have noticed the vivid colours even on patches of oil in wet streets. It is wrong to call these colours "prismatic." They have nothing whatever to do with prisms, and, moreover, we get tints that are unknown in the spectrum. As a rule, the brilliant colours alone catch the ordinary eye, but a moment's attention will show the presence



of zones of browns, dull greens, reddish whites, &c. The exact relation between each colour and the thickness of the film has been ascertained in glass, water, and other substances, but it is not known in the case of the ceratin of feathers.

The difficulties attending the microscopical examination of feathers are very great. In spite of the most careful methods of imbedding and cutting, the sections of metallic feathers exhibit little of value. It is impossible to learn the nature or the extent of the transparent outer sheath, but stained and oblique sections show that it is actually present. I have only discovered one way of demonstrating the true nature of metallic feathers, and that is by the use of solutions of caustic potash. This is a solvent of ceratin, and by it we can remove a portion of the thin outer film, and as each particular colour depends upon a certain thickness of the layer, the general tint of the feather is affected at once by the potash, and we get some illuminating results from our experiments.

The comparatively dull colours of the Starling prevent it being a convenient subject, and for experimental purposes I have found other birds more suitable. Peacock feathers are admirable, as are those of Ducks, exotic Pigeons, or Humming Birds; and by the exercise of ordinary caution I have turned green feathers to brown and red, red to green, and so on. In most instances these changed colours are permanent when the feathers are dried, and a Humming Bird with an area of golden green in the middle of a specific ruby patch, or a tail-feather beautifully green where it should be violet, is well worth the trouble taken in its metamorphosis.

In the Starling the potash removes the lustre of green feathers, and changes purple feathers into green. Those who have not made the acquaintance of the wide range of thin plate colours need to be warned that this does not *quite* prove that the critical layer of ceratin is thicker in purple feathers than it is in green, but for our present purposes we can assume that it is so. Thus it would be possible, in theory, to change a specimen of *Sturnus menzbieri* into typical *S. vulgaris*, but in practice this would be impossible, unless we treated the plumage feather by feather. Here we have an illustration of the dangers that attend the student who attaches too much importance to colour

in questions of the relationships of birds. The difference in colour between the extreme *S. menzbieri* and *S. vulgaris* seems enormous, yet when we inquire into the source of these tints we learn that the only difference lies in the thickness of the transparent outer layer on certain parts of certain feathers, and at the outside this difference cannot be more than one fifty-thousandth part of an inch, and is probably much less.

In certain birds these metallic feathers are variable to some extent. I recollect once noting this in examining the purple specula of a batch of male Pintails. Often we find metallic colours appearing more or less sporadically in certain birds—for example, Ruff, Common Snipe, or even Red Grouse. This is easily explained by the theory of thin plate colours, which depend upon the simplest possible structures, but the phenomenon would be inexplicable to one who believed that metallic feathers owed their lustre to an elaborate system of prisms.

It is not then surprising to learn that Dr. Sharpe failed to reduce the chaos of our forms of Starlings by a study of their colours. Really one is justified in discussing the possibility of *S. menzbieri* leaving Siberia in its typical form, and arriving in England as the green-headed *S. vulgaris* merely through the wear and tear of the journey. Fatio, working along quite different lines, attempts to show how this is possible, and with the Starling; and I have myself tried the plan of rubbing the feathers with a pad of blotting-paper, in an attempt to wear down the colour. The best way is to cover half the feather with a piece of thin tough paper, so that the worn part may be compared later with the protected part. There is certainly a change of colour, and one in the right direction—from purple to green, but I must confess that I cannot hold the experiment to be free from the chances of error, nor productive of unequivocal results, owing to the fact that the feather presents not a flat surface, but a series of tiny curved facets.

The longer we live the more conscious we are of our ignorance of the real meanings of bird coloration. Mere questions of *values*, as discussed by that sagacious and keen-witted American, Mr. A. H. Thayer, may be solved, as he has worked, by accurate observation; but when we come to *colour*, we are at sea immediately. Years ago Dr. Waelchili demonstrated that some birds

(Finch, Pigeon, Common Fowl—possibly all birds) are colour-blind to blue. I have not been able to consult the original paper ('Onderz. Phys. Lab. Utrecht,' 1881, vi. pp. 297-314), and know only of his careful work with the micro-spectroscope on the retina through an article by T. Brudenell Carter (*cf.* 'Nature, May 15th, 1890, pp. 55-61; and 'Smithsonian Report,' 1890, pp. 687-704). How many ornithological students have stopped to consider this question of colour-blindness in birds? \* Romanes has shown that some at least of the higher Apes are colour-blind, and it is comparatively a modern discovery that many men are so afflicted. The writer of a well-known work dealing largely with the colours of birds makes one statement that is so much at variance with my own experience that I cannot avoid thinking one of us must be abnormal; and this does not help one to accept with any confidence the lively speculations made in the past by those who have written on the æsthetic tastes of birds.

The inside of a pearly shell is quite as beautiful as the lustre of a Starling, and the same colours are repeated in greater brilliance when a drop of oil spreads on still water. In two of these cases we can agree that the beauty is useless—and can we not think that the beauty of a Starling or a Humming Bird is useless also? The actual polish of the feathers certainly repels water, and is so far useful, and perhaps we can ascribe the colour to the fact that the feather has a sort of reservoir of new surfaces, and that when one surface becomes worn and roughened another is ready to take its place, in exactly the manner in which we use a sketching or a scribbling block. Here we should have in a reversed form the changes that lend the colour to the growing *Halotis* shell, where the lining is produced in thin layers. Of course this is pure speculation, and I should not like to think that it would be accepted as anything else.

Like most other common birds, the Starling is well worth

\* In spring the House-Sparrow frequently does much damage to crocuses in our gardens. The blooms are destroyed, but, apparently, not eaten, and many people have remarked that the yellow crocuses are the chief sufferers. Indeed, I have been informed that Sparrows *never* touch purple flowers. This is not correct, for I have seen them destroy the purple varieties of crocus; but there is no question that the yellow kinds are far and away the worst sufferers. This quite agrees with Waelchili's investigations on the structure of the "rods and cones" of the retina.

intimate study. We owe it to those who are to follow us that we should put on record any points in which it may be undergoing change. Colour is not, I think, one of these, and I have added the latter part of the present paper in the hope that it may prevent other students attaching too much importance to the extremely thin layer of ceratin on which the tints of the bird depend. To urge the chromatic stability of such species as *S. indicus* as an objection seems illogical, for the birds are living under far different conditions. To me it seems that the colours of the genus are instable, but the points of psychology appear to be less subject to change and more eloquent of past history, and in this light it becomes more important to know whether a bird does or does not perch on sheep than to learn the colour (and in this the structure) of its plumage. Indeed, the mind and habits of the Starling might well be investigated along several other avenues—its mimetic song, polyandry, the theories of the “psychology of crowds” as applied to aerial evolutions. All these have some bearing on its increase, and so, through agriculture, on the larger problems of human life.

## SOME NOTES ON THE NESTING OF THE TAWNY OWL (*SYRNIUM ALUCO*).

BY J. STEELE ELLIOTT.

*May* 10th.—8 p.m. : A Tawny Owl hooting freely during the daylight in a small plantation at the back of my house which adjoins the Wyre Forest.

11th.—7.30 p.m. : Three young, about a fortnight old, found inside a hollow apple-tree in my orchard ; the tree some thirty yards distant from the plantation whence I watched the Owl hooting last night. The female was in the hole with the young, and as she refused to leave by either of the two entrances, I was able to place marking-rings on both her and her young. One pellet only, containing the remains of a rat and that quite recently ejected, was in the nesting-hole, and from its size ejected by the adult bird. No trace of any food in the nest. 8.15 p.m. : The male flew out of the plantation to one of the orchard trees, but did not hoot. I watched the nest until 9.20 p.m., when it was too dark to make further observation from a distance, so I visited the nest again to make sure that the female was still there. At 10.35 p.m., whilst standing on a short ladder to feel into the nest, the entrance of which is some eight feet from the ground, and the hollow eighteen inches deep, I was struck a severe blow on the back of the neck by the male bird ; being taken unawares (although I have experienced a similar attack before when climbing up a tree to replace a young one that had fallen from the nesting-hole) I jumped to the ground and pulled my coat over my head just in time to ward off a second attack. Lighting a candle prevented my being further molested, and I was then able to satisfy myself that the hen bird was still with the young.

12th.—10.30 a.m. : No remains of any food or pellets in the nesting-hole. The removal of pellets from their nesting quarters

by this Owl seems to be an invariable rule, so unlike the Barn Owl, where a large accumulation remains.

13th.—7 a.m.: Hind-quarters of young rabbit in nest. 6.30 p.m.: no trace of any food remains. Two pellets of Tawny Owl taken from the roosting-place of another pair placed in the nest. 8 p.m.: the male bird being mobbed by small birds in the plantation. 9 p.m.: female on nest. 12 midnight: female still in nesting-hole with young, and one of the pellets placed in nest removed.

14th.—7 a.m.: No trace of any food remains. A portion of one pellet placed in nest by me not yet removed, probably the young ones had pulled it into parts. 9.30 p.m.: male bird heard hooting loudly near at hand, and visiting the nest at 10 p.m. I found it contained a half-grown rat recently killed, as it was still quite warm and partly eaten.

Although I constantly hear the male bird hooting loudly at a considerable distance away, it is very rarely that he hoots close at home.

15th.—7 a.m.: No remains of rat or other food in nest, and all portions of pellets also removed. One young one taken from nest and placed in a basket for the day. 7 p.m.: young one has ejected pellet in the interval; it contained some remains of the rat, all the larger bones, including the skull, were fractured. The skull was entire when examined in the nest the previous night. To-night is damp and cold, and the mother is brooding over her young with outstretched wings.

16th.—7 a.m.: No trace of any food in nest. A young one again removed. 6 p.m.: no pellet as yet cast by young one in basket. 8 p.m.: a pellet now in the basket. Pellet only contained a few bones, mostly fur.

The cleanliness of their nesting quarters puzzles me considerably. It is very rarely that any excrement or pellets are found in the hole at any time of the day or night. The young kept by me voided about three times during twelve hours and cast a pellet in the evening. There seems no alternative but that the fæces and pellets are either withheld until the nest is visited by the male bird, or those of the young swallowed in the meantime by the female. Remains of food, such as the larger bones, skulls, &c., which cannot be fractured and swallowed, are

removed to some distance. I have never found any traces of food pellets or excrement near the nesting quarters.

17th.—7 a.m. : No traces of food in nest.

20th.—7 p.m. : The first time I have visited the nest and found the female absent from her young. A pellet placed in nest on previous visit has been removed. A freshly ejected pellet, containing a few small bones and fur, also legs and elytra of dung beetle and cockchafer. 8.50 p.m. : no additional pellets in nest. Although still quite light, I was attacked by one of the old birds and struck on my back, a second swoop being warded off. I watched nest at a distance until 9.20 p.m. ; one of the old birds had called frequently from a pear-tree during the earlier part of my observation, and after remaining for some time I concluded the old bird had flown away so I approached the nest again for further investigation. I was under the impression I was keeping a sharp look-out, when, without any warning, I felt a terrific blow on the side of my face, and I was partly dazed for the moment. The Owl had torn my ear and side of my face with her talons, and my hearing was affected for a day or so as the result of the blow. From the vicious swoop made I came to the conclusion that it was the female that had now attacked me, and I made a note at the time, wondering how the bird escaped injuring herself by the contact. The impetus with which the swoop is made is sufficient to knock the life out of a rat or similar prey.

21st.—6 p.m. : No pellets or food in nest. One of the old birds roosting in plantation within thirty yards of nest.

The male bird appears to roost throughout the nesting period in close proximity to the young, the female remaining with the young throughout the day, and probably practically the whole of the night as well, until the young are some three weeks old, and then seldom leaving the nest unguarded until the young are on the wing, thus leaving the male bird free to provide food both for female and its young.

23rd.—7 a.m. : Rained all night. One young one has fallen from the nesting-hole and found at foot of tree and replaced. The young are now old enough to clamber upwards to the entrance. No food remains in nest.

24th.—6.45 a.m. : The above young one dead in nest and

removed, no portion of it had been eaten. Hind portion of one and the back leg of another young rabbit, legs and tail of a Starling, and portion of Long-tailed Field Mouse in the nest. I did not contemplate being attacked by the old bird during the bright sunshine until this morning, when I received another blow on my collar.

I am of opinion that birds of prey seldom hunt for food in the immediate vicinity of their nest, and these observations tend to confirm this belief. In close proximity to the nest I have a considerable number of cross-bred white rabbits, and although their numerous young ones must be a conspicuous prey for Owls, none of their remains are ever found in nest or in the pellets.

31st.—7 a.m. : One of the old birds flew from plantation to apple-tree next to nesting-tree but did not attack. Amongst part of the refuse taken from the bottom of nesting-hole are the feathers of a Mistle-Thrush, some portions of pellets containing the legs and wing-cases of several cockchafers, and one or more dung beetles. Some parts of excreta are now found in the nest. 7.30 p.m. : whilst standing on the ladder to inspect the nest, one of the old birds immediately flew from the plantation direct at me. I held out the straw hat I was wearing at arm's length for protection; the force with which the Owl struck the hat stunned the bird, and she fell motionless to the ground some few feet distant beyond the tree. It proved to be the hen bird, as I had anticipated. In striking the hat she had forced it from my grasp, and in so doing considerably bent the double straw brim and driven her beak right into the angle of the crown, which was evidently the cause of her disaster. In a quarter of an hour she again showed signs of life, and in a few minutes after she had recovered sufficiently to fly from my house to the top of a beehive in my garden some twenty yards distant. Here she remained another fifteen minutes, allowing herself in the meantime to be freely mobbed by the small birds until a Mistle-Thrush, with more daring than all the other birds, gave her a severe buffetting, when she once again sought the plantation.

June 1st.—6.45 a.m. : As a protection from further attack I took an open umbrella with me to the nest. But in vain, for the old bird attacked me in exactly the same way as last night,



and ripped the umbrella cover right across. Remains of a rat in nest. Four large pellets put into nest the previous night have all been removed.

2nd.—9 a.m. : One young one sitting outside at entrance to hole. Owl attacks again; in this instance I waved the umbrella round, endeavouring to scare her, but without success, and she ripped it this time across the side.

3rd.—7 a.m. : I took a second person with me to the nest. The Owl was seen but did not attack. One young had left the nest, and was perched in apple-tree close by.

4th.—7 p.m. : The nest empty. One young perched in tree near at hand. Upon an examination of the remains on the floor of the nest I found the leg of a Starling, several pin-feathers from wing of young Jay, four fractured leg-bones of rats, two pairs of lower jaws of voles, and few more remains of cockchafer and dung beetles, a few small portions of pellets, and a small amount of excreta.

16th.—Both young still continue to roost in the plantation. Each night at dusk they call vociferously for food. To-night, at 9.15 p.m., they were crying out one on either side of the valley, eventually the one crossing over to the far side to join the other. Soon afterwards one of the parent birds hooted in reply to the cry from the opposite side, when both young immediately recrossed in answer to the call.

22nd.—10 p.m. : At the time of closing these notes for publication the young may still be heard uttering their monotonous cry for food.

30th.—Up to this date the two young Owls, with at least one of the old birds, always somewhere near at hand, have continued to spend the daytime in the plantation next the orchard.

## ON THE FURZE WARBLERS OF FRANCE.

BY COLLINGWOOD INGRAM.

DURING a recent excursion through Western France I was able to collect a small series of Furze Warblers. Having compared these with specimens in various French museums and with those in the British Museum, I have come to the conclusion that the form found in the soft climate of Western France (and probably down the Atlantic coast as far as Spain) is intermediate between the British *Sylvia undata dartfordiensis*, Lath. and the typical *Sylvia undata* from Provence, &c. In my opinion, therefore, Cretté de Palluel's name *aremoricus* ('Ornis' x., p. 42) should be retained for this western race.

We will compare the upper surface first. All the English specimens I have examined have these parts hair-brown, at all seasons darker and browner than in *S. u. aremoricus*. Admittedly the latter bird, even in worn plumage, has the back (and, to a lesser extent, the head) washed with brownish, but this colour is constantly lighter and of a "greyer" shade. (It must be remembered that the brown coloration is always more pronounced in the freshly acquired plumage of autumn and winter.) During the summer the typical *S. undata* has the crown and back almost uniform slaty-grey, with only the faintest tinge of brown on the mantle. The head is almost invariably of a clearer and more slaty hue. Even at a distance this gives the bird a noticeably paler and greyer appearance.

We will now take the under surface. In the English *S. u. dartfordiensis* the feathers on the throat and upper breast are never so distinctly tipped with white, and as the season advances these marks disappear almost entirely, even from the throat. The vinous-chestnut seems to cover a larger area, and is darker, and of a richer and much more rusty hue. *S. u. aremoricus* only differs from this bird by having the under parts slightly less rusty in colour. The throat-feathers in summer usually have very small, but distinct, white tips.

*S. undata* has the under surface conspicuously paler and more vinous, with a greyish wash on the flanks, and the throat-feathers are always more distinctly tipped with white. In winter the feathers on the under parts are heavily bordered with white.

The distribution of the various races appears to be roughly as follows:—

*Sylvia undata* (Boddaert). Northern shores of the Mediterranean basin, east to Italy.

*S. undata aremoricus*, de Palluel. The Atlantic coasts from Finistère and North-west France to Spain (?) (Portuguese specimens seem to agree perfectly with those from Western France).

*S. undata toni*, Hartert. North-west Africa. (A slightly smaller race.)

*S. undata dartfordiensis*, Latham. Southern England.

THE BIRDS OF THAT PORTION OF THE NORTH-EAST COAST BETWEEN TYNEMOUTH AND SEATON SLUICE, NORTHUMBERLAND.

BY J. M. CHARLTON.

ADDENDA ET CORRIGENDA.

ADDITIONAL SPECIES.

LESSER WHITETHROAT (*Sylvia curruca*).—I have examined a male shot in Holywell Dene, May 3rd, 1905, by Mr. J. Proudlock.

BLACKCAP (*Sylvia atricapilla*).—An adult female in Mr. Proudlock's possession shot in Holywell Dene, spring 1896; an adult male shot, 1892, of which he has a drawing.

GARDEN-WARBLER (*Sylvia hortensis*).—Occurs regularly in spring and nests have been found in Holywell, the eggs of which I have examined.

WOOD-WARBLER (*Phylloscopus sibilatrix*).—Occurs sparingly on migration; one or two pairs nest at irregular intervals in Delaval Hall Avenue.

GRASSHOPPER-WARBLER (*Locustella naevia*).—Occurs regularly in late spring; a few pairs breed, and I have examined eggs taken in Holywell Dene.

COAL-TITMOUSE (*Parus ater*).—Of infrequent occurrence in Holywell during winter.

HAWFINCH (*Coccothraustes vulgaris*).—A pair observed closely by Mr. Proudlock in Holywell, spring 1898.

SISKIN (*Carduelis spinus*).—A winter visitant; occurring some years, but others entirely absent.

MEALY REDPOLL (*Linota linaria*).—Irregularly occurs on coast in varying numbers; abundant in 1910.

TWITE (*Linota flavirostris*).—Sometimes captured in winter with other finches by limed twigs of pitmen.

[LITTLE BUNTING (*Emberiza pusilla*)].—On Dec. 8th, 1911, I observed a bird within six yards during a foggy evening on Cullercoats cliffs, which corresponded exactly with the description of the immature of this species.

TENGMALM'S OWL (*Nyctala tengmalmi*).—For my account of a specimen "winged" in Holywell Dene, Jan. 1912, see 'British Birds,' June 1912. It was caged and is still alive.

[LITTLE OWL (*Athene noctua*)].—I notified the occurrence of a possibly genuine wild individual picked up in Whitley, Nov. 1911, in 'British Birds,' Feb. 1912.

HEN-HARRIER (*Circus cyaneus*).—An immature female shot in Holywell Dene, Jan. 24th, 1912 ['British Birds,' March, 1912].

BERNACLE-GOOSE (*Bernicla leucopsis*).—Two shot by Mr. Amos Winslip, St. Mary's Island, winter 1882-3. Another by Mr. J. Mitchison, same locality.

STONE-CURLEW (*Edicnemus scolopax*).—Two recorded by Mr. G. Bolam as observed, and one of them, an adult, shot Jan. 1st, 1897, near Earsdon.

[BLACK-WINGED STILT (*Himantopus candidus*)].—One believed to have been seen by Mr. Proudlock near Holywell, spring 1889. It was by an inland pond, and was clearly observed both before and when in flight.

GREAT SNIPE (*Gallinago major*).—One shot in fields near Holywell, 1900. Examined and preserved by Mr. Proudlock, who noted characteristics.

BLACK-TAILED GODWIT (*Limosa ægocephala*).—On Sept. 8th, 1869, Mr. R. Duncan shot two immature birds from a flock of four flying north at St. Mary's Island.

[IVORY GULL (*Pagophila eburnea*)].—A specimen in the late Mr. T. Thompson's collection said to have been shot off the mouth of Tyne, but that gentlemen and others did not think it authentic.

[BRÜNNICH'S GUILLEMOT (*Uria bruennichi*)].—Mr. G. Bolam records that at one time the late Mr. Howse suspected one or more to have been shot off the Tyne, but could not trace them.

Further investigations have made the following notes necessary :—

RING OUZEL.—Probably regular if rarely observed migrant. I have several other records.

WHINCHAT.—Still breeds sparingly in favourable localities. Have examined local eggs.

REDSTART.—Breeds in stone walls around Holywell.

BLACK REDSTART.—A male shot near Delaval Hall, winter 1897.

CHIFFCHAFF.—In his book on 'Birds of Northumberland and

the Eastern Borders,' Mr. George Bolam has entirely misrepresented my remarks in this paper, when he says that I mention this species as scarce in Northumberland; it is obvious that I merely stated that it was rare *in winter*.

SEDGE-WARBLER.—A few pairs breed regularly in Holywell Dene; I have examined unblown local clutches.

HEDGE-SPARROW.—Mr. Proudlock has a fine cream-coloured specimen shot in Holywell about 1892.

GREAT TIT.—Nests have been found at Holywell; I have seen eggs.

MARSH-TIT.—Several more occurrences.

TREE-CREEPER.—A few more occurrences.

PIED WAGTAIL.—A fairly common breeding species.

YELLOW WAGTAIL.—Nests found on several occasions in the past few years in cornfields around Holywell by Messrs. Hodgson and Proudlock; I have seen the eggs.

GREY WAGTAIL.—Two nests recorded, Holywell Dene, 1904, 1907; eggs examined.

TREE-PIBIT.—I have examined eggs from a nest in Holywell, taken 1906.

GREAT GREY SHRIKE.—Several more definite occurrences; one in late spring, 1912.

WAXWING.—Four killed at one shot, Holywell Dene, winter of 1904. Another, winter 1909.

PIED FLYCATCHER.—Evidently regular spring migrant in small numbers.

HOUSE MARTIN.—A pure albino shot, St. Mary's Island, 1894.

LESSER REDPOLL.—Nests have been found in Holywell Dene. I have examined clutches. Seldom occurs in autumn or winter.

REED-BUNTING.—A local name is "Rasher" Bunting; the vernacular for reed.

ROSE-COLOURED PASTOR.—Mr. G. Bolam states that at least one has been killed at St. Mary's Island (in about the seventies).

SHORE-LARK.—Small flock seen passing south at Cullercoats, Oct. 30th, 1911 ('British Birds,' Feb. 1912).

GREAT SPOTTED WOODPECKER.—The second specimen recorded, on examination by Dr. N. F. Ticehurst proved to be of the Northern Continental form ('British Birds,' Dec. 1911).

HOOPOE.—One shot, Hartley Pans, autumn 1902.

CUCKOO.—Mr. Proudlock has almost yearly found a young bird in Holywell Dene.

BARN-OWL.—Definite proof of nesting in Delaval Hall. All specimens examined of white-breasted form.

ROUGH-LEGGED BUZZARD.—Can, at present time, be termed a regular migrant ('British Birds,' Feb. 1912).

HONEY-BUZZARD.—A fine male shot at Holywell about 1904, in possession of Mr. James Elder; a very dark bird.

BRENT GOOSE.—In a note in 'British Birds,' May, 1912, I have given proof of the northward migration to Holy Island in Jan. and Feb. 1912.

PALLAS'S SAND-GROUSE.—Two more shot from flock at Island on May 20th, 1888, by Mr. J. Smith. They were locally known as "Pintails."

QUAIL.—One or two heard fairly regularly each spring.

DOTTEREL.—I have three or four more records within the last ten years.

SNIFE.—Has bred on one authentic occasion in Holywell Dene.

DUNLIN.—Regular visitant in autumn and winter.

LITTLE STINT.—Mr. Duncan and his father shot three from a flock of fifteen at St. Mary's Island, Sept. 1855.

REDSHANK.—Has bred on several occasions in the vicinity of Holywell.

BLACK-HEADED GULL.—Account of movements of flies and gulls, 'British Birds,' March, 1912.

GLAUCOUS GULL.—Immature, observed by myself in heavy storm, Nov. 27th, 1911, at St. Mary's Island. Others have occurred. Local name "Tallow" Gull.

ICELAND GULL.—Immature closely observed by H. V. Charlton, Jan. 31st, 1912, at Tynemouth.

LITTLE AUK.—Great passage of this species along the entire coast, Jan. 1912, recorded in 'British Birds,' March, 1912, and in 'Zoologist.'

GREAT CRESTED GREBE.—Adult winter plumage, shot 1884, St. Mary's Island.

FULMAR.—An adult male brought to me Nov. 1st, 1911, caught on sands at Whitley and kept alive for a day.

My thanks are due to Mr. John Proudlock, Seaton Delaval, for many notes.

A SEASON WITH THE BIRDS OF ANGLESEY  
AND NORTH CARNARVONSHIRE.

By T. OWEN.

THE 21st day of February dawns at last, when it has been proposed that we should visit the mountains to observe our friend the Raven. The Thrush has been pouring forth its sweet music from the early morn, and the Great Tit, with its saw-rasping note, has been active in the trees about. The day does not look very promising, but all is well up to 2 p.m., and we lead forth our bicycles into the roadway, and soon are riding towards our destination, eleven miles away.

On the way we see a flock of Sea-gulls which have just left off following the ploughman at his work, and are flying off probably to the now ebbing tide to gorge themselves furthermore, much to the relief, we suppose, of both the man and horses. A Chaffinch, busily feeding on the roadway, waits until the front wheel of one of our machines is upon it, and nearly becomes entangled in the spokes, but somehow it manages to flit on to a hedge, uttering a sweet "pink, pink." After riding for a couple of miles or so in this mountainous district we come to a good-sized lake, on which we perceive six Wigeon, their chestnut-coloured heads being conspicuous a long way off. We still have about three miles to cover before we come to the crag where a pair of Ravens are known by us to nest annually, but we soon arrive there and dismount.

Leaving our bicycles, we push forwards, and soon are climbing over the boulders and heather-clad slopes, stopping now and again to recover our breath, and meanwhile cast our eyes in various directions in the hope of seeing the Ravens. As we proceed we are suddenly attracted by a loud "kak, kak, kak" above us, and, looking up, we behold a Peregrine Falcon that has just left its look-out ledge, and is now flying spirally upwards. It swoops once again towards the ledge, and, giving



another call, it dashes off into the valley at such a pace that in a few seconds our eyes can no longer see the speck into which it has diminished. The next bird to attract our attention is the Wren, which we first of all hear and then see at a good distance off. How such a frail-looking bird as this braves the winter at a height of over two thousand feet above the sea-level excites our wonder.

After a somewhat stiff climb we are at length able to look down at the nest of the Ravens, for the wary birds have a well-chosen site, which can only be gained by the aid of ropes and skilful manœuvring on the part of the climber. Up to now no sign has been seen of the birds themselves—probably they are foraging the country around—but the nest has been seen to, as we can tell from the fresh-looking branches that are piled upon it. After some time, and just as we are about to leave, there falls upon our ears the sound that we have longed for, the croak of the Raven, and, looking out into the valley, we observe both the birds. But there is a third bird present; it is the Peregrine again, which follows them like a flash—now it is above them, and suddenly, like a thunderbolt, it falls—but the Ravens merely seem to give a half-turn of their wings, and the Peregrine goes on into space. However, it soon checks its downward rush, and immediately gains above them again to repeat its actions. This proceeds for a time until the Ravens settle down on a crag, and then the Peregrine is obliged to give up its “sport.”

On reaching the bottom of the mountain again we meet the keeper, who, with his gun under his arm, is looking for the track of a Fox that has been reported to him. We at once become inquisitive as to his knowledge of the birds of the locality, and are much delighted at the information that he gives us. When we asked him whether he tried to shoot the Ravens and Falcons, he replied that he did not, as they caused his charges no harm.

On February 24th we visit another locality up in the mountains in the hope of coming across another haunt of the Raven. Not much of bird-life is seen by us on the way, and the first bird seen that is worthy of mention is a Red Grouse, which we flush from the heather on the mountain side. On nearing the top of

the mountain attention is drawn to a large bird sailing in view overhead, and, from its rounded wings and tail and its circling flight, we know that it is a Buzzard. However, this afternoon no Raven flies forth from the many crags that we search to challenge us with its "croak, croak."

*March 6th.*—Snow mantles the mountain-tops as we set out to the Raven's haunt. When we come to the large lake we notice that the Wigeon are still there, and also, on a large boulder on the opposite shore, is a Cormorant. Coming at last to the nesting-site of the Corbies, we keep on the look-out for their dark forms as they would fly from the crag, but they do not appear, neither does the Peregrine greet us with its call as we start on our climb up. A little wool has been added to the nest, so that very soon now it ought to contain the first egg, but it was March 25th, 1911, when we visited the nest and found it to contain eggs. The Ravens at last appear overhead, and after bellowing out their croak they fly spirally upwards to a great height, and, after watching this fine aerial performance, we descend into the valley, where six Stonechats and a small flock of Plover are seen.

*16th.*—Owing to the state of the weather we decide to-day to go only for a short cycle ride, our chosen path taking us past a large rookery, and here we stop for a while. Some of the Rooks are already sitting, and others are busily engaged in getting material. Between the lot of them there is a terrific din, and here and there a battle-royal exists between those who prefer to steal material from the nests of others and the owners thereof. From the rookery we cycle on until we come to a small pond, where a Waterhen with its bobbing head and a pair of Wild Duck seem to be the only occupants. The piping note of a Dipper next attracts our attention, and then we see the bird itself as it darts swiftly over the pond.

*20th.*—On visiting the Raven's haunt to-day we find that the nest is in the same state as when last seen by us, and consequently we are greatly perplexed, for by now the nest should contain eggs. As we believe that there is but little chance of harm having befallen the Ravens, we come to the conclusion that they must have built a new nest elsewhere. A search among some of the rocks does not disclose it, and at length we

are obliged to give it up, but at the same time we determine to come here again and search further.

When we are down in the valley our attention is drawn by a mewing cry, and on looking up we see a Buzzard sailing gracefully along with motionless wings. Suddenly it throws itself forwards, and with wings drawn back it cleaves downwards through the air to earth. It seems exactly as if it was going to dash against the ground, but, no! for when it is but a few yards above it, it spreads its wings and tail out again, and then glides for about two hundred yards, rising once more to join another Buzzard that has appeared on the scene.

23rd.—To-day we walk along the bank of the Ogwen River, and see a Grey Wagtail and a few Dippers, but we do not find a nest of the latter species built as is usual against a part of a bridge across the river. In a plantation of small firs a Thrush's and a Blackbird's nest are found, both containing three eggs.

27th.—Permission having been obtained, we to-day spend the afternoon in Penrhyn Park. Taking ourselves to a corner of the park where there is a heronry, we are, on arriving there, greatly disappointed to see only a few nests, whereas last year there were more than a dozen. Of the few nests only two seem to be inhabited, for on our approach a Heron gets up from each, and these are built at the top of two exceedingly tall trees. Owing to the thickness of them both, and the scarcity of branches near to the base, we are unable to climb up and ascertain the contents of the nests. From the wall which bounds the park on the Menai Straits side we can see a few Redshanks wading in the mud by the Weir.

31st.—When out for a short walk about half a dozen Goldfinches are observed in a field.

The afternoon of April 3rd finds us cycling to Penmon, Anglesey. On the way we dismount, and, leaving our bicycles by the roadside, go into the adjacent wood to inspect a hole in an oak-tree, where we have been told a Tawny Owl nests annually. On climbing up to the hole a faint scrambling noise is heard inside, and presently two blue eyes peer out, and then the Owl wholly emerges and flies noiselessly away. A hand lowered down into the nesting-hole secures three eggs. These,

on being handled, at first give one the impression that they are the eggs of one of the hawk tribe, for they are profusely splashed with red. However, this is not due to there being a pigment present in the shell, for on wetting it quickly disappears, leaving a pure white surface. This colouring matter we find is the result of the eggs having been rolled about the bottom of the hole, which was lined with a substance of this colour.

Arriving at the Priory Woods, we begin to make a search, and soon we are attracted by a loud tapping noise. Stopping we make out the direction the noise proceeds from in order to see what we thought would be a Green Woodpecker, but what we behold is a beautiful pied bird—a Greater Spotted Woodpecker\*—which we keep following for a little time. In this wood there is a rookery, and as we pass beneath the nests the Rooks become very noisy. A half-finished nest of a Tree-Sparrow is come across in a hole in an old tree—at least we presume that it will belong to a Tree-Sparrow, for a pair of this species have built in the hole for some seasons past.

Quitting the wood, we make for the common, where Meadow-Pipits abound, and Lapwings rise here and there, calling out their weird note; but although we search carefully for their eggs, we fail to discover any. When returning to our bicycles we keep alongside the wood, and perceive a Green Woodpecker.

Good Friday finds us once more in the haunt of the Raven. When we are about six miles distant from it, two Ravens are seen circling above a high crag, and finally drop on to it, but we do not stop to investigate.

On arriving at our known haunt we are right glad to see two Corbies flying about, and we hide ourselves behind a boulder to watch their movements. The two birds keep at a good distance from the crag, but at last one of them flies towards it, swoops

\* Later, on consulting Forrest's 'Fauna of North Wales,' 1909, we found that the Greater Spotted Woodpecker was not recorded for Anglesey. On writing to Mr. Forrest to ascertain whether the species had been reported to him since the date of the publication of his book, he wrote back to say that it had not been, so that, to our knowledge, we have the pleasure of being the first to put it on record for Anglesey.

down on to a ledge, calling out a hoarse croak, and flying out again to its mate. After taking careful bearings of this ledge to enable us to know where to stop, we at once begin to climb up. The point is at length reached, and after some trouble one is able to look along the narrow ledge, where, to our joy, the new nest is found. However, it is not possible for us to look into the inside of it from this point, so that for this purpose we have to climb higher still. Then crawling along on all fours and running some risk, the edge of the precipice is thus gained, and a view of the inside of the nest obtained. It contains three young, as far as we can discern, which accounts for the behaviour of the two old Ravens when we approached the crag, and now they are wheeling close above our heads, croaking the whole time. While we are at this point we are attracted by the call of the Peregrine, and on looking up we see four of them keeping apart in pairs. Down in the valley, conspicuous by their white rumps, are a number of Wheatears, hopping swiftly from mound to mound as we approach them.

*April 6th.*—In the afternoon we walk up along the left bank of the River Cegin. Having been told of a Dipper's nest at a certain place where one was known to us last season, we, on coming to the spot, begin to search, and soon come across it, and find that it contains young. On proceeding along we perceive a Grey Wagtail as it flits by down stream with its undulating flight, and uttering a sharp "zisy." Further on up the river we come across another Dipper's nest, built against a steep mossy rock on the opposite bank.

*Easter Monday.*—Thinking of visiting another Raven's haunt that we knew of, and which needs a whole day to reach and return, we leave the town by the 7.50 a.m. train. Our journey by railway is only short, but before we arrive at the little station where we are to alight we see, when looking through the carriage-window, a brace of Partridges squatting low as the train rumbles past them. On alighting we deliver up our tickets to the stationmaster, who was the sole person on the little platform, and who bids us a pleasant walk. Passing a large rookery, where all the Rooks seem very busy, we enter into a narrow valley which is exceedingly well-wooded, and here we obtain a glimpse of a Sparrow-Hawk. A tramp

of three miles brings us to the first rock that we are to stop at. Here three years ago a pair of Buzzards nested and successfully reared off a brood of three young, but since then they have nested somewhere else in the same vicinity, for, although we have been unable to discover the new nest, the two old birds, together with their young, have been seen by us at the end of each season. The Buzzards are not about this morning, but we climb up to the old nest in order to see if there is any sign of their going to utilize it this spring, but it is in the same dilapidated state. No sooner than we reach level ground again it begins to rain, and we hurriedly seek for shelter. A shelter, however, we are unable to obtain, and in rushing about we frighten a Tawny Owl from its snooze in an ivy-clad tree. We determine to wait for an hour in the hope of it clearing up, but the hour is ended and still it pours, so we wend our way back, disappointed and uncomfortable in our wet clothes. On the way a Mistle-Thrush's nest with two eggs is found, and we also stop for a while to watch a gymnastic display afforded us by a couple of Long-tailed Tits in a small hawthorn.

10th.—We cycle to a wood not very far away from the town, where a Chiffchaff is seen and heard for the first time this season. After a long search for nests, the only one of interest that we find is a Long-tailed Tit's, which is built in a gorse-bush and is full of eggs. A Kestrel is also seen.

13th.—Another visit is paid to Penmon, and on arriving at the deer-enclosure we endeavour to find some Peewits' eggs, and in all we find about nine nests, all of which are empty, for the man who supplies the poultry dealer has been there before us in the early morn. A Carrion-Crow which appears overhead is at once chased away by the Peewits. After this we enter the Priory Wood, not very far off. In a hole that a Green Woodpecker had started to hack out last year, and the entrance to which had been enlarged with a knife, a Robin had built its nest, which contained five eggs. As one is in the act of climbing up to investigate a hole in a tree, and gripping on to a piece of bark in order to ascend, a big strip of the latter gives way and reveals to us a nest. This is a last year's structure of a Tree-Creeper, with one broken egg and two whole ones embedded in the feathers. A pair of Pied Wagtails are

seen sporting themselves at a pond. To-day two Swallows are observed.

20th.—We are unable to give this day wholly to the interest of bird-life. However, in riding along the narrow lanes we observe quite a number of Yellowhammers, Greenfinches, and a few Linnets, and also have the pleasure of hearing the Cuckoo for the first time this season.

24th.—This day again we are hindered from spending a whole afternoon with the birds, but at about 5 p.m. we take ourselves to a wood on the shore of the Menai Straits. Here we find many Blackbirds' and Thrushes' nests containing both eggs and young, and we notice that there are a few young Thrushes already on the wing. A pair of Bullfinches are seen, but they do not appear to have a nest at the place where they were disturbed.

26th.—When down by the Straits to-day a pair of Dunlin are seen, these being in summer plumage.

27th.—Having been informed that a pair of Mute Swans were nesting at a certain place in the county of Anglesey, we determined to cycle there on this date. Therefore, at 1 p.m., we start, and an hour and a half later we arrive at the lake, the only bird which we see on the way worthy of mention being a Sparrow-Hawk, which was flying low over the hedgerow. Leaving our bicycles we at once begin a detour of the lake, and as we proceed we disturb a few Redshanks from the water's edge. On approaching a part of the lake where some bulrushes are growing, we see a Swan resting on the shore, and on arriving nearer, it lazily stretches out one of its wings and, taking to the water, swims gracefully away. Reaching the swamp we look about and soon discover the object of our visit right in the centre of the bulrushes. When we try to get nearer to the nest we sink knee-deep into the mire, but at length we approach as near as we dare the sitting bird, which is now showing signs of anxiety and hisses. A few photographs of the Swan on its nest are taken, and then, as we are taking the camera away, an inquisitive farmer appears on the scene and demands to know what we are about; however, we soon set him at ease, and in turn become inquisitive ourselves as to the history of the Swans, but he is not able to tell us much. A little later we meet

an old gentleman who appears to be in charge of the fishing of the lake, and he tells us that the Swans have nested at the place for the last seven years to his recollection. Last year they had a brood of seven cygnets, and this year the nest contains eight eggs. He said that in winter the old birds frequently leave the lake, and he has known them once to have been away for nearly a month. Among the birds that frequent the lake, he tells



MUTE SWAN ON NEST. (Photo T. Owen.)

us, are a few pairs of Tufted Ducks, but we do not see them to-day.

May 1st.—To-day we visit the district round the old Buzzard's haunt. On the mountain side we see a Ring-Ouzel, and also obtain a fine view of a Kestrel that settles on a rock close to where we are resting. A loud cackling noise issues from somewhere below us, and after scanning about we at last see two Pheasants amongst the bracken, they being engaged in



combat. When we have descended again into the valley we find a Chaffinch's nest containing five eggs, and also come across two other empty ones of the same species. From close by a Green Woodpecker calls out its loud laughing note, and the other birds we see in going along include a pair of Tree-Pipits, Chiffchaffs, Wood-Wrens, and Willow-Wrens. At about 9.45 in the evening we hear the seven times repeated whistle of Whimbrel, as a flock of them pass overhead in a northerly direction.

4th.—We cycle to Castle Rock in Red Wharfe Bay, Anglesey, where Stock-Doves are known by us to breed. As we approach the precipitous side of the rock a Kestrel is seen to leave it, and a flock of Jackdaws that nest in the numerous holes start to fly around, "dawing" the whole time. A large number of Stock-Doves leave their nesting-holes, which we notice are nearly all at the top of the rock. When we reach a place where we can ascend we do so, keeping close to the edge when walking along. Some more Stock-Doves leave their nesting-holes, but only two of these are accessible, the one containing a single egg, and the other a couple of young a few days old. Coming to the place whence we had seen the Kestrel leave, we once more disturb it, but now we can look down and can distinguish its four ruddy eggs laid in a slight scratching on a grassy ledge. The same day we observe Swifts and hear the Corn-crake.

To be continued.)

## NOTES AND QUERIES.

## MAMMALIA.

**Habits of the Common Squirrel.**—In 'The Zoologist' (*ante*, p. 267) Mr. J. S. Huxley reported having noticed a Squirrel gnawing at a fallen antler of a Fallow-deer. He thought it interesting to know if others had noticed similar proclivities in the Squirrel; he believed the habit well known among certain other species, such as cows. May I be allowed to give the readers of 'The Zoologist' the following observations relating to Mr. Huxley's inquiries? In 1881 I saw in the Stuttgart Museum a piece of a deer's antler which was gnawed by the common European Squirrel. Mr. Du Chaillu called an African Squirrel (*Sciurus eborivorus*) the "Ivory-eater," and said that the animal shows a curious partiality for ivory, and that many tusks of Elephants are found with the marks of its teeth. Other rodents seem to be very fond of hard animal or other matter; for instance, Mr. Du Chaillu relates that the Porcupine of West Africa is said by the natives to feed sometimes on the tusks of the Elephant, and so on. I think that Mr. Siebe ('Der Zoologische Garten,' 1881, No. 3, p. 93) is right in supposing that Squirrels and other gnawing animals gnaw stones, shells, and other hard substances for the purpose of shortening the incisors.—(Dr.) F. A. JENTINK (Leyden Museum).

## AVES.

**A Lonely Sparrow.**—A male Hedge-Sparrow (*Accentor modularis*) completed a nice little nest in the tangled growth of a roadside bank on July 2nd last, and apparently had not a mate to share his domestic happiness with him, but sat upon his hermitage, a nicely lined structure, for thirteen days. I passed this spot at Dulcote Village twice daily, and I believe the bird began to know me, for it would allow me to chatter to it and almost touch it before leaving the nest. On July 16th the surveyor's man trimmed the long growth which threatened to overhang the road, and on this date the Sparrow forsook its nest.—STANLEY LEWIS (Wells, Somerset).

**Motacilla alba in Ireland.**—The kindness of my old friend Captain Kirkwood, of Bartragh House, has again enabled me to record the

spring visit of the White Wagtails this season to their usual haunt on the island of Bartragh, Killala Bay. Their favourite haunt is a damp flat of short coarse pasture situated between the sandhills and the shore of the estuary, close to the fruit garden, and a small horse-pond outside the paddock-wall is probably the attraction, for it is the only water on the island available, except a small spring on the shore not frequented by the birds. Captain Kirkwood informed me that on April 25th a flock of fifteen or sixteen birds was first observed, which remained on the island for three days, until the gale of northerly wind that was blowing on their arrival had changed to the south-west, when they disappeared, and none were seen afterwards. These birds have now been observed regularly visiting Bartragh every season since 1898 (with the exception of 1907), and that omission may have been caused by the absence of Captain Kirkwood and his man from the island at the time of the birds' visit, which sometimes is only for two or three hours, altogether depending on the state of the weather.—ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

**Note on *Caprimulgus europæus*.**—In 'The Zoologist' for 1911 (p. 318) I recorded the finding of two young Nightjars on the sand near Southwold in July last, and ventured to suggest that the parent bird might possibly have moved her eggs and small young. But this year I found two nearly fresh eggs on the sand close to the same spot, so it would appear that for two years in succession this Nightjar made choice of a most unusual breeding-place, the more difficult to account for when there is a wood not far away, and an abundance of cover afforded by brake within a stone's throw.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

**Absence of the Cuckoo.**—June 17th is the latest date on which the Cuckoo was heard in this neighbourhood this year, for I fear we have heard it for the last time. Prior to this date Cuckoos were seen and heard on every side, sometimes three at once, but since June 17th the well-known note of this species has been very conspicuous by its absence; I have made inquiries amongst the country-folk, and they "have not heard the Cuckoo for some time." I ramble over field and fallow every day, and not only have I failed to hear a Cuckoo, but I have not seen one; I followed a bird some distance on July 4th, but it turned out to be a Kestrel. Towards the end of June I expect to hear less of its notes, also the faulty call, with two or three "cucks" to one "coo," but not its entire absence from us. A partial migration undoubtedly took place here from the middle to the

latter part of June, and it would be interesting to know if they left our shores or not.—STANLEY LEWIS (Wells, Somerset).

**Three Nests of Land-Rail in the same Field.**—Three nests of the Land-Rail (*Crex pratensis*) were found in the same field during the first week of July by Mr. Moses Say, of Croscombe, near Wells; two containing eggs were destroyed by the knives of the mowing-machine, and one nest had already hatched off, for three young ones were seen with a parent bird. Land-Rails have become rarer here than formerly, and the nesting of three pairs of birds in the same field seems remarkable, for had I been asked I should have said six birds were all we had in the neighbourhood. I saw two of the nests with the broken eggs in them.—STANLEY LEWIS (Wells, Somerset).

**Great Crested Grebes in the County of London.**—As you were good enough to insert in your last issue my notes on the Great Crested Grebe (*Podiceps cristatus*) breeding in London, I am sending you some further observations on these birds, which perhaps you may think sufficiently interesting to print. The young birds were hatched presumably on July 8th after about four weeks' incubation, and on the 9th I saw the male bird step off the nest with the young ones under his wings. For a day or two both birds kept near the nest, roosting there at night, but the young were always carried under the wings of the male. On July 13th I saw the old birds far out in the open water, but could discover no young ones, although, from the appearance of the male, I gathered they were still under his wings. On July 14th I got near enough to see the young birds under the male's wings, and the female dive repeatedly, and feed them in that position. From that day I saw nothing of them until, on Sunday, July 21st, I made a tour of the reservoir. Walking round, I after a time, with the aid of glasses, detected the old birds on the farthest side among the reeds. I remained still, and after a time they came more into view in the open water. Once or twice I saw dark specks near them, and soon was able to make out that, though nearly a fortnight old and apparently five or six inches long, they were still caressed and fed by the female under the wings of the male. For a short time I had the satisfaction of seeing four young birds in the water, where they dived regularly and continuously, but I imagine rather for practice than food, as both parents were busily engaged in diving and feeding them. In the last edition of 'Yarrell' the Rev. Richard Lubbock is mentioned as an authority for these birds taking their young, for protection, down with them when they dive. This

I have not seen, but I suggest that this habit of carrying the nestlings under the wing for so long after they are hatched is an instinct implanted to preserve the species—apparently a slow-breeding one—from the dangers attendant upon the large sheets of water they



frequent being inhabited by large Pike, Trout, &c. I have known Pike of seventeen pounds taken in the reservoir in which these birds nested.—WM. F. DEWEY (Carisbrooke, Finsbury Park, N.).

**Notes on Nest-Boxes.**—Though the tenants of our nest-boxes this year have been numerous, there have been none of special interest or rarity. The list is: Robin (in an old water-can in ivy), Great Tit, Blue Tit (two or three of each), Nuthatch (one), Tree-Sparrow (many), House-Sparrow, Tawny Owl, and Stock-Dove. The box occupied by the Tawny Owls is simply an old half-dozen wine-case, placed in the fork of a beech, and kept in position by a heavy drain-brick on the lid. A Stock-Dove had two eggs on Feb. 28th, which is our earliest record of any eggs in a box, and last evening (July 21st) one flew out of the same box, which contained a new nest with two nearly fresh eggs. We

hoped to have been able to add the Jackdaw to our list, as none have ever used the boxes, but the only pair which have nested in the place during the twenty-five seasons we have been here preferred a cavity high up in a beech. This season there has been an unusual amount of "infant mortality" among the birds, whole broods having been found dead in the nests. The last of the four owlets in the box, which was all right on a Friday evening, was dead on the following Sunday, much to the disappointment of some young friends who came to see it. I have often found bees in the boxes, and once a hornet, and it is possible that a sting from some insect might have caused its death.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

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#### NOTICES OF NEW BOOKS.

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*The Depths of the Ocean: a General Account of the Modern Science of Oceanography, based largely on the Scientific Researches of the Norwegian Steamer, 'Michael Sars,' in the North Atlantic.* By Sir JOHN MURRAY, K.C.B., F.R.S., &c., and Dr. JOHAN HJORT, with contributions from Professors A. APPELLÖF and H. H. GRAN and Dr. B. HELLAND-HANSEN. Macmillan & Co.

THE name of Sir John Murray will always be associated with the 'Challenger' expedition; it must also be connected with the cruise of the 'Michael Sars,' for Dr. Hjort tells us in his preface that "Sir John Murray wrote to me that if the Norwegian Government would lend the 'Michael Sars' and her scientific staff for a few months' summer cruise in the North Atlantic, he would pay all the other expenses." This volume describes the scientific results of this cruise, results that may well satisfy all concerned, and which afford material of the highest value to the science of Oceanography.

To readers of 'The Zoologist' the biological narrative will prove the most attractive, and chap. x., "General Biology," is worthy of the most careful perusal, for it deals with many

theories and conclusions based on marine animal life. Dr. Hjort soon puts the discussion on a sound foundation. We read:—"But no definite human idea of the fitness of adaptations is of any value as knowledge. No more does any human idea necessarily correspond to the reality occurring in nature. The idea is only valuable as stimulating the investigator to seek realities. And reality in the scientific sense means a definite, positive mechanism, existing in the organism itself or in the surrounding medium. The object of investigation is to understand these mechanisms; the leading idea may often prove an empty fancy beyond the world of realities."

As regards the "Colours of Marine Animals," much information and cautious discussion, assisted by beautiful illustration, are supplied. Here Dr. Hjort is again candid and just. He writes:—"From time immemorial seafaring men have possessed a certain amount of knowledge as to the colours of marine animals. Sailors know well the sky-blue colours peculiar to the tropical surface forms. Herring-fishermen also know that the blackish-brown back of the herring is almost invisible from above, and only when occupying a slanting position or making a sudden turn does the herring become visible, its mirror-like sides emitting a silvery flash. The deep-sea fishermen are equally acquainted with the dark, black, brown, violet, or red colours peculiar to deep-sea animals. No scientist can claim the discovery of these phenomena, which are as well known as the colours of the ocean itself."

This volume contains excellent portraits of those well-known authorities who have made Oceanography a science.

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*Science of the Sea. An Elementary Handbook of Practical Oceanography for Travellers, Sailors, and Yachtsmen.* Prepared by The 'Challenger' Society. Edited by G. HERBERT FOWLER, B.A., Ph.D., &c. John Murray.

OUR previous notice referred to the work done in Oceanography by special and experienced scientists; the present volume is intended for the use of volunteers in the same field of observation. We prefer the term "scientific volunteer" to that of "amateur," the latter name being frequently a term expressive

of some amount of contempt. There is scarcely anyone who travels across the seas, and in whom the scientific spirit—either physical or zoological—is latent, whose observations when properly directed may not corroborate other statements, suggest further study, or be definitely informative. To them this book will prove a boon. We well remember a long sea voyage made more than forty years ago when Maury's 'Physical Geography of the Sea' was the only scientific book contained in the small and very miscellaneous cabin library. Publications of this calibre were then scarcely imagined, especially where the biological element is so fully pronounced. It was still largely then the day of sailing-vessels, and most skippers had almost a superstitious objection to a surface trawl-net—however small—being towed astern. Now the information is available by which a wealthy yachtsman may aspire to make his yacht an infant 'Challenger,' with even more modern appliances; passengers may find a scientific interest that will beguile a long day, even at the expense of "bridge" or deck-cricket; and the trained seaman may in leisure moments study in a fresh direction the element on which he so largely passes his days. This volume should be placed in the library of every liner, and the fond mother who usually places a Bible in the hands of her apprenticed son might with good results present this 'Science of the Sea' at the same time. It is well illustrated.



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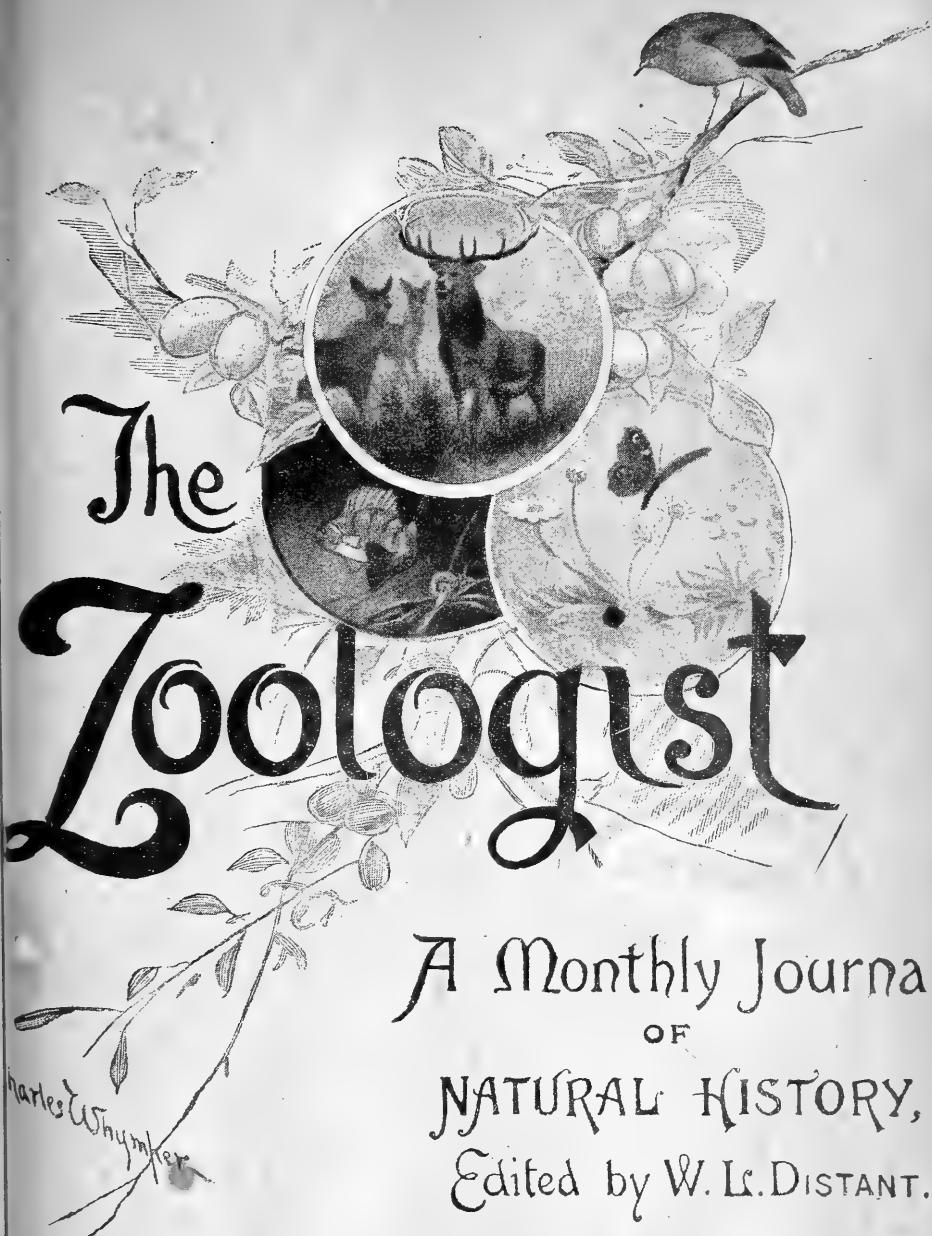
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# THE ZOOLOGIST

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No. 855.—September 15th. 1912.

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AN OBSERVATIONAL DIARY ON THE DOMESTIC HABITS OF THE CARRION-CROW (*CORVUS CORONE*).

By EDMUND SELOUS.

HAVING found a Crow's nest near the French town in which, at the time of making these notes, I was living, I determined to watch it, in order to gain some insight into the domestic habits of the species. The nest was situated in a small beech-tree, being one of a row, forming the line of intersection of two meadows, or open spaces of pasturage, lying a little off one of the roads from the town. It was easy to watch, which is the only essential point. The following is my diary of observation. I should here premise that the pronoun "he" or "she" does not imply certainty in regard to the bird's sex, but likelihood (in my view) only.

*April 18th, 1910.*—Got into position at 4.30 a.m., and heard the first very deep, hoarse "arr" at 4.45. It was uttered three times, and twice, again, five minutes afterwards, not by the sitting bird—for the nest was occupied—but some other one—the partner presumably—in the neighbourhood.

5.4.—Crow flies up to the nest, and for an instant stands in the cup of it, above the sitting bird—well in view, though partially concealed by the cavity. He then flies down, and is followed almost directly by the sitting bird, who before was hardly to be seen. Both, I think, go down on the ground—probably to search for food—though I cannot see them. It was certainly the bird who flew up to the nest, who first flew off it

again, so that there was no change upon the nest. The nest, therefore, was now empty, and empty it appeared to me to remain for the next twenty minutes or so, when, all at once, I thought I saw something black move in it. The glasses, however, revealed nothing, but five minutes afterwards, having the same impression and bringing them to bear quickly, I saw unmistakably the upturned head and beak of the sitting bird, and I could now always see its occasional movements on the nest. One of the birds, therefore, has returned unnoticed by me, which I can hardly understand, as even when writing the above—in pencil and more shortly—I was constantly turning my eyes up to the nest. However, the fact is certain.

At 5.45 the partner bird flies silently to the nest, coming from somewhere behind me. I got the glasses on the nest, a moment before he went down upon it, so that I saw everything clearly. The arriving bird just bent, for a moment, over the sitting one, and then flew almost perpendicularly down to the ground. All was in silence, as was also the case in the previous visit. Some ten minutes later a bird, which I took to be the same one, passed a little in front of me, in a drifting manner—flying a little sideways, that is—as though searching the ground—for the height was but moderate. I do not think he saw me, as I sat motionless at the foot of a baby tree, and a good deal concealed by gorse-bushes and other small trees, &c.—the gorse, by the way, which abounds here, is now a most magnificent sight. I sat where I was till well past 7 with my eyes fixed on the nest almost continuously—never off it but for a few seconds, during which they still guarded the neighbourhood—but there was no further visit from the partner bird. Several times I saw what I thought to be the latter beating round about at a greater height, as though quartering the ground for food, but as, more often, there were two birds doing this, I could never be sure that it was he, even when I did not see another. There would seem to be another pair that have their nest at no great distance.

What is shown in regard to the incubatory habits of Crows by the above observations? As I say, it was the bird that flew up at about 5 o'clock, that first went off again, leaving the one who had been there when he came, still there. As it was dark

when I came, the latter may be assumed to have been on the nest all night, and would therefore, most probably, be the female. She was not relieved in the duties of incubation, therefore, but sat on though only for a few moments longer. When she also flew down both birds were out of my sight, so that even if I had not missed the return, shortly afterwards, of one of them, I could not have told which one this was. Assuming it to have been the female—which I think the more likely—then she was visited twice on the nest by the male whilst I stayed (which was till about 7), once, roughly speaking, at daybreak, and, again, about forty minutes later. I certainly did not see the sitting bird fed by the visiting one on either of these occasions, but with so deep a cavity to the nest this would have been difficult, and she might very well have been, each time. In fact, the pose and actions of the male, on each visit, were quite consistent with this supposition, and it seems, in itself, more likely that he came with some ulterior object than merely to pay an affectionate visit, though, to be sure, there is nothing so very unlikely in that.

I think it more likely that it was the female who returned, to sit on the eggs, than that it was the male, for if there was a change upon them at all, why did it not take place when the latter first flew up at daybreak? Again, if it had been the male, then the female, relieved after her all night's sitting, would probably only have returned to the nest when she was again ready to take her place upon it. It does not seem likely that she would have come back to it again, shortly afterwards, either to feed the male or merely to make him a visit. But likelihood and unlikelihood are all I have to go upon.

*April 19th.*—At same place at same time (4.30 a.m.) as yesterday, and there waited, with my eyes always turned on the nest, till 7.30, except that sometimes, during the last half-hour, I turned the glasses, for a few seconds, elsewhere; but even then I gave some side-glances towards the nest, so that it was never absent from my view in such a way or for such a time that I could have missed anything.

During the whole of these three hours nothing whatever happened. There was no visit, and the sitting bird, whose head I could see plainly all the while, never left the nest. This

supports my observations of yesterday, and the inference I drew from them. Had it been for the purpose of relieving the female in her incubatory duties—had this visit really represented a change on the nest or had this taken place a little later—there is little doubt that the same thing would have taken place this morning. It would then be a regular custom, in all probability, for the male to relieve the female at or not long after daybreak. But if the female is only fed by the male, whilst she incubates, or if he merely pays her visits, there is no reason to expect regularity or anything approaching it. The bringing of food would be dependent on the finding of it, and visits, as such, would, of course, be quite casual.

Whilst it was still dark, or almost dark, there were the same two bursts of croaking—first three and then two “arrs”—as yesterday, and from about the same place. After that I only heard distant ones, and it was not till long afterwards that I saw a Crow flying near the nest, but he did not go to it, and soon disappeared. I do not believe that either of the Crows saw me the whole time I sat watching both yesterday and to-day, and I am quite certain that this was not the case at the time when the male paid his visit to the nest. It was dark when I came, nor did any Crow go off startled on my way to the place. The Crow on the nest and her partner, somewhere near, would therefore have awakened with the dawn, in the usual manner, and, by experience, would not have been expecting to see a human being for some little while. The wariness of the most wary birds can be completely discounted by taking advantage of the darkness—no other way, in my experience, is equal to this. I watched the nest from a well-sheltered plantation on the other side of the meadow.

In the afternoon I watched the nest from 3 or thereabouts till 6.45. No visit was made to the nest, which had the appearance of being empty, but I have no doubt the bird was there, as to test this, on subsequent occasions, I have struck the trunk of the tree with the stick of my camp-stool, when it has flown off. The sitting bird may either be plainly visible or entirely concealed in the cavity.

*April 20th.*—Was down at 10.30 a.m., but did not stay long, and the bird may or may not have been on the nest, for all I



could tell. At 2.20 I returned, when I thought I saw it there, but was unable to say.

*April 21st.*—At place at 7.25 a.m., and watched the nest till 8.35 a.m., when the bird flew off it, in silence—there had been no previous visit from the partner bird. At about five minutes to 9 a Crow—one of the pair, as I assume—perched on a low tree in the neighbourhood, then flew off it, and a little later the two were flying about in each other's company. At 9.30 one of them flew into a tree belonging to the row in which the home one is situated, being the eighth away from it (there being but a step or two between each), then into another of them, nearer, and I thought she would go to her nest, thus by easy stages. But she flew off again, and soon I saw the pair flying about, and expatiating, as it were, together, as before. Some minutes later she, or one of the birds, flew into the same tree, then off again, and at 9.30 I saw her sitting on a low, lopped tree-stump, from which she, in a moment, flew to the ground. At 9.55 I, all at once, saw a hawk—a Kestrel—glide from the nest, on the further rim of which he must, I think, have been settled. At 10 the Crow was flying about over the ground, and then a little higher, as though feeding from place to place. The boy now appeared on the scene, with his cows, and cracking his whip at short intervals (yet withal I noted that he had a paper and was reading it), and, thinking that the bird would not return to the nest whilst he was there, I rose and began to walk away. In this, however, I was mistaken, for I had only gone a few yards when I saw her in the same tree as before, or a neighbouring one, and standing still, where I had a good view of the nest, in a few minutes—just at 10.7—she flew on to it and disappeared, having thus been absent from the nest over an hour and a half. It is curious how the bird's going down on the nest almost exactly coincided—just after, not before—with the arrival of the boy and the cracking of his whip. Can she have adopted this as a signal?—but this hypothesis did not continue to recommend itself.

*April 22nd.*—Getting to the place at 9.35 this morning, I watched the nest for a full three hours, during which time no bird either came to or left it. All the while, however, the Crow kept about in the neighbourhood, feeding, for the most part,

over the land, as far as I could judge, but time and again sitting in one or other of the trees of the row, in more or less close proximity to the home one, sometimes flying from one to another till within a tree or two of it, but always floating away again, generally downwards, evidently on to the ground, though my position never allowed me to see her settle. Once or twice she was joined by her mate, but not for long. Both were very silent. Only once (or twice perhaps) I heard a subdued croak or two, but this was not very near, and may have been uttered by another bird. From the above observations I have no doubt that the nest was empty all this time. I might have tested it, but dislike all obtrusion into what I am watching.

*April 27th.*—Watched the nest for about half an hour in the afternoon, during which time it was neither left nor visited by either of the birds. One of them kept about in the neighbourhood, but I cannot say whether the nest was empty or not. It would seem, therefore, that incubation is still proceeding.

*April 29th.*—In the morning I watched the nest for a time sufficient to make sure that the eggs are not yet hatched. I saw neither of the birds, though one of them was very probably sitting. The nest is visible from the road by which I cycle to get to it. This afternoon, therefore, I fixed my eyes upon it, as I passed along this road, and had the luck to see the bird fly off it, being then about 6.40. Had the other bird first flown up, and had there been a change on the nest, I should have seen this just as plainly, but such was not the case any more than on other occasions. It was a solitary departure, and the nest was left empty, though I stayed for a little to make sure of this. It is becoming more and more plain that one of these two Crows is alone incubating. I have now seen the sitting bird leave the nest three times, each time on a different day and at a different hour—once, namely, at 5.4 a.m., once at 8.35 a.m., and this last time at 6.40 p.m.—and there has not, on any of these occasions, been a change on the nest, though, on the first, there was what might very well have been mistaken for one—a visit, namely, and quick succeeding departure of the visiting, not of the sitting, bird. The latter, indeed, followed almost immediately, but the nest was left empty. Three times is certainly not very many, yet if the male really shared in the duties of incubation there

would probably have been the change on each occasion. Moreover, the infrequency of these exeats on the part of the sitting bird is itself evidence that she alone sits, for, if the duty were shared, why should she have to sit so long, and why should the eggs be left so long uncovered? This last must be necessarily the case, however, if the bird who does all the sitting has likewise to procure her food, as she must, if not fed on the nest by her mate, of which latterly there has been little evidence—she cannot, at any rate, be sufficiently fed there.

*May 9th.* — This afternoon being a little finer than it has been for the last week or more, I cycled to the first nest along the La Guesnière road, and had it under observation about 4. I assumed that the eggs must now be hatched, and two visits which were paid within the next thirty-five minutes would seem to support that view. The first was at 4.15, and the next at 4.35. I thought, each time, that the bird that came was the one that went away, but it was a long view, this time (I was not in the accustomed place), and the nest is now almost concealed amongst the growing leaves of the beech it is in. I supposed also that when the visiting bird, each time, flew away, the nest was left empty except for the young, but here I was in error, for on walking up to the tree after the last visit and striking it with my stick, the bird at once went off. This was not till ten minutes after the last visit, and it would have been possible, certainly, for one of the birds to have come, since then, without my seeing it, but I do not suppose this to have been the case. What I think likely is that, the young being yet of tender age, the hen Crow was covering them, and that the male twice brought food, which she probably received from him, and then fed the chicks with.

My observations on this pair of Crows ended here.

*March 29th, 1910.*—About a week ago I saw a Crow busily engaged in chasing away several Magpies, not only from three or four tall slender trees close together, in one of which it had its nest, but also from various other trees, not far off, round about. In this the Crow had a good deal of trouble, as the Magpies were always returning. After a time it was joined by another Crow, which, however, did not take so active a part in

the drama, nor did I see either of the two actually go to the nest, though I could only explain their action by supposing it was their own. This morning I saw the same thing reversed, for a pair of Magpies, with an undoubted nest, kept attacking a Crow that insisted on settling in one of a row of trees—also tall and slender—in which it was placed. Both were equally persevering, the Crow, though often chased away, always returning, and settling generally in the last tree of the row, where he would be left alone sometimes for a minute or two, but before long one of the Magpies always flew at him, and put him to flight. The Crow defended itself, but not, it would seem, very successfully, and in the last attack upon him, made, with great spirit, in the air, a large black feather floated to the ground, which I made no doubt was his. Yet this did not drive him from the trees, and it was only on my approaching nearer that he finally left them. Thus we see that both the species look upon the approach of the other to within a moderate distance of their nest as an intrusion.

*May 2nd.*—Walked out in the afternoon, and located another Crow's nest in course of construction, a discovery to which I was led by observing the pertinacious attacks upon one of its joint owners by a Magpie in the neighbourhood of its own nest. The Crow was ready to defend himself, but the Magpie was too quick for him, and by constantly flying at him and pecking him in the air at last drove him out of the little plantation in which the drama was enacting. As soon as he took to flight he was joined by another, who carried a good-sized stick. As they went down amongst trees some way off, I naturally concluded that the nest was situated in one of these, and found what looked like the commencement of one. I sheltered myself at some distance, and waited for about half an hour, but to no purpose. Meanwhile, however, the Crows had floated over these trees in the direction whence they had come, and, returning, I found the same bickering going on between them—or one of them—and the Magpie. A nest of the latter, from which the sitting bird went off tardily on my striking the tree, explained the matter as far as the Magpie was concerned, and I began to suspect the Crows of pillaging or designing to pillage this nest, to build their own, especially on their appearing again (for they had again

been driven out) whilst I sat under a tree near, evidently only deterred from re-entering the plantation by my presence. I now sheltered myself very effectually beneath a hazel-bush at the foot of a tall tree, and before long the two Crows appeared, both carrying sticks, and the mystery was soon explained by their flying into the summit of a lofty fir quite near me, and busying themselves with the construction of their nest—as I could make out, but not the nest itself, owing to the opacity of the foliage forming the fir's crown. Building now went on continuously, at irregular intervals, for more than an hour up to 6 o'clock, when there was a longer interval; but as I walked back I again saw the two birds, from a distance, come down together into the same tree. Both birds built, one being generally there at a time, but, two or three times, both were in the tree, and I think both building, together. Had this tree been as the others, I should have had a fine view of their operations, being so near and so well concealed, but the nest, besides being high up, is completely shrouded amidst the heavy pine-fronds. This time, however, I often saw the Crows collecting their materials, and it was never on the ground that they did this, but always in trees, the growing twigs of which they seized in their bills and broke off, often having to pull and tug at them with great force to do so. They often dropped the twig they pulled off, and did not then pick it up from the ground again, but began pulling at another, and once one of them dropped the one he was flying with, and left it. Whether this was done, each time, accidentally or purposely, I could not be sure. I think the first, but still they seemed to pick out particular twigs, and to prefer such as were both long and stout. It might be argued, too, that they would have picked them up again had they not intended to discard them. The Crows never went to the Magpie's nest, and had evidently no design upon it, as, indeed, it is hardly to be supposed that they should have had, taking the strength and vigilance of the foe into consideration. Also the twigs of any nest would not have been selected, and pulled by themselves; that they should be thus pulled and not merely collected, as sticks, from the ground, seemed to be a *sine qua non* with the birds. The nest, however, was, no doubt, the *teterrima causa belli*—at least on one side—the Crows coming too near to it in

the opinion of its owners, who a little before I left made a fresh joint attack upon one of them in particular. The latter, in defending himself, made a sort of backward movement, jerking his wings; so, at least, it appeared to me. At any rate, he jerked his wings, and the attacking Magpie swerved off, as though they were his beak, whether or not it was only that that he feared, as seems most probable.

*May 3rd.*—Got into place to watch the building of my last-found nest in the fir-tree at 4.40 p.m., the Crows not being then about.

4.46.—A visit—single—direct flight on to nest.

4.49.—Second bird flies on to nest with stick, just leaves it, and goes.

The first-come bird, therefore, is still on the nest, and I now see him there. I did not notice a stick in his bill when he came. If he had one it was small.

4.57.—One of the birds—as I supposed, the first owner—off, but to my surprise the other follows. He had evidently returned without my seeing him, having been concealed, I suppose, by the gloom of the fir-tree, as he flew in from behind it. A bird now flies in again, and is off the next minute.

There is now an interval, both birds sitting quietly in an adjacent tree and preening themselves. This tree is very little removed from the one in which there is the Magpie's nest, but there is no interference from that quarter. Though close, the insufferable degree of proximity has not, it appears, been reached.

5.20.—One of the birds now begins twig-pulling in the tree he is in. He soon gets one, but, for some time, sits perched with it in his bill. I lose him for a moment then, then all at once there is an "arr, arr, arr," and both are in flight, the one still carrying his twig. In a minute or two they are back again—the twig still held—and perched, side by side, in the tree next to that in which they were before.

5.32.—The bird with the twig flies away, still keeping it, leaving the other one sitting. He passes over the nesting-tree to a line of trees some way off, where I lose him, but in less than three minutes he comes flying up again—stick and all—as the sitting bird "arrrs," and again they sit side by side. Soon both

are off and out of sight, but I hear not far off that curious more human-sounding note that I have remarked in another pair of birds, and which I suppose (for the present) to be confined to the male. After staying till a little after 6, I left, and had hardly got out from under my bush when I saw both the birds still sitting where they had been before. They must have come back silently from another direction, so that I missed them, but not long ago. They now seemed settled to roost, and when I passed along the road, at nearly 7, the tall fir visible from it stood sad and solitary. Had they suspected my presence? I do not think so; I was too well hidden. I recall that other instance when one of another pair, though having a beakful of dried grass or other material, flew down and fed over the land, where he was joined by the other, and both came so near me as to make me feel that they had no idea of my whereabouts. I have also at various other times seen a Crow thus fly and perch with a stick in its bill, and it subsequently transpired that I was nowhere near its nesting-tree. This tardiness in bringing the gathered materials is a normal trait, therefore—to be observed in other birds also—and need not be attributed to fear or suspicion. It may result from a conflict between different impulses—as, for instance, hunger and the nest-building one—for in both the previous instances the birds laid down what they were bringing and began to feed over the land; and so, too, it may have been in this case, for there was a little time for supper before bed. Thus, bit by bit, we get at their daily round.

*May 4th.*—I was unsuccessful in trying to watch the birds building this afternoon. They went off—one carrying a stick—on my entering the little “shore” or dingle where the nest is situated, and, though I waited under my hazel-bush till considerably past 5 (from 3.20 p.m.), they did not come to the tree again, but only, towards the last, into the neighbourhood, though I believe they had then forgotten all about me. After I had left my place—towards 6—they went down apparently to feed over some potato-planted land, but I did not see them hack at the plants or pull them up. Then they both flew to the nest—one having a stick which it must have got since its return—but the building was not continued, and I left them, still on the land, about 6.30. Before coming to the nest these Crows had

settled in some neighbouring trees, and, getting too near to another Magpie's, were vigorously attacked by the owners. Further on they met with the same reception from a Jay.

*May 5th.*—Got down at 5.20 a.m. The Crows were about, and I saw them into some trees a good way off before taking my place. Yet when I had taken it, I observed them in their accustomed ones near by, but they did not appear to have noticed me. They then went down on the potato land, and the first visit to the nest was not made till about 6. It was a single one, and so were six others between then and 6.45. At 7.25 and 7.27 there were two more such visits, then a double one at 7.32, and a single one again, at 7.34—building been still in progress when I left my place a few minutes afterwards, and when I started to return at 8.5 or so. In all but the first visit or two, when it was sticks, the birds carried little bundles of soft stuff—dry grass it looked like—so that they must now be lining the nest. By a double visit I mean that both birds came together, or nearly so, and were on the nest at the same time. Some of the single ones were made by the two birds alternately, but, as a rule, I could not tell if this were so. My notion is that whilst the male, equally with the female, brings and places the materials, the latter stays longer and does most of the actual architecture. At any early stage in the building the Crows were attacked by the Magpie that I had first seen them engaged with—the male, as I believe, who acts as sentry—so that I saw the latter and one of them tumbling through the air in a grapple. This was close by the nest of the Magpie, but, further than this, I did not see the actual origin of the fracas. I have no doubt, however, from their general conduct, that the Crows had merely come inadvertently too close to the nest without any idea of interfering with it. They often retaliated after this by attacking and chasing away the Magpie, but it was the offensive-defensive strategy, nor are they so redoubtable as the latter, who shows both superior vigour and greater activity. At 3 p.m. I was in my place in the hazel-bush again, but saw nothing further. In coming up I had startled the birds, who were in a tree a little to one side of the dingle. They went off with loud “arrrrs,” and did not return whilst I was there.

*May 10th.*—This evening, at ten minutes past 7, I saw one



of the birds fly into the tree after they had both peregrinated about the place for a little, at short intervals. As this bird went down on the tree, I put up the glasses, but should have done better not to, as I could not catch it again with them. I have no doubt it went on to the nest, and was lost in the very act of my raising the glasses. It looks as though incubation were now begun.

*May 13th.*—Got to my place at 4.15 a.m. All was quite still and silent—there seemed to be no life in the dark fir-tree—but at 4.20 one of the fronds at its top dipped and swayed, then came some vigorous “arreings,” and off the bird went. After an absence of less than ten minutes, in which I heard her voice (or her mate’s) always near about, and in the trees, she returned, or, more strictly, a bird came on to the nest. In another five minutes the partner bird flew up, went first into a tree close beside the nesting one, and then into the latter. I did not observe any materials in the bill either of this or the other bird, but this does not exclude the possibility that the interior of the nest is still being shaped. If this is not the case, and if incubation is proceeding, then I cannot say for certain whether there was now a change on the nest or not. I can say, however, that the exit of one of the birds, shortly afterwards, was from precisely the same spot where the bird alighted, that the dark mass of the nest was visible a little under this, and that there was no commotion or appearance suggesting a change, as I believe there would have been had there been one. The time for which the two birds were together on or at the nest was also a little longer than it generally is, in my experience, when one comes for the special purpose of relieving the other on the eggs. During this time there were low, croodling, affectionate sounds, very pleasant to hear, all in the Crow intonation, but much softer. The bird left on the nest did not stay there five minutes after the other had gone, but flew off, then in about another five minutes returned—strictly there was a return to the nest, and then, at similar short intervals, another departure and return. Since this time—it is now, when I write, 5.20—there has, I believe, been continuous sitting or continuous occupation of the nest, but in this I may be mistaken, for I have not kept my eyes continuously fixed on the tree, and now on leaving, a little later, I

see both the birds in a neighbouring tree. The above observations, then, hardly suggest the female bird having been relieved on the eggs by the male, or why should the latter, having taken his place, have twice left the nest and returned to it at these short intervals? The facts seem more in accordance with the unassisted incubation of the female, or perhaps with incubation not having yet seriously begun—all the eggs perhaps are not yet laid.

Down again at 3.45 p.m.

3.50.—Bird off, unrelieved by the other.

4.10.—Bird on.

5.15.—Off again, and I did not see any return to the nest or tree between this and 6.30 p.m., when I left. The nest, therefore, has been left twice, but there was no change upon it, either time.

*May 15th.* — Watched the tree from 2 p.m., and at 2.35 the Crow flew off, presumably from the nest. Either it uttered its note, as it flew, or the partner bird did so, somewhere near, but I think the first, and afterwards I saw the two together—no change, therefore.

2.40.—Bird on.

3.15.—Ditto, from which I learnt that it must have gone off some time between these two, but this I missed.

3.40.—Bird off.

I then walked to the tree and struck it violently several times with my walking-stick camp-stool, but no bird flew out. It is clear, therefore, that, though I missed the second going off, there had been no change on the nest, for if one had gone on to them then, some time between 2.40 and 3.15, my striking the tree would in all probability have driven it out. But this is made almost superfluous by the fact that, before the bird came on again, at 3.15, I had seen the two flying round about in the usual manner.

*May 16th.*—Down at about 5.30 (I think a.m., but have omitted to mark it). At 6.30 the two Crows began to fly about, “arrreing,” as usual, and at 6.35 one of them went on to the nest, which must, for some time before, and probably all the time, have been empty.

*May 27th.*—Wishing to see the first activities of Crows

during incubation, I left the house about 2.30 a.m., and got to the place whence I watch the nest in the fir-tree, or rather its site, about 3. It was too dark then for day-birds to be seriously active, though cocks were seriously crowing, as I walked down. I could not, however, see the time by my watch without striking a match.

The first deep "quor" in the neighbourhood—it had a sleepy sound—was at 3.35.

4.20.—One of the Crows flies into the tree and out of it, again, almost immediately. It only just entered the fronds by the nest, and I never quite lost sight of it. I am sure, therefore, in this instance, that it was the same bird that came and went.

4.21.—A moment afterwards the other bird—evidently the sitting one, who has been there all night—flies out of the tree,\* and then both fly about from tree to tree in the neighbourhood of the nest, and are very noisy, answering one another. Up till now, except for the deep, single "quor" I have noted, and one or two others—single also and all unanswered—there had been deep silence. I notice now a very considerable difference in the character of the note, especially as uttered by one of the noisy birds.

4.33.—Bird to the nest, alone and in silence. I stay till 4.50, and then leave.

*May 30th.*—Watched the nest between 11.30 and 12.30 this morning, but no bird either came or went.

*June 3rd.*—A sad discovery this morning. The tall fir-tree where the pair of Crows I have been watching lately had built has been ascended and the nest flung down—unless, indeed, it has been blown out of the tree; this, perhaps, is possible. I incline, however, to the human hypothesis. I had thought the tree was unscaleable, which shows—if my view is correct—how little I know about it. A sad thing—and no neck broken! A little later I saw the poor birds circling rapidly about, close together.

\* Compare entry of April 18th. Here at daybreak there was an exactly similar visit and departure of the male, leaving the female still sitting. But she, too, only stayed a moment before following him off.

A pair of Crows had built their nest in a small plantation of beeches, which two Sparrow-Hawks had also chosen for a similar purpose, the respective trees being but a step or two from each other. In the course of my observations on the hawks, I made the following slight notes on the feeding of the young Crows by their parents :—

*June 25th.*—Get under my newly-made shelter at 5.50 p.m., and a few minutes afterwards the young Crows begin to cry in the nest. They are answered by a “quor” or two, and one of the parents passes over where I sit. A little while afterwards both sail silently above me, evidently without seeing me. Somewhere towards 7 one of the birds settles silently on a skirting tree of the plantation—then in a few minutes flies from it to another one nearer the nest. There is then a long wait, till at 7.15 either this or the other parent—but I think this same one—flies to the nest, her arrival being preluded by some cries from the chicks. She disappears into the nest, and is evidently feeding them. After a little she comes out and flies from the tree, and the other parent is, as it seems to me, on the point of entering the nest, in his turn, when his mate, flying over my shelter, unfortunately sees me, and raises a loud cry. The one at the nest stands, as it were, petrified for a moment or two, then, with an answering cry, flies after her, and both, settling in trees just behind me, raise a terrible clamour. They cannot, as I gather, quite make me out, but see that something is there, and suspect the worst. They are excited, indignant, and keep up a constant vociferation of loud, deep, expostulatory “quors.” So great is the noise that I almost fear someone’s curiosity may be excited, but the place is lonely, curiosity of the sort, perhaps, not much in evidence, and nobody comes. At last, still clamouring discontentedly, both the birds fly away, though one of them, now, at 7.30, has entered the plantation again.

*June 27th.*—In the plantation before light, and get under a shelter which I had either made or improved the day before.

At 4.5, 4.14, 4.37, and 5 o’clock the chicks were fed by one of the parent Crows, who came alone, but whether it was each time the same one or the two alternately I am unable to say. The fifth visit, however, was at 5.2, so that, on account of the

shortness of the interval, one may feel sure that it was not made by the bird which had only just left, but by the other one. The same applies to the two next visits, which were at 5.13 and 5.15. There is a good deal of noise at each visit, but this is almost all on the part of the young Crows, who utter sounds like immature caws—or rather “quars” or “arrs”—as well as others of eagerness and expectation, ending in subdued, satisfied murmurs, upon (evidently) having been fed. A low, subdued chuckle, as one may call it, is the old bird’s contribution to the medley. Sometimes, however, it is a louder, clearer, and, indeed, very musical sound—at least, I judge this to be made by the parent, and not by one of the chicks, it being beyond them, I think, and too mature in tone and character.

5.28.—Another visit, the bird remaining perched in the tree for a minute or two after leaving the nest.

5.45.—Another visit, and then another just half a minute afterwards, so that, no doubt, each was from a different parent. For the next visit—at 6.3—I got up my glasses, which I had feared to do before. The view was much obscured by foliage, but the feeding appeared to me to be by regurgitation.

This was the last observation on the birds’ nursery habits that I was able to make, for whilst moving some of the boughs in front of me, so as to get a better view, I was discovered by one of them, and a loud alarm instantly raised. “Quarr” now answered “quarr” in rapid succession, and the noise was becoming tiresome, when it was put a stop to in an unexpected and interesting manner, for one of the Sparrow-Hawks—evidently by its size and slighter build the male—flew up swiftly through the trees, and descending right upon the more vociferous of the Crows’ back—no doubt delivering, at the instant of contact, an assault with beak and claws—both silenced her and put her to instant flight. Whether the result would have been the same if the Crow had been then in the nesting-tree is perhaps “a question to be asked.” I wish she had been, but she had left it either upon discovering me or just before.

BLUE-WINGED TEAL (*QUERQUEDULA DISCORS*)  
BREEDING IN NORTH ICELAND.

BY F. COBURN.

IN my paper, "Brief Notes on an Expedition to the North of Iceland in 1899" (Zool. 1901, pp. 401-419), at p. 411, I gave "Teal, ? sp.," and stated that I had seen a female Teal with a very dark back leading a brood of dark coloured young towards the water, and that, when feigning lameness to distract our attention from them, she momentarily expanded her wings, when I noticed that she had *one* broad white bar across instead of the *two narrow ones*, which is the complement for the Common Teal (*Q. crecca*).

I was riding at the time, and unluckily my guide, Sigurdur Samlaridason, was in advance, carrying my guns. I shouted to him to use the 12-bore and shoot the bird, but he did not understand, or could not see the bird I was pointing to, and when I took the gun from him and followed up the bird all my efforts to procure her or any of the young were fruitless. I asked readers of 'The Zoologist' for information as to what species of female Teal had one white bar across the wing, but could get no definite information, although I have a hazy recollection that some one did write to me, but who it was I cannot now remember.

At South Kensington Museum I made inquiries, but none of the assistants there knew of any female Teal that had but one white bar across the wing; later I wrote to the curators of some other museums, but could get no satisfactory information.

Remembering my discovery of the breeding of the American Wigeon (*Mareca americana*) in the same district of North Iceland, I naturally thought of the Blue- and Green-winged Teals, and searched all books available to me, both British and American, for information on these birds, but it is almost incredible that in none could be found any description of the female Blue-winged

Teal which made mention of this very conspicuous white bar across the wings, and up to 1904 I had never seen a female of this bird.

The matter rested in this unsatisfactory state until 1904, when I went on a collecting expedition—a very successful one—to the Cariboo district of Central British Columbia, where I found various surface-feeding and diving ducks breeding in abundance.

With the first specimen of a female *Q. discors* I procured I at once recognized the Teal with one broad white bar across the wings which before had been such a puzzle to me. I found also that the young males and immature females have a broader white bar across the wings than the adult female. I brought an interesting series of skins back with me.

Gröndal, in his list of the Birds of Iceland, includes Garganey Teal (*Querquedula circia*), on the strength of an adult male shot on June 16th, 1860, in the same district where I saw the Blue-winged Teal. Many British ornithologists have expressed doubts that such a southern species should have wandered so far north as the Arctic Circle for breeding, and I now have little hesitation in suggesting that a mistake in identification has been made, and the supposed Garganey Teal was an adult male Blue-winged Teal; a mistake very easy to make, and one which has more than once been made here.

Icelanders have but a poor stock of books for reference, and practically no specimens for comparison, and although they possess a good knowledge of their country's birds, they cannot be expected to discriminate closely allied forms. In the case of the American Wigeon they had noticed the difference in the coloration of the head of the males, but thought it was merely a variation, and quite failed to discriminate between the females, although the difference is striking enough to those who know what to look for. I do not suppose that the Blue-winged Teal is a regular breeder in Iceland, but, like the American Wigeon, only a casual visitor for breeding.

When in Iceland I was much impressed by the appearance of some of the females of what I thought were Common Teal as they flew past me, and since my experiences in Central British Columbia I now strongly suspect that future investigation may

prove that occasionally the Green-winged Teal (*Q. carolinensis*) breeds in North Iceland.

The breeding of this bird in North Iceland is a matter of great importance to ornithologists generally, not only as being a first record for Europe, but as strengthening the position of the bird on the British List; and as there is a regular line of migration for American birds to Iceland, it is not surprising that this bird should occasionally join the streams of other ducks to this island, and on the return migration accidentally wander



Photo.

F. Coburn.

BLUE-WINGED TEAL (*Querquedula discors*). Adult female, autumn.

eastwards instead of westwards, and so, at very rare intervals, reach our shores.

As I cannot find a really satisfactory description of the female *Q. discors*, it may be useful to give one here; also an illustration of one of my British Columbian specimens, an adult female shot in September, 1904, showing that the white bar across the wing is so conspicuous that it could not be mistaken for any other duck:—

*Top of head: forehead streaked with dirty white, crown and nape dusky blackish, crown minutely freckled on margins of*



feathers with lighter brown; hind neck and back paler. Scapulars deep dusky brown, almost black, fringed with dirty white on worn feathers, but pale brown on freshly moulted ones. Tail and upper tail-coverts similar, but rather paler, and not so distinctly margined. Sides of head yellowish white, streaked with dark umber, becoming broader on lower neck and upper breast. Throat and front of upper neck yellowish white, unstreaked. Flanks umber, margined with yellowish white. Under breast yellowish white, some of the feathers with dark umber centres. Abdomen yellowish white, more thickly marked with pale umber. Under tail-coverts blackish umber, broadly margined with dull white. In the wings the outer margins of the primaries are dusky, inner margins paler. Secondaries greenish grey, faintly margined with pale buff. Tertiaries dark umber, margined and centred with pale buff. Greater wing-coverts bluish slate, marbled and broadly margined, but gradually diminishing towards inner ones, with pure white, forming a broad white bar across the wings, very conspicuous when expanded; median and outer wing-coverts pale blue. Axillaries and most of the under wing-coverts white. Bill greenish drab on top, merging into pale drab around margins, spotted and blotched with black, around base pale yellowish drab; inside mouth drabish white. Legs and toes drabish yellow, toes becoming a clearer yellow, webs very pale drab, nails drab. Immature males and females have broader white bars across the wings.

I understand that this season (1912) several English ornithologists intend visiting those districts of Iceland worked by me in 1899, and to some of those who have been in correspondence with me I have communicated the above facts, and asked them to be on the alert for Blue-winged Teal in particular. I have also asked that the case of conscious protective colouring—a very interesting one—I mentioned in connection with the Ringed Plover (*Ægialites hiaticula*), p. 413, shall be investigated if the one party (Mr. Young's) reaches Husavick early enough in the season.

I intended writing upon this subject, and others, immediately after my return from British Columbia, but that period marked the commencement of a multitude of troubles and hard work which gave me no time to devote to these matters.

A SEASON WITH THE BIRDS OF ANGLESEY  
AND NORTH CARNARVONSHIRE.

BY T. OWEN.

(Concluded from p. 313.)

*May 8th.*—Whilst up in the mountains in September, 1910, we discovered a Chough's nest inside an old mine, and earlier in the same year a pair of Choughs had been seen in that particular vicinity, and were probably the pair that had tenanted this nest. However, when we visited the haunt in 1911 we saw no sign of the birds with "talons and beak all red with blood," and to-day again we did not see them, and on entering into the mine we find that the old nest has been pulled down and the material is all scattered about. On the grassy slope at the entrance to the mine we find a Meadow-Pipit's nest containing a couple of eggs.

Visiting Aber on May 11th, we first of all come across a Chaffinch's nest containing two newly hatched young and three eggs on the point of hatching. Afterwards we walk along the left bank of the river flowing from the lake, and soon turn into a wood on our right. Here we find a nesting-hole of a Blue-Tit, with the bird sitting, as we can tell by the hissing sound which issues from the interior, and after some trouble we manage to dislodge the bird, but after all we were unable to see the contents. At the top of one of the trees is a Carrion Crow's nest, but we are too late for them now. An Owl is known by us to nest in a certain old tree by the corner of the wood, and on reaching it one starts to climb up. The hole in which the Owl nests has a depth of about three feet from the main entrance, but there is also a tiny hole close to the level of the hollow. On gaining this lesser hole and peering inside, the old Tawny can be seen glaring at us, but the next instant it is scrambling out of the hollow leaving to view two young owlets clad in greyish down and with their eyes closed. Before we start on our return journey we see a Cuckoo.

15th.—Penmon is our destination. On the way we call at

the Tawny Owl's nest discovered by us on April 3rd, but the young have flown, for they were very nearly fully fledged when seen by Mr. H. H. Thompson a week previous. At the deer enclosure, Penmon, we make a halt, and see there a couple of Sheldrakes, a pair of Oyster-Catchers, and plenty of Peewits, as well as a few baby Peewits, which, when we approach them, crouch low in the grass. We leave our bicycles at the Priory and then enter the woods, where we soon find a Starling's nest with five eggs. High up in one of the trees we perceive a newly-hacked Woodpecker's hole, and a stone is thrown up which knocks smartly against the bark below the hole, but no bird leaves it. A small colony of Tree-Sparrows nest here, and we discover two of their nests, both containing a couple of eggs.

From the woods we proceed over the common towards Trwyn Dinmor, a high cliff on the Red Wharfe side. Amongst the bracken a Turtle-Dove is seen feeding, and it allows us to approach it within close range before it takes wing and makes towards a clump of hawthorn trees. This species is only known as a passing migrant in the county of Anglesey. When the cliff is reached the Herring-Gulls soon begin to clamour, and a small colony of Kittiwakes which breed here leave the ledges, but they soon return again and take but little heed of us as they fly to and fro, some of them having material in their beaks for their nearly finished nests. The Guillemots and Razorbills hurriedly make a dash for the sea, and a Shag also leaves from somewhere below us. From time to time a few Cormorants with conspicuous white flanks pass in a line a little out at sea. In 1910 we discovered a Rock-Pipit's nest in a cleft near the top of the cliff; and to-day when we happen to look into the same spot we are surprised to see a Rock-Pipit leave, revealing to us a nest containing two eggs. Jackdaws, Swifts, and House-Martins breed at this cliff, and many of them are flying about. A pair of Oyster-Catchers are seen flying away from a flat headland close by, uttering their whistling note as they go, but when we go and search the place to find whether they have laid their eggs, we only come across two empty scratchings.

17th.—A few Common Terns seen by the Menai Straits.

18th.—A visit to two of the Anglesey lakes has been arranged for to-day. When we reach the first, namely, Llyn-y-parc, we only see a few Coots and Herring-Gulls on the water. As we

are searching about for nests we flush a Common Sandpiper from a rock covered with herbage near the water's edge, but it does not appear to have a nest there. Some empty Coots' and Waterhens' nests are found, and the only one that we find containing eggs is a Dabchick's. This nest is floating midst the stems of some tree close to the water's edge, and when found it is covered with wet leaves, weeds, &c., but on removing these we expose five yellow-stained eggs. Quitting this lake we proceed on towards the other, called Llyn Bodgylched. This is a fine sheet of water, with sedge and high reeds covering about one-half of it, and where usually we found a wealth of bird-life. However, very few birds are present to-day, those that we see being Wild Ducks, Coots, Waterhens, Snipe, and a single Sedge-Warbler. Near to the border of the lake we find a Peewit's nest and four eggs, and on proceeding to the opposite side we observe some Sand-Martins skimming about over the lake.

25th.—This afternoon we cycle to Carreg Onnen, a high cliff on the Anglesey coast, where a large colony of Cormorants breed. At length we arrive at our destination, and straightway make for the cliffs. Walking along the top of these, a halt is made, for our olfactory senses have detected the nesting-site of the "Colliers," as the Cormorants are known to the inhabitants around here. The Cormorants are very plentiful, and on the ledges about half-way down the cliff are many nests containing eggs. As we clamber down, all the birds that can see us immediately leave, but so soon as we have hidden ourselves amongst some small nut trees they return, landing clumsily on to the ledges, and some of them uttering a harsh croak while doing so. Some of the male birds are very savage, and fight with each other until one gets too near to the edge and overbalances itself. One pair that we see are very loving, the male bird fondling the female by gently running its bill along the feathers of her head and bringing it around the eyes and over the lores, &c., just as Pigeons do. A few Herring-Gulls are also nesting here, and we observe some of their nests containing eggs. On returning we see a brace of Partridges, a Corn-Bunting on the top of a furze-bush, and later we hear the churring note of a Nightjar, and then see the bird itself leaving a branch of an oak-tree by the road-

side. To-day, too, at one place along the coast we have the pleasure of observing five Ravens in the air together, being a pair of old birds and their three young. This pair, we are glad to say, successfully reared off a brood last year and the year before that to our knowledge, and long may they do so is our most sincere wish.

On Whit-Monday, thanks to a friend who invites us to a yachting cruise, we are able to pay a visit to Puffin Island, off the eastern corner of Anglesey. When the yacht arrives within a couple of hundred yards of the island we board a small boat and are rowed across to it. As soon as we set foot upon the shore the Gulls begin to call out "yac, yac, yac." Every step forward on the grassy top brings us upon nests, the majority of which belong to Herring-Gulls, and some to the Lesser Black-backed species. However, the eggs are so indistinguishable, that in order to ascertain which are which we have to hide ourselves and watch the Gulls settling down again, and then mark a few of them. A few years back the Lesser Black-backs were rather scarce on the island and generally confined to the south side of it, but to-day we see them rise up from all sides. The Lesser Black-backs resent our intrusion far more than the Herring-Gulls do, for frequently one of them swoops viciously at us, rising up again when within a yard or so of our heads. Flying about with the rest of the Gulls is a Greater Black-backed variety, it being at once conspicuous by its larger size, and we watch the movements of this noble-looking bird for some time in order to see whether it will settle on a nest, but this we fail to see. The Kittiwake Gulls, Puffins, Guillemots, and Razorbills reside on the north side, and as we approach that point we observe a large number of the Puffins on the slope near the edge of the cliff. The Puffins are very tame, looking curiously at us, and allowing us to go within a couple of yards of them before they make a dash out to sea, with their quick-beating wings making a loud whirring noise. The ground where these nestle is tunnelled in all directions, and we often sink knee-deep through the turf and cause some of the sitting Puffins to scuttle out of their burrows. Most of the holes that we investigate contain the single egg, these being for the most part fresh, as they did not have the dirty appearance that they attain as incubation advances. At one part of the

cliff the Guillemots, Razorbills, and Kittiwake Gulls have congregated, the former being very plentiful on the wider ledges, but the second named species does not appear to be abundant. Guillemots' eggs are very plentiful, there being many variations in colour and markings. The pretty Kittiwakes have their nests built on the smaller ledges, both above and below the sites of the Guillemots and Razorbills, and some of the nests are placed right against the upright face of the cliff with hardly any support beneath them, most of them containing two eggs. The other birds observed on the island are Jackdaws, Meadow-Pipits, and Rock-Pipits.

29th.—At the sand-dune district of Newborough, Anglesey, in 1909 and 1910, we discovered a pair of Merlins nesting, and to-day we cycle there with the same anticipation. At the rabbit-warren Carrion Crows are very plentiful, and we continually see them being mobbed by Peewits. Wheatears also are very abundant, and we saw one female leave a rabbit's burrow, but we do not stay to dig away at it owing to want of time. At length, after a weary walk over the sand, we come to the area where the Merlins nested, and keep a sharp look-out for them, but after a long search we fail to flush our quarry. We are very disappointed at not seeing the Merlins again, and we hope that they have not fallen to the gun during the rabbit-shooting season, but are now nesting peacefully in another locality. Over a shingle beach close by some Common Terns are flying and screaming, so we proceed there to find out whether or not they are nesting at the place. However, after walking to and fro over the beach and scrutinizing nearly every inch of the ground, we only came across an Oystercatcher's scratching with three eggs. A few Ring Plover are running about the beach, and they often take short low flights, calling out their whistling note.

June 1st.—We first cycle to the seashore within a mile or so of Llanfairfechan, where, on a long shingle beach, a small colony of Lesser Terns breed, and as we walk towards this beach the Terns rise, and soon the air is full of their harsh cries. Searching for their eggs proves a difficult task, and at last we walk some distance away and lie full length upon the ground. No sooner have we done so than we are surprised to see how quickly the Terns alight and settle on their eggs.

We mark a few of these birds, and getting up we once more proceed to the beach, and soon find three nests close to each other—one with one egg, one with two, and the other with three; and at a little distance away still another three eggs which harmonize well with the small pebbles, shells, and bits of dried seaweed amongst which they are laid. We then ride on to Aber, and proceed to a place where last year we found a pair of Redstarts nesting. The Redstarts are tenanting the nest again this year, and when we flush the female from out of the hole in the branch where the nest is built, we see five blue eggs. Near by, in another hole in a tree, is a Great Tit's nest, with eight fully-fledged young, which, when we are looking at them, fly off one by one. Crossing the valley to the other side, we then begin to search about the small trees in the hopes of coming across a Cuckoo's egg, but although we find many Chaffinchs' nests with eggs or young, we do not see the object of our search. Cuckoos are very common here, and we frequently see about three of them at a time with little birds following in their wake. From amongst the bracken at one place we flush a Willow-Wren, and on searching we discover its nest with five eggs. A few Garden-Warblers are also seen.

5th.—The Sunday previous to this date we were told about a young Cuckoo, so that to-day we go by train to Felin Hen, in order to see it. On alighting at the little station, we meet our informer, who then guides us along the track of a narrow gauge railway. After a short walk we come to a halt, and are shown the young Cuckoo in a Meadow-Pipit's nest, on a bank within two yards of the rail. It is a little over a week old, and is very fierce, striking out with its beak and hissing when one puts a finger near it. When we whistle it opens wide its beak, revealing to us the red coloration of the inside of its mouth, and, fluttering its tiny wings, seems quite eager for food. During our stay of about half an hour at the nest we did not once see the foster-parents, this being quite contrary to the behaviour of a pair of Robin foster-parents that we once observed, and which were always with their charge, and took no heed of our intrusion. At length we take our leave of the young Cuckoo, and, entering a wood near by, we find a Wren's nest containing eggs, and also a half-finished nest of a Goldcrest.

12th.—We once again visit Llyn Bodgylched, in Anglesey. To-day we see far more birds there than on our previous visit; Coots, Waterhens, and Wild Ducks are very plentiful, and there are also a few Black-headed Gulls present. Some Sedge-Warblers and Reed-Buntings are seen about the vegetation at the water's edge, and in amongst the sedge we come across two empty nests of the former species. We also obtain a glimpse of a pair of Shovelers and their brood just before they disappear and hide in the vegetation; but the beautiful male bird comes forth again into the open, where we watch it for some time, and are charmed by its splendour. Snipe are very common, being flushed at almost every step. About four Teal are seen, their small size and whistling call being characteristic.

15th.—For the last four seasons a pair of Nightjars have been known by us to breed in a certain field near to the Tubular Bridge on the Carnarvonshire side, so to-day we proceed there to see if they are present again this season. As we are cutting through a wood towards the field we disturb a flock of Wood-Pigeons, while a Jay draws our attention by its harsh note, and we obtain a view of it before it disappears amongst the trees. To our disappointment no Nightjar is flushed from the bracken-covered ground, which we beat from end to end.

16th.—A Kingfisher seen when we are out walking along the left bank of the River Cegin.

22nd.—In a large hawthorn-tree in one of the fields just outside the town a Red-backed Shrike's nest, containing five young, is found. The young are fully fledged, and leave the nest on our approach, while both parent birds fly quickly from twig to twig overhead, calling out "chack, chack." The beautiful male bird is rather bold, and frequently comes down quite near whilst we are inspecting the nest and a youngster that we have caught. In the Menai Woods near by we find a Chiffchaff's nest full of fledged young.

This last date brings an end to the pleasant rambles with the birds of the two counties for the season 1912, and, in conclusion, I must mention the name of Mr. H. H. Thompson, Bangor, who was my frequent companion, and to whom I owe my thanks for affording many an enjoyable day.



## NOTES AND QUERIES.

## MAMMALIA.

**Natterer's Bat (*Myotis nattereri*) in Buckinghamshire.**—Although Natterer's Bat is probably not uncommon in Buckinghamshire, it has hitherto escaped notice, and it may be well to record its occurrence in Hockeridge Wood, Berkhamstead. At about eleven o'clock on the evening of Aug. 28th, 1912, I captured a male which was fitting about inside a hut in the depths of the big beech-wood.—CHAS. OLDHAM (Kelvin, Boxwell Road, Berkhamstead).

## AVES.

**Notes on the Habits of *Sturnus vulgaris*.**—It used to be a fairly common sight in Yorkshire to see Starlings perched upon the backs of sheep, but I have not often seen them on cattle. I am, however, quite sure that the habit is not so prevalent as was formerly the case. Many years ago a series of articles appeared in the now defunct 'Leeds Mercury Supplement' upon "Ornithology in Relation to Agriculture." I was responsible for the one upon the Starling, and particularly drew attention to this habit. The articles were afterwards published in book form, and were reviewed by the late John Cordeaux. He rather ridiculed my statement, saying he had never observed this habit. A day or two afterwards I was going to the Bempton Cliffs with the late John Farrah, F.L.S. We had not travelled far when Farrah said: "Look! that upsets Cordeaux' ideas, and bears out your statements." There were seven or eight Starlings perched on sheeps' backs, and all of them industriously searching for "ticks" or other insects. In this district they have increased enormously of late years, but I have not heard of any complaints of their doing any damage to crops or fruit. They, however, usurp almost every likely hole for nesting operations, and Woodpeckers have had a sad time. I frequently find perfectly open nests, owing to the inability of the birds to find suitable holes in the neighbourhood.—R. FORTUNE (Harrogate).

**Dark-throated Quail in Northamptonshire.**—Three years ago I recorded the occurrence of a brown-throated Quail in Oxfordshire

(Zool. 1909, p. 469), and this spring another has been killed at Middleton Cheney, in Northamptonshire, about four miles over our borders. In the example, the subject of the present notice, the dark colour of the chin and throat is more extensive than in the first-named specimen, *i. e.* it extends further laterally. The colour is darker also, the middle of the throat is black, or almost so, and this shades off into rich chestnut-brown at the sides. This bird is no doubt a hybrid between the typical *Coturnix communis* and the chestnut-throated subspecies (or resident local race), *C. c. capensis*. Mr. Grant says ('Handbook to the Game Birds,' vol. i. p. 181) that the results of the interbreeding of these two forms are to be seen in the many male birds from South Africa and South Europe, &c., in which the white parts on the sides of the head and throat are more or less suffused with the bright rufous-chestnut characteristic of the resident bird. I have seen these chestnut-throated birds among the cages full of Quails to be seen in the markets in May, sent from the Mediterranean countries. But it is evident that the hybrids also reach our shores, and probably (to judge from two occurring—or rather being identified—in the neighbourhood within three years) not uncommonly. If only the people on the shores of Italy, &c., would let a few Quails through sometimes at the time of the spring migration, I feel sure we might once more have this grand little bird among our list of regular game-birds; and its pretty call, "twit-middick," might be a familiar summer sound. I have heard one Quail calling here this summer (1912).—O. V. APLIN (Bloxham, Oxon).

**Three Nests of *Crex pratensis* in the same Field.**—In 1910 I saw three nests of Land-Rails in one small field of about two acres. They were in a field on the Corporation's Sewage Farm at Spofforth. When the grass was being cut two were destroyed, but the third was observed in time to save it, and a tuft of grass was left to protect the nest. The bird did not desert, but continued to incubate her eggs. The caretaker called to inform me, in case I would like to photograph her, as she was exceedingly tame. When I went over the bird was absent, and upon another visit in about an hour or so she was still absent, and the eggs quite cold. It looked as if she had deserted, but it turned out she was the victim of a most unfortunate accident. Quite close to the nest was a large septic tank, and the bird had somehow managed to get into this, and was drowned; her dead body, perfectly fresh, was floating on the top.—R. FORTUNE (Harrogate).

## INSECTA.

**Clouded Yellow Butterfly (*Colias edusa*), &c.**—As this was expected to be a “Clouded Yellow” year, I may mention that I saw a male specimen at Easton, Isle of Portland, on July 17th. “Holly Blue” (*Cyaniris argiolus*).—The present year seems to have been a good one for the “Holly Blue.” It appeared in my garden in April and May, and again at the latter end of July.—O. V. APLIN (Bloxham, Oxon).

[*C. argiolus* I found abundant in South-west Cornwall in July and early August, and also in my garden in Surrey.—ED.]

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## OBITUARY.

ALLAN OCTAVIAN HUME, C.B.

THIS well-known naturalist—both ornithologist and botanist—died very recently at the age of eighty-three. Mr. Allan Hume was the youngest son of the celebrated Joseph Hume, M.P., and spent the best part of his life in India, where he held some high appointments. He did valuable service during the Mutiny, and received his C.B. for gallantry in the field. He made a wonderful collection of Indian birds and eggs, which he presented to the British Museum, “one of the most splendid donations ever made to the Nation, and added to the Museum, which had previously but a poor series of Indian birds, the largest and most complete collection of birds and eggs from the British Indian Empire the world has ever seen.” The collection contained 258 types. He also presented a magnificent collection of heads and horns of Indian Ruminants, numbering 223 specimens, as well as 371 skins of Indian Mammals. After his return from India he was much interested in the study of theosophy, but subsequently devoted himself to botany, and his botanical specimens now constitute the South London Botanical Institute of Norwood.

W. L. D.

## NOTICES OF NEW BOOKS.

*The Early Naturalists ; their Lives and Work (1530-1789).*

By L. C. MIALL, D.Sc., F.R.S. Macmillan & Co. Lim.

THIS work of Prof. Miall is an undertaking which must have been beset with two primary difficulties, *viz.* when to begin, and whom to include. The first sentence of the introduction is evidence of the former supposition : "The beginnings of natural history are wholly unknown to us." In the preface we read : "I cannot pretend, however, to have been altogether consistent and impartial in my selection," a witness to our second proposition, so that perhaps "Early Naturalists" might have proved a happier title. The biographical studies commence with Otto Brunfels, botanist (1484-1534), and terminate with Buffon (1707-1788). There is a postscript, "1789 and later," but the real work terminates with the consideration of the great French naturalist and philosopher. And here we cannot refrain from quoting some interesting coincidences and successions given by Prof. Miall : "Linnæus and Buffon were born within four months of each other (1707); Linnæus, Bernard de Jussieu, Haller, Voltaire, and Rousseau died within eight months of each other (November, 1777-July, 1778)."

Dr. Miall is a candid critic, especially when writing of Linnæus, with whose work he seems somewhat out of sympathy. Thus we read : "Linnæus was deficient in the patience and candour necessary for the profitable discussion of deep questions of biology. He was, for example, utterly unable to deal with the great unformulated question of the nature of affinity." But, as we previously were told, "some disapprobation was caused by the place assigned to Man in the *Systema Naturæ*, where he is included in the same order with the Apes, and in the same genus with the Orang," we think Linnæus must have been not altogether averse to candour, nor outside the consideration of affinities. However, differences of view must always pertain to naturalists who approach the consideration of other's work from the standpoint of their own particular studies, and this seems unavoidable; but Prof. Miall has given us a book of biographical

studies and criticisms which largely help to show the evolution in biological thought and knowledge, and for which naturalists will be grateful to him. We wish the work had contained some portraits as well.

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*Birds of Northumberland and the Eastern Borders.* By GEORGE BOLAM. Henry Hunter Blair, Alnwick.

MR. BOLAM has achieved a very considerable success in the preparation of this volume; it is not only a reliable enumeration and history of the birds of Northumberland and the Eastern Borders, but it is enriched with many notes, quotations, and references appertaining to the subject which give his book a unique status in ornithological literature, and make it one of the most readable of county records. The introduction contains biographical notes of no little value referring to old naturalists who lived and worked in Northumberland, and we even find interesting entomological observations. Thus, referring to the Glowworm (*Lampyrus noctiluca*), Mr. Bolam adds: "In addition to its well-known habit of preying upon slugs, I have seen this insect devouring 'green fly' (Aphides)." As regards the nomenclature, that used in Saunders's 'Manual' (except in one or two cases) has been followed, but it is pointed out that, although *Cygnus bewicki*, Yarrell, is applied to Bewick's Swan, it should in strict priority be remembered that it was "Mr. R. R. Wingate, of Newcastle, who first called attention to the distinctness of this species from the common Wild Swan, a discovery which was communicated by him to the members of the Natural History Society of Northumberland, Durham, and Newcastle-on-Tyne on 20th October, 1829. On 16th February following, Selby read a paper to the same Society further elucidating the discovery, and the name of *Cygnus bewicki* of Wingate, then given to it, ought in fairness to have priority. Yarrell's paper setting out the like facts was read to the Linnean Society, 19th January, 1830."

Mr. Bolam has well garnered his notes and observations, and if some have been recorded elsewhere, it is still a matter of congratulation that few indeed are missing from this excellent faunistic publication.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF  
SCIENCE, DUNDEE, 1912.

ADDRESS TO THE ZOOLOGICAL SECTION.

By P. CHALMERS MITCHELL, D.Sc., F.R.S., *President of the Section.*

ZOOLOGICAL GARDENS AND THE PRESERVATION OF FAUNA.

IN thinking over possible subjects for this Presidential Address, I was strongly tempted to enter on a discussion of the logical methods and concepts that we employ in Zoology. The temptation was specially strong to a Scot, speaking in Scotland, that he should devote the hour when the prestige of the presidential chair secured him attention, to putting his audience right on logic and metaphysics. But I reflected that Zoology is doing very well, however its logic be wavering, and that as all lines subtend an equal angle at infinity, it would be of small moment if I were to postpone my remarks on metaphysics. And so I am to essay a more modest but a more urgent theme, and ask you to consider the danger that threatens the surviving land-fauna of this globe. A well-known example may serve to remind you how swift is the course of destruction. In 1867, when the British Association last met at Dundee, there were still millions of bison roaming over the prairies and forests of North America. In that year the building of the Union Pacific, the first great trans-continental railway, cut the herd in two. The Southern division, consisting itself of several million individuals, was wiped out between 1871 and 1874, and the practical destruction of the Northern herd was completed between 1880 and 1884. At present there are only two herds of wild bison in existence. In the Yellowstone Park only about twenty individuals remained in 1911, the greater part of the herd having been killed by poachers. A larger number, over three hundred, still survive near the Great Slave Lake, and there are probably nearly two thousand in captivity, in various Zoological Gardens, private domains, and State Parks. It is only by the deliberate and conscious interference of man that the evil wrought by man has been arrested.

A second example that I may select is also taken from the continent of North America, but it is specially notable because it is sometimes urged, as in India, that migratory birds need no protection. Audubon relates that just a century ago Passenger Pigeons existed in countless millions, and that for four days at a time the sky was black with the stream of migration. The final extinction of this species has taken place since the last meeting of the Association in Dundee. In 1906 there were actually five single birds living, all of which had been bred in captivity, and I understand that these last survivors of a prolific species are now dead, although the birds ranged in countless numbers over a great continent.

It would be futile to discuss in detail the precise agencies by which the destruction of animal life is wrought, or the pretexts or excuses for them. The most potent factors are the perfection of the modern firearm and the enormous increase in its use by civilised and barbarous man. Sometimes the pretext is sport, sometimes wanton destructiveness rules. The extermination of beasts of prey, the clearing of soil for stock or crops, the securing of meat, the commercial pursuit of hides and horns, and of furs and feathers, all play their part. Farmers and settlers on the outskirts of civilisation accuse the natives, and allege that the problem would be solved were no firearms allowed to any but themselves. Sportsmen accuse other sportsmen, whom they declare to be no real sportsmen, and every person whose object is not sport. The great museums, in the name of science, and the rich amateur collectors press forward to secure the last specimens of moribund species.

But even apart from such deliberate and conscious agencies, the near presence of man is inhospitable to wild life. As he spreads over the earth, animals wither before him, driven from their haunts, deprived of their food, perishing from new diseases. It is part of a general biological process. From time to time, in the past history of the world, a species, favoured by some happy kink of structure or fortunate accident of adaptability, has become dominant. It has increased greatly in numbers, outrunning its natal bounds, and has radiated in every possible direction, conquering woodland and prairies, the hills and the plains, transcending barriers that had seemed impassable, and perhaps itself breaking up into new local races and varieties. It must be long since such a triumphant progress was unattended by death and destruction. When the first terrestrial animals crept out of their marshes into the clean air of the dry land, they had only plants and the avenging pressure of physical forces to overcome. But when the Amphibians were beaten by the Reptiles, and when from amongst the Reptiles some insignificant species acquired the prodigious possibility of transformation to Mammals, and still more when amongst the Mammals Eutherian succeeded Marsupial, Carnivore the Creodont, and Man the Ape, it could have been only after a fatal contest that the newcomers triumphed. The struggle, we must suppose, was at first most acute between animals and their nearest inferior allies, as similarity of needs brings about the keenest competition, but it must afterwards have been extended against lower and lower occupants of the coveted territory.

The human race has for long been the dominant terrestrial species, and man has a wider capacity for adaptation to different environments, and an infinitely greater power of transcending geographical barriers than have been enjoyed by any other set of animals. For a considerable time many of the more primitive tribes, especially before the advent of firearms, had settled down into a kind of natural equilibrium with the local mammalian fauna, but these tribes have been first driven to a keener competition with the lower animals, and then, in most parts of the world, have themselves been forced almost or completely out of existence. The resourceful and aggressive higher

racés have now reached into the remotest parts of the earth, and have become the exterminators. It must now be the work of the most intelligent and provident amongst us to arrest this course of destruction, and to preserve what remains.

In Europe, unfortunately, there is little left sufficiently large and important to excite the imagination. There is the European bison which has been extinct in Western Europe for many centuries, whilst the last was killed in East Prussia in 1755. There remains a herd of about seven hundred in the forests of Lithuania, strictly protected by the Tsar, whilst there are truly wild animals, in considerable numbers, in the Caucasus, small captive herds on the private estates of the Tsar, the Duke of Pless, and Count Potocki, and a few individuals in various Zoological Gardens. There is the beaver, formerly widespread in Europe, now one of the rarest of living mammals, and lingering in minute numbers in the Rhone, the Danube, in a few Russian rivers, and in protected areas in Scandinavia. The wolf and the bear have shrunk to the recesses of thick forests and the remotest mountains, gluttons to the most barren regions of the north. The chamois survives by favour of game-laws and the vast inaccessible areas to which it can retreat, but the mouflon of Corsica and Sardinia and the ibex in Spain are on the verge of extinction. Every little creature, from the otter, wild cat, and marten, to the curious desman is disappearing.

India contains the richest, the most varied, and, from many points of view, the most interesting part of the Asiatic fauna. Notwithstanding the teeming human population it has supported from time immemorial, the extent of its area, its dense forests and jungles, its magnificent series of river valleys, mountains, and hills have preserved until recent times a fauna rich in individuals and species. The most casual glance at the volumes by sportsmen and naturalists written forty or fifty years ago reveals the delight and wonder of travel in India so comparatively recently as the time when the Association last met in Dundee. Sir H. H. Johnston has borne witness that even in 1895 a journey "through almost any part of India was of absorbing interest to the naturalist." All is changed now, and there seems little doubt but that the devastation in the wonderful mammalian fauna has been wrought chiefly by British military officers and civilians, partly directly, and partly by their encouragement of the sporting instincts of the Mohammedan population and the native regiments, although the clearing of forests and the draining of marshlands have played an important contributory part. The tiger has no chance against the modern rifle. The one-horned rhinoceros has been nearly exterminated in Northern India and Assam. The magnificent gaur, one of the most splendid of living creatures, has been almost killed off throughout the limits of its range—Southern India and the Malay Peninsula. Bears and wolves, wild dogs and leopards, are persecuted remorselessly. Deer and antelope have been reduced to numbers that alarm even the most thoughtless sportsmen, and wild sheep and goats are being driven to the utmost limits of their range.

When I speak of the fauna of Africa, I am always being reminded



of the huge and pathless areas of the Dark Continent, and assured that lions and leopards, elephants and giraffe, still exist in countless numbers, nor do I forget the dim recesses of the tropical forests where creatures still lurk of which we have only the vaguest rumour. But we know that South Africa, less than fifty years ago, was a dream that surpassed the imagination of the most ardent hunter. And we know what it is now. It is traversed by railways, it has been rolled over by the devastations of war. The game that once covered the land in unnumbered millions is now either extinct, like the quagga and the black wildebeeste, or its scanty remnant lingers in a few reserves and on a few farms. The sportsman and the hunter have been driven to other parts of the continent, and I have no confidence in the future of the African fauna. The Mountains of the Moon are within range of a long vacation holiday. Civilisation is eating into the land from every side. All the great European countries are developing their African possessions. There are exploring expeditions, punitive expeditions, shooting and collecting expeditions. Railways are being pushed inland, water-routes opened up. The land is being patrolled and policed and taxed, and the wild animals are suffering. Let us go back for a moment to the Transvaal and consider what has happened since the Rand was opened, neglecting the reserves. Lions are nearly extinct. The hyæna has been trapped and shot and poisoned out of existence. The eland is extinct. The giraffe is extinct. The elephant is extinct. The rhinoceros is extinct. The buffalo is extinct. The bontebok, the red hartebeeste, the mountain zebra, the oribi, and the grysbok are so rare as to be practically extinct. And the same fate may at any time overtake the rest of Africa. The white man has learned to live in the tropics; he is mastering tropical diseases; he has need of the vegetable and mineral wealth that lie awaiting him, and although there is yet time to save the African fauna, it is in imminent peril.

When we turn to Australia, with its fauna of unique zoological interest, we come to a more advanced case of the same disease. In 1909 Mr. G. C. Shortridge, a very skilled collector, working for the British Museum, published in the 'Proceedings of the Zoological Society of London' the results of an investigation he had carried out on the fauna of Western Australia south of the tropics during the years 1904-1907. He gave a map showing the present and comparatively recent distribution for each of the species of Marsupials and Monotremes indigenous to that locality. West Australia as yet has been very much less affected by civilisation than Queensland, New South Wales, or Victoria, and yet in practically every case there was found evidence of an enormous recent restriction of the range of the species. Marsupials and Monotremes are, as you know, rather stupid animals, with small powers of adaptation to new conditions, and they are in the very gravest danger of complete extinction. In the island of Tasmania the thylacine, or marsupial wolf, and the Tasmanian devil have unfortunately incurred the just hostility of the stock raiser and poultry farmer, and the date of their final extermination is approaching at a pace that must be reckoned by months rather than by years.

The development of the continent of North America has been one of the wonders of the history of the world, and we on this side of the Atlantic almost hold our breath as we try to realise the material wealth and splendour and the ardent intellectual and social progress that have turned the United States into an imperial nation. But we know what has happened to the American bison. We know the danger that threatens the pronghorn, one of the most isolated and interesting of living creatures, the Virginian deer, the mule-deer, and the bighorn sheep. Even in the wide recesses of Canada, the bighorn, the caribou, the elk, the wapiti, the white mountain goat, and the bears are being rapidly driven back by advancing civilisation. In South America less immediate danger seems to threaten the jaguar and maned wolf, the tapirs and ant-eaters and sloths, but the energy of the rejuvenated Latin races points to a huge encroachment of civilisation on wild nature at no distant date.

You will understand that I am giving examples and not a catalogue even of threatened terrestrial mammals. I have said nothing of the aquatic carnivores, nothing of birds, or of reptiles, or of batrachians and fishes. And to us who are zoologists, the vast destruction of invertebrate life, the sweeping out, as forests are cleared and the soil tilled, of innumerable species that are not even named or described, is a real calamity. I do not wish to appeal to sentiment. Man is worth many sparrows; he is worth all the animal population of the globe, and if there were not room for both, the animals must go. I will pass no judgment on those who find the keenest pleasure of life in gratifying the primeval instinct of sport. I will admit that there is no better destiny for the lovely plumes of a rare bird than to enhance the beauty of a beautiful woman. I will accept the plea of those who prefer a well-established trinomial to a moribund species. But I do not admit the right of the present generation to careless indifference or to wanton destruction. Each generation is the guardian of the existing resources of the world; it has come into a great inheritance, but only as a trustee. We are learning to preserve the relics of early civilisations and the rude remains of man's primitive arts and crafts. Every civilised nation spends great sums on painting and sculpture, on libraries and museums. Living animals are of older lineage, more perfect craftsmanship and greater beauty than any of the creations of man. And although we value the work of our forefathers, we do not doubt but that the generations yet unborn will produce their own artists and writers, who may equal or surpass the artists and writers of the past. But there is no resurrection or recovery of an extinct species, and it is not merely that here and there one species out of many is threatened, but that whole genera, families and orders are in danger.

Now let me turn to what is being done and what has been done for the preservation of fauna. I must begin by saying, and this was one of the principal reasons for selecting the subject of my Address, that we who are professional zoologists, systematists, anatomists, embryologists, and students of general biological problems, in this country at least, have not taken a sufficiently active part in the

preservation of the realm of nature that provides the reason for our existence. The first and most practical step of world-wide importance was taken by a former President of the British Association, the late Lord Salisbury, one of the few in the long roll of English statesmen whose mind was attuned to science. In 1899 he arranged for a convention of the Great Powers interested in Africa to consider the preservation of what were curiously described as the "Wild Animals, Birds and Fish" of that continent. The convention, which did most important pioneer work, included amongst its members another President of this Association, Sir Ray Lankester, whom we hold in high honour in this Section as the living zoologist who has taken the widest interest in every branch of zoology. But it was confined in its scope to creatures of economic or of sporting value. And from that time on the central authorities of the Great Powers and the local Administrators, particularly in the case of tropical possessions, seem to have been influenced in the framing of their rules and regulations chiefly by the idea of preserving valuable game animals. Defining the number of each kind of game that can be killed, charging comparatively high sums for shooting-permits, and the establishment of temporary or permanent reserved tracts in which the game may recuperate, have been the principal methods selected. On these lines, narrow although they are, much valuable work has been done, and the parts of the world where unrestricted shooting is still possible are rapidly being limited. I may take the proposed new Game Act of our Indian Empire, which has recently been explained, and to a certain extent criticised, in the 'Proceedings of the Zoological Society of London,' by Mr. E. P. Stebbing, an enlightened sportsman-naturalist, as an example of the efforts that are being made in this direction, and of their limitations.

The Act is to apply to all India, but much initiative is left to Local Governments as to the definition of the important words "game" and "large animal." The Act, however, declares what the words are to mean in the absence of such local definitions, and it is a fair assumption that local interpretations will not depart widely from the lead given by the central Authority. Game is to include the following in their wild state:—Pigeons, sandgrouse, peafowl, jungle-fowl, pheasants, partridges, quail, spurfowl, florican and their congeners; geese, ducks and their congeners; woodcock and snipe. So much for Birds. Mammals include hares and "large animals" defined as "all kinds of rhinoceros, buffalo, bison, oxen; all kinds of sheep, goats, antelopes and their congeners; all kinds of gazelle and deer."

The Act does not affect the pursuit, capture, or killing of game by non-commissioned officers or soldiers on whose behalf regulations have been made, or of any animal for which a reward may be claimed from Government, of any large animal in self-defence, or of any large animal by a cultivator or his servants, whose crops it is injuring. Nor does it affect anything done under licence for possessing arms and ammunition to protect crops, or for destroying dangerous animals, under the Indian Arms Act. Then follow prohibitory provisions, all of which refer to the killing or to the sale or possession of

game or fish, and provisions as to licences for sportsmen, the sums to be paid for which are merely nominal, but which carry restrictions as to the number of head that may be killed. I need not enter upon detailed criticism as to the vagueness of this Act from the zoological point of view, or as to the very large loopholes which its provisions leave to civil and military sportsmen; these have been excellently set forth by Mr. Stebbing, who has full knowledge of the special conditions which exist in India. What I desire to point out is that it conceives of animals as game rather than as animals, and that it does not even contemplate the possibility of the protection of birds of prey and beasts of prey, and still less of the enormous numbers of species of animals that have no sporting or economic value.

Mr. Stebbing's article also gives a list of the very large number of reserved areas in India, which are described as "Game Sanctuaries." His explanation of them is as follows:—"With a view to affording a certain protection to animals of this kind (the elephant, rhinoceros, ruminants, &c.), and of giving a rest to species which have been heavily thinned in a district by indiscriminate shooting in the past, or by anthrax, drought, &c., the idea of the Game Sanctuary was introduced into India (and into other parts of the world), and has been accepted in many parts of the country. The sanctuary consists of a block of country, either of forest or of grassland, &c., depending on the nature of the animal to which sanctuary is required to be given; the area has rough boundaries such as roads, fire lines, nullahs, &c., assigned to it, and no shooting of any kind is allowed in it, if it is a sanctuary pure and simple; or the shooting of carnivora may be permitted, or of these latter and of everything else save certain specified animals."

Mr. Stebbing goes on to say that sanctuaries may be formed in two ways. The area may be automatically closed and reopened for certain definite periods of years, or be closed until the head of game has become satisfactory, the shooting on the area being then regulated, and no further closing taking place, save for exceptional circumstances. The number of such sanctuary blocks, both in British India and in the Native States, will cause surprise and pleasure to most readers, and it cannot be doubted but that they will have a large effect on the preservation of wild life. The point, however, that I wish to make is that in the minds of those who have framed the Game Act, and of those who have caused the making of the sanctuaries—as, indeed, in the minds of their most competent critics—the dominant idea has been the husbanding of game animals, the securing for the future of sport for sportsmen. I do not forget that there is individual protection for certain animals; no elephant, except a rogue elephant, may be shot in India, and there are excellent regulations regarding birds with plumage of economic value. The fact remains that India, a country which still contains a considerable remnant of one of the richest faunas of the world, and which also is probably more efficiently under the autocratic control of a highly educated body of permanent officials, central and local, than any other country in the world, has no provision for the protection of its fauna simply as animals.

(To be continued.)

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# THE ZOOLOGIST

No. 856.—October 15th, 1912.

ON SCOTTISH MARINE FISHERIES, 1898–1912.

By Prof. McINTOSH, M.D., LL.D., F.R.S., Gatty Marine  
Laboratory, St. Andrews.\*

WHEN the British Association last met in Dundee (1867) the scientific study of the marine fisheries was in abeyance, though considerable attention had been devoted to the life-history of the Salmon. It was sixteen or seventeen years later before a commencement was made with this important subject under the auspices of Lord Dalhousie, the Chairman of the Royal Commission on Trawling and the Fisheries. This Commission was appointed in response to urgent appeals in regard to the supposed decadence of the sea-fisheries in general. The subject has already been dealt with in its earlier aspects in a communication to the Edinburgh Meeting of the British Association in 1892,† in the “Resources of the Sea” in 1898, and in 1903 (a second decade) after the international scheme of work had been outlined.‡ Two lectures were also given at the Royal Institution in May, 1907.§ The object of the present communication is to carry the subject up to date, and to consider what conclusions may safely be drawn from a review of the whole question.

In the “Resources of the Sea” an abstract of the yearly

\* Abstract communicated to the meeting of the British Association in Dundee, Sept. 5th, 1912.

† ‘A Brief Sketch of the Scottish Fisheries, chiefly in their Scientific Aspects, during the Past Decade, 1882–1892.’

‡ ‘A Second Decade in the Scotch Sea Fisheries, Dundee, 1903.’

§ ‘Zoologist,’ July, 1907.

captures by liners and by trawlers up to 1897 (inclusive) was entered, and, for the sake of the continuity, a similar abstract is given up to 1911, so that the yearly fluctuations may be observed and explanatory remarks made where necessary.

Line-caught round fishes (exclusive of Herrings) in 1898 amounted to a total of 926,257 cwts. = £398,912, a reduction of no less than 350,445 cwts. and £93,191 from the previous year. The Board attributed the decline partly to inclement weather and partly to deficient appliances. An increase of price, *viz.* 8s. 7d. as contrasted with 7s. 8d. in 1897, however, took place. There was a decrease in the case of Cod, as had occurred the previous year, yet 390,000 cwts. were taken, and only 287,000 cwts. of Haddocks. The decline in the Cod fishery was thought to be due to the failure in the district of the Moray Firth. There was a decrease also in Ling, Haddock, Whiting, and Conger, Saithe and Torsk alone showing increases.

Round fishes captured by the trawl had a weight of 661,000 cwts., valued at £322,780, or 9s. 9d. per cwt. as compared with 9s. 2d. in 1897. The increase on the previous year amounted to 161,741 cwts., and £93,274. An increase on the previous year in Cod, Ling, Saithe, Haddock, and Whiting occurred, but Conger presented a decrease. In the western districts the catch of Ling was greatly reduced.

The liners had a total of 111,554 cwts. of flat fishes, or 1403 cwts. less than last year, for which £66,543 were obtained, a sum less by £5525 than in 1897, but the price was lower, *viz.* 11s. 6d. instead of 12s. 9d. A serious decline took place in the quantity of Halibut taken by the liners.

Trawlers landed 84,275 cwts. of flat fishes, an increase over the previous year of 12,467 cwts., and the price obtained was £120,572, or nearly double that obtained from flat fishes by the liners. This is further brought out by the average price in each case, the liners receiving about 20s. per cwt., whilst the trawlers obtained 32s. 4d. Such is not, however, due to the inferiority of the catches of the former, but to the fact that the trawlers capture the most valuable kinds (Skate, for instance, being chiefly caught by the liners), and also obtain a better market.

The uncertainty of fishing operations was well illustrated in the case of the Scotch herring-boats which went to English

waters, where with ninety-four more boats a catch less by 36,646 crans resulted.

The grand total of all kinds of fishes (other than shell-fishes) landed in 1898 was 6,657,768 cwts., or an increase of 1,656,096 cwts. over the previous year, and of £252,112, a comparatively large increase, a considerable part of which was due to Herrings.

Fishing boats had decreased by 6 per cent., whilst trawl-vessels had increased by 86 per cent. The number of persons employed in the fisheries was 89,600, of whom 36,000 were fishermen, with 11,590 fishing vessels.

Of round fishes other than Herrings, the liners in 1899 caught 812,224 cwts., thus continuing the steady decline in quantity so noticeable for some years. For the catch they received £371,861, a sum less by £27,047 than in the former year.

The trawlers landed 816,410 cwts. of round fishes, of the value of £429,929, an increase over the previous year of 155,096 cwts., and of £107,149.

The liners captured 114,361 cwts. of flat fishes, an increase of 2807 cwts. over 1898, but with a value less by £2137.

The trawlers brought in nearly the same quantity as the liners, *viz.* 114,035 cwts., an increase over the previous year of 29,760 cwts. and £34,739.

The total quantity of all fishes landed was 5,145,076 cwts. = £2,189,933, or 1,512,692 cwts. less, and, strange to say, of £310,067 more in value than in 1898. The increase in value was partly due to the greatly enhanced value of the diminished catch of Herrings, the highest price ever obtained having been got for them. A single shot procured £300, and the average per boat ranged from £400 to £1300. The total catch of Herrings was 3,207,000 cwts. = £1,143,000.

The number of boats of all kinds was 11,190, of which 207 were steam trawlers. The number of persons employed in the fishing industry was 84,500, a smaller number than last year, and of these 35,700 were fishermen.

The round fishes captured by the liners in 1900 amounted to 650,005 cwts. = £304,837, a reduction on 1899 of 160,219 cwts. and £67,028.

Trawlers caught 891,975 cwts. of round fishes = £512,803, an increase of 75,565 cwts. and £92,874 over the previous year.

The flat fishes procured by the liners weighed 97,035 cwts. = £63,733, a diminution of 17,326 cwts., yet only of £673 in value. The increased captures of Halibut this year may have tended to increase the value.

The trawlers landed 129,550 cwts. of flat fishes = £167,569, an increase both in quantity and value compared with 1899. While Turbot and Lemon-dabs had decreased, Flounders, Plaice, and Brill had considerably increased.

The total quantity of all kinds of fishes landed was 5,369,265 cwts. = £2,325,994, a substantial increase on the previous year both in quantity and value. Of this total Herrings made up the large proportion, *viz.* 3,534,767 cwts. and a value of £1,251,394.

The number of boats was 11,275, an increase on the previous year, and of this number 232 were steam trawlers, and of fishermen 35,800, an increase under both heads.

This year (1901) also the disparity between the captures of liners and trawlers in regard to round fishes was marked. The liners landed 572,802 cwts. = £261,103, a considerable diminution both in weight and value compared with 1900.

The trawlers caught, of round fishes, 1,093,730 cwts. = £593,114, a large increase both in quantity and value in contrast with the previous year. Under this head 549,600 cwts. of Haddocks alone were landed at Aberdeen.

The liners increased their captures of flat fishes by 13,735 cwts. and £14,303, the totals being respectively 110,770 cwts. and £78,036.

The trawlers brought to shore 157,374 cwts. of flat fishes = £203,640, an increase over 1900 of 27,824 cwts. and £36,071. Line-caught flat fishes sold at 14s. 1d. per cwt., whilst the trawled produced 25s. 11d. per cwt.

The total quantity of fishes landed was 6,385,170 cwts. = £2,238,310, an increase over the previous year of 1,015,905 cwts., but the value was diminished by £87,674. This state of affairs was due to the low price of Herrings, the large catch of which, *viz.* 4,360,303 cwts., only brought 4s. 11d. instead of 7s. 1d. per cwt. the previous year.

The round fishes captured by the liners in 1902 amounted to 501,708 cwts. = £248,159, a reduction under both heads on the previous year. Though the total is less than in 1901, it is interesting that there was an increase in the capture of Haddocks—for the first time since 1896. The decrease in price was mainly due to the markets being flooded with an immense number of small Haddocks.

The trawlers brought to land 1,253,167 cwts. of round fishes = £602,290, an increase of 159,437 cwts. = £9,176, the comparatively small increase in price being due to the fact above mentioned.

97,247 cwts. of flat fishes were captured by the liners = £67,908, a reduction on the previous year, and the disparity in price (14s.) as compared with the trawlers (31s. 9d.) is noteworthy. The great success of the herring fishery may have contributed to the diminished catches of both round and flat fishes by the liners.

118,989 cwts. of flat fishes were landed by the trawlers = £118,719, a diminution compared with 1901 of 38,385 cwts. and £14,921.

The grand total of all kinds of fishes, exclusive of shell-fishes, captured in 1902 was 6,866,028 cwts. = £2,502,668, an increase over 1901 of 480,858 cwts. and £264,358. Nearly three-fourths of this amount was due to Herrings, which also reached a higher price (5s. 9d.) than last year.

The liners in 1903 landed, of round fishes, 511,737 cwts. = £249,107, an increase of 10,029 cwts., but only of £948, on last year. The small increase in price was largely due to the immense number of small Haddocks landed at Aberdeen, which port accounted for 78 per cent. of the total catch of this fish.

Of round fishes, the trawlers caught 1,342,586 cwts. = £578,981, an increase of 89,419 cwts., but a diminution of £23,309, the latter being due to the low price obtained for Haddocks at Aberdeen.

Of flat fishes, the liners captured 82,059 cwts. = £64,591, a decrease of 15,188 cwts. and £3,317, the price having been 1s. 9d. more than in the previous year. Though there was an increase on the total landings of Flounders, Plaice, and Brill, the catch of the liners showed small decreases under both heads.

The trawlers landed 165,085 cwts. of flat fishes, the value of which was £232,053, about double the weight of those caught by the liners, and no less than threetimes the value, for whereas the liners only got an average of 15s. 9d. per cwt., the trawlers obtained 28s. 1d., since they captured a larger quantity of the more esteemed species, besides having greater facilities for rapid distribution from their ports.

The total quantity of fishes landed in 1903 was 6,518,808 cwts., a result considerably exceeding the average of the previous ten years. It stands third (to 1898 and 1902) in quantity, and second to 1902 in value, which was £2,410,287, the price having been 7s. 5d. as against 7s. 3d. in 1902. This result was obtained by 11,008 vessels, of a tonnage of 140,531, valued at £3,448,168, a diminution of 2289 vessels, but an increase in value of £21,923. The steady decrease of sailing boats of the smaller size, their replacement by those of larger size and greater value, and an increase of vessels propelled by steam (nearly 300 per cent.) during the decade being the noteworthy features. However, there are still 10,572 sailing boats as against 436 steam vessels. There were 36,162 fishermen employed, *viz.* 75 more than in 1902. In regard to Herrings, whilst the catch during the decade has varied little, the value has risen year by year, so that a sum of £474,145 more was obtained in 1903, as contrasted with 1894, though the catch was 54,440 cwts. less.

A considerable increase occurred in 1904 in the quantity of round fishes caught by liners, *viz.* 628,898 cwts., or 117,161 cwts., and £30,321 more than in 1903. Instead of the continuous decline in the line-fishing of Cod, this year produced an improvement. Other round fishes such as the Ling also showed an increase, largely due to steam-liners in the Atlantic.

Trawlers landed 1,520,949 cwts. of round fishes, an increase of 178,363 cwts. over the previous year, and £39,706 more in value, though the average price was 7d. less per cwt.

The liners brought to land 120,211 cwts. of flat fishes, an increase of 38,152 cwts. and £16,112 over 1903, and this year the liners accounted for most of the general increase in weight and for the whole of the increased value, since the trawled flat fishes realized £11,837 less than in 1903. Halibut, which is chiefly caught by liners, showed a considerable increase. An

increase of £2800 in the value of the Flounders, Plaice, and Brill caught by the liners is also a noteworthy feature.

The weight of the flat fishes caught by the trawlers was 180,709 cwts., and the value £221,212, an increase of 15,624 cwts., but a diminution of £10,841, the price having been 3s. 7d. per cwt. less than in 1903. Lemon-dabs are almost wholly captured by the trawlers, and while there was a slight increase in quantity, the value showed a decrease of 7 per cent. on 1903. Turbot, which had shown a gratifying return of 8955 cwts. and £32,081 in 1903, fell this year by 2000 cwts. and £8,739.

The total quantity of fishes landed in 1904 was 7,947,829 cwts., a record in the Fishery Board's returns, and exceeding by 1,081,801 cwts. that of 1902, hitherto the highest on record. The value, however, was not proportionate, for whereas the average per cwt. in 1902 was 7s. 3d., it was only 5s. 7d. in 1904. The Board accounted for the diminution by the preponderance of Herrings which amounted to 5,488,456 cwts., the highest figure during the decade, yet the price was low, *viz.*, 3s. 9d., the enormous total catch thus falling short of that of 1902 (the next highest) by £271,566. Such are the vicissitudes of the fishing industry. The white fishes formed a record, both in quantity and value.

Though there were ten trawlers less than in 1903, the returns of trawled fishes presented an increase of 139,600 cwts. Steam-liners, on the other hand, showed an increase during the decade of 350 per cent. in number, and 530 per cent. in value, a greater increase than that of the trawlers. The total number of persons employed in the fisheries was 86,621, an increase over 1903 of 2068. Of these, 31,984 manned the sailing-boats, 1639 the steam-liners and net-fishing craft, and 2637 were on board the trawlers.

The quantity of round fishes captured by the liners in 1905 amounted to 619,194 cwts. or 9704 cwts. and £4674 less than in 1904. Thus the tendency in the quantities captured by the liners to decline still continued, and were only 50 per cent. of what they were ten years ago. It is noteworthy also that stormy weather interfered with the catch of Haddocks by the liners, and that the decrease in quantity (27,530 cwts.) was accompanied by a diminution in value (£14,649); whilst the diminished captures

by the trawlers (70,440 cwts.) was followed by an increase in value (£47,100)—probably because the proportion of small fishes was less than usual. Line-fishing still maintained its superiority in regard to the capture of Ling.

The trawlers landed 1,563,247 cwts. of round fishes, the greatest amount both in weight and value (£729,822) during the decade. The whole of the increase in value was referable to the Aberdeen district. As an example of the changed circumstances, it may be noted that, whilst in 1898 the liners landed one and a half times the quantity of Whittings obtained by the trawlers, the latter now land five times the quantity procured by trawlers.

The flat fishes caught by the liners in 1905 amounted to 111,941 cwts. = £72,961, a decrease on the previous year of 9170 cwts. and £7742. The Board attributes the decrease partly to the stormy weather and to the greater facilities which trawlers have of despatching fresh fishes. Plaice caught jointly by liners and trawlers showed a decline from the preceding year of 10,230 cwts. and £9481, the failure of the line-fishing in Anstruther and Montrose districts being especially noteworthy in this respect. There are other causes, however, which the Board does not allude to, such as the absence in certain places of that whole-hearted energy which alone can give success in sea-fishing.

The trawlers caught 177,472 cwts. of flat fishes, a decrease on the previous year of 3237 cwts. and £4769. No fish has been so often brought forward as indicating the decline of the sea-fisheries as the Lemon-dab, which ere now, according to these views, should have been on the verge of extinction. Yet in the returns this fish, almost wholly caught by trawlers, stood at 30,850 cwts. = £55,379—an increase over the previous year of 15 and 11 per cent. respectively in weight and value. Turbot showed a decrease of 300 cwts. and £1900.

The total amount of fishes (exclusive of shell-fishes) was 7,856,310 cwts., a decrease on the record figures of the previous year of 91,519 cwts., but the value of the year's catch was the highest on record, *viz.* £2,649,148, and exceeded that of 1904 by £146,480. The Fishery Board looks on value as the "true test," and therefore rightly considers the result highly satisfactory. Much of this was due to the large catch of



Herrings, *viz.* 5,375,225 cwts. = £1,352,421, yet there was an increase both in quantity and value of white fishes. This total catch was obtained by 310 fewer vessels, and 102 fewer men on board.

In 1906 the liners caught 601,033 cwts. of round fishes, a decrease on 1905 of 18,161 cwts., but an increase in value of £7390. It is interesting that the line-catch of Haddocks brought nearly £17,000 more than in 1905. As bearing on the question of steady perseverance at a particular branch of fishing, it is noteworthy that the liners had a decrease of nearly 21,000 cwts. of Cod, and nearly £2000 as compared with 1905, the fishermen of the East Coast preferring to follow the Herring rather than the Cod. Thus the variable energy as well as the vicissitudes of weather have an influence on the captures of sea-fishes.

The trawlers captured 1,683,335 cwts. of round fishes, an increase of 20,089 cwts., but a decrease in value of £7142. Of Haddocks alone 100,000 cwts. more were caught than last year, but the value was £24,000 less. The Board states that the warm weather and the landing of large quantities of small Icelandic Haddocks reduced prices to an exceptionally low level. There was an increased catch and value of Cod.

Of flat fishes 46,431 cwts. were caught by the liners in 1906, the smallest catch in the decade. It is 64,610 cwts. less than in 1905, and so sudden a decrease shows that it is due to other causes than diminution of fishes. Whilst the reduction in quantity is thus great, it is satisfactory to find that the value was reduced only by £13,317, this being due to the enhanced price of 25s. 8d. instead of 13s. 2d. in 1905.

137,496 cwts. of flat fishes were landed by the trawlers, and though the amount was less by 39,976 cwts., the value was £3824 over that of the previous year, the price per cwt. having been 32s. instead of 24s. 1d.

The total catch of Plaice by liners and trawlers was 58,830 cwts., valued at £80,251, so that, contrary to the views of some, it is a fish of considerable importance in Scotland. The catch was 2581 cwts. and £3183 over that of the previous year. Lemon-dabs showed an increase of 6 per cent. in weight and 19 per cent. in value over 1905. Turbot still presented a diminution both in weight and value.

The grand total of all kinds of fishes (other than shell-fishes) landed in 1906 was 7,593,369 cwts., the third highest on record, but what is very satisfactory is that the value is the highest yet obtained, *viz.* £2,977,593, or £328,445 above any previous record. It cannot be said that these and other statistics bear out the lugubrious remarks which for many years have characterized a section of the community. This great total was largely made up of Herrings, *viz.* 5,016,220 cwts. = £1,661,178, the largest sum obtained within the decade, though the weight was less than that in the two previous years. 38,856 persons manned the fishing fleet, an increase of 2698 over 1905; and 92,305, including the former, were employed in the various industries subsidiary to the fisheries, an increase of 4104 in all. Such figures do not point to an unsatisfactory pursuit. There was a reduction of twenty-seven in the number of vessels, but an increase of 5696 in tonnage and £715,116 in value.

In 1907 the round fishes landed by liners weighed 529,962 cwts., and had a value of £262,817, a diminution on both heads as contrasted with 1906. The position of line-fishing is shown by the fact that in 1898 no less than 58 per cent. of the round fishes were captured by them, whereas in 1907 the quantity stood at 22 per cent. Less energy was given to this pursuit, and more to the Herring fishing. Ling, Haddocks, Cod, and Whittings all participated in the decrease, yet in Conger fishing, a pursuit of the liners, there was an increase of 2525 cwts. and £921 over 1906.

The trawlers caught 1,874,411 cwts. of round fishes, the largest catch on record up to date, and 191,076 cwts. over the large return of the previous year, and exceeding it in value by £32,169.

The liners produced 54,043 cwts. of flat fishes = £69,432, an increase over the previous year, yet only about half the quantity obtained in 1905. Whilst the liners thus improved on the previous year, the trawlers had diminished catches. Hali-but, Plaice, and Flounders were those in which improved catches were obtained.

The quantity of flat fishes landed by trawlers amounted to 136,502 cwts. = £218,705 a slight diminution in both cases from 1906. The total quantity of Plaice (80 per cent. of which

was due to the trawlers) was 54,700 cwts. = £75,989; a decrease of over 4000 cwts. and £4200 as compared with 1906. On the other hand, Lemon-dabs did not vary much in quantity from the preceding year's figures, yet £3000 more was obtained. Turbot, again, showed increases of 755 cwts. and £2773.

The total amount of all fishes landed was the highest on record, being 9,078,059 cwts. of the value of £3,169,737. The Board truly says that this result shows a new record in the fishing industry in Scotland. It exceeds by 1,484,690 cwts. and £192,144 the highest figures hitherto attained. Yet the average price was lower by 10*d.* per cwt. than in 1906. This favourable condition was largely due to the fact that the catch of Herrings exceeded all former returns, though at one time the Herring was supposed to be a vanishing fish. The Herrings landed amounted to 6,381,117 cwts., and the value to £1,834,940. Yet there were 189 fewer vessels than in 1906, though there was an increase in tonnage to the extent of 2304 and of £680,968 in gross value; 32,228 men and boys, or 372 more than in 1906, manned the vessels. The greater number of vessels, 89 per cent., were sailing-boats, 8 per cent. were steam-driven vessels employed in Herring, drift, and long line-fishing, and 348, or 3 per cent., were trawlers.

In 1908 the liners captured 670,946 cwts. of round fishes, 140,984 cwts. more than in 1907, but as the value was lowered by 2*s.* per cwt. the total over last year was only £1457. Much of the improvement in the catch of the liners was due to steam-liners, yet in regard to Cod and Ling the sailing-vessels were pre-eminent. It is interesting that, taking the statistics of the East Coast for twenty years,\* the average catch of Ling for the first ten years, 1889-1898, was 46,129 cwts., whilst for the last ten years, 1899-1908, the average was 105,648 cwts., or more than double. Of Torsk, a fish also taken largely by liners, the respective averages were 1981 cwts. and 7540 cwts., a still more noteworthy increase.

The trawlers caught 1,910,038 cwts. of round fishes, the highest on record, the same position being held by the value, *viz.* £756,569, though the average per cwt. (8*s.*) was the lowest

\* 27th Ann. Rep. S. F. B., Part III., "Review of Statistics," by Dr. Fulton, p. 129.

in the decade. At Aberdeen the preponderance of small Haddocks was again noteworthy, *viz.* about 42 per cent. of the total catch. Cod, Ling, and Whiting all showed increased returns.

The returns of the flat fishes caught by the liners, *viz.* 71,072 cwts., also showed a substantial increase on the former year of 17,029 cwts. and £23,991. This improvement was due to the larger catches of Halibut (11,000 cwts. over 1907) landed at Aberdeen, chiefly by the steam-liners, greater attention having been devoted to this fishing owing to the low prices prevailing for Cod and Ling.

The trawlers landed 128,843 cwts. of flat fishes, or 7659 cwts. less than last year, and with a diminution in value of £15,204. There was a decrease in the total landings of Plaice of about 5300 cwts., referable entirely to trawlers, for the catch of the liners showed an improvement. The total value was £69,404, or £6586 less than the previous year. Lemon-dabs realized £1400 more than in 1907, and showed an increase of about 1200 cwts. The catch of Turbot showed a slight decrease, but the value was greater by nearly £1000. The average value of Turbot is about £3 10s. 4d. per cwt., while for Lemon-dabs it is £2 1s. per cwt., and for Halibut £1 14s. 2d. per cwt.

The total quantity of all kinds of fishes (exclusive of shell-fishes) for 1908 was 8,645,252 cwts., or 372,901 cwts. less than in 1907, the record year, and the value less by £636,965. Though the year stood second in the amount of fishes landed, it was only fourth in value, for the average price was only 3d. more than the lowest (5s. 7d., 1904) in the decade, and 2s. 10d. under that of 1907. Though the catch of Herrings was under that of 1907, it was the second highest on record, *viz.* 5,728,157 cwts., but its value was only £1,161,111, since the average price was about 4s. per cwt. instead of 5s. 9d. in 1907, and being below the average for the preceding ten years. The foregoing results were obtained under a decrease of 438 sailing-vessels, and an increase of 151 steam-vessels. During the ten years a diminution of 1498 vessels had occurred, but the value of these larger and better equipped vessels had increased by £3,193,765, a remarkable fact. The men employed on board had increased by 100 since last year; and during the ten years by 3328. In the same way the total number of persons employed in the fisheries and

subsidiary industries had increased by 2759 in the decade, and this year stood at 92,359.

In an interesting review of the statistics of twenty years in 1908,\* the second decennial period, 1899–1908, showed an increase in the captures of the following fishes over the first decennial period, 1889–1898, on the East Coast, thus:—Cod, 48 per cent.; Ling, no less than 129 per cent.; Torsk, almost 281 per cent.; Saithe or Coal-fish, 85 per cent.; Haddock, 23 per cent.; Conger, 5 per cent.; Turbot, 41 per cent.; Halibut, 85 per cent.; Lemon-dab, 58 per cent. The total returns of Plaice are only given for the years 1904–1908, a steady decrease from 62,565 cwts. to 44,596 in 1908. As, however, the total captures of Plaice rose in 1909 to 58,977 cwts., in 1910 to 51,295 cwts., and in 1911 to 53,368 cwts., there is room for caution in deduction, since it is necessary to ascertain the amount of attention devoted to Plaice-fishing in the various areas. In the case of the Herring, the increase in the ten years ending in 1908 over the previous ten years was no less than 231 per cent., and yet anxiety about this fish was felt a hundred years ago, if not earlier.

Of round fishes other than Herrings the liners landed in 1909 667,432 cwts. = £248,609, a little less than in the previous year, or a decrease of 6·5 per cent., but the quantity taken by Cod-nets and other fixed nets was more than doubled in contrast with 1908. The catch of Whittings was considerably less than in the previous year, but the price, 12s. 4d. per cwt., was 5s. 2d. over that for trawled Whittings.

The trawlers caught 1,828,570 cwts. of round fishes = £735,471, a diminution of 81,468 cwts. and £21,098 compared with 1908.

The liners produced 66,568 cwts. of flat fishes = £86,152, a decrease of 4504 cwts. and £7271 on the previous year.

The trawlers landed 144,966 cwts. of flat fishes = £207,433, an increase of 16,123 cwts. and £3942, the price this year having been 3s. less than in 1908. Under this head it has to be noted that Lemon-dabs showed an increase of 6929 cwts. on the previous year, the total value being £74,627, a considerable sum for a fish that formerly was supposed to be steadily diminishing.

\* *Op. cit.*, Dr. Fulton, Part III., p. 129.

Plaice had increased by 9564 cwts. and £4311 over 1908. Turbot showed a slight increase in quantity over the previous year, but a decrease in value.

The total quantity and value of all fishes (exclusive of shell-fishes) landed in 1909 was 7,423,185 cwts. = £2,889,107, a diminution in weight of no less than 1,222,077 cwts. on 1908, but with the substantial increase in value of £376,945 over last year. Such are the continuous vicissitudes of the fisheries. Whilst the Herrings had diminished by no less than 1,148,817 cwts. under the catch of 1908, yet the advance in price made a balance in favour of 1909 of £418,099. This year also showed a diminution in the number of vessels, and a slight diminution of the persons employed.

An instance of the vast resources of the sea occurred at Kirkwall and Stromness Harbours, where immense shoals of young green Cod (Saithe) appeared, and upwards of 400 tons were captured and sold for manure at about 10s. per ton.

The liners in 1910 captured 712,099 cwts. of round fishes = £272,159, an increase of 44,667 cwts. and £23,520 on the previous year, the quantity and value of this class of fishes from all methods of fishing being the highest on record, a result to some extent of the great development of the Cod-net fishing, though the quantity taken by line increased by 5000 cwts. The total of Haddocks for the first time fell below Cod in quantity. Ling, Whiting, and Torsk caught by liners had increased on the previous year. This year also 14,000 cwts. of young green Cod were landed in Orkney, and 240 tons were sent to Aberdeen to be manufactured into fish-meal. The rest were sold locally for manure.

The trawlers landed 1,898,014 cwts. of round fishes = £875,478, the highest on record, surpassing that of the previous year by 69,444 cwts. and £140,007, the price obtained being 1s. 2d. above that of 1909. This year, notwithstanding previous doubts, Cod exceeded Haddocks in total weight, but vast numbers of small Haddocks appeared on various grounds, and were sold for manufacturing into fish-food for cattle.

The liners caught 64,847 cwts. of flat fishes = £95,178, a diminution of 1721 cwts., but an increase of £9026 in value compared with 1909. The liners were also fortunate in getting

an increased price on the former year, *viz.* 29s. 4d., instead of 25s. 11d. per cwt.; 145,937 cwts. of flat fishes = £215,297 were landed by trawlers, an increase of 1001 cwts. and £7864 on 1909.

Taking both liners and trawlers together, it was found that Plaice showed a decline of 7682 cwts. and £2643, the Board supposing that Plaice were becoming scarcer on the regular trawling-grounds. Halibut fishing, on the other hand, was highly successful, for an increase of £12,368 occurred over that of the previous year. Lemon-dabs, a fish long held up by the advocates of the impoverishment of the sea, showed an increase of 3101 cwts. and £5766 on 1909. Turbot had a weight of 4987 cwts., and a value of £17,681, a diminution of 1359 cwts. and £3059 on the previous year.

The total quantity of all kinds of fishes (exclusive of shell-fishes) brought to shore in 1910 amounted to 8,709,655 cwts. = £3,100,387, an increase on the previous year of 1,286,470 cwts. and £211,280, the second highest result on record. Of this, 5,741,057 cwts. was attributable to Herrings, and the value of these was £1,609,048.

The total number of fishing-vessels was 9724, of which the liners and net-fishermen had 346 steam, 3563 sail and motor boats, and the trawlers 320 vessels; 38,941 fishermen manned the vessels, a considerable increase over the previous year.

The round fishes captured by the liners in 1911 weighed 755,122 cwts. = £285,087, an increase of 43,023 cwts. and of £12,928. This increase is in consonance with the record catch of the year. The liners captured 694,017 cwts. and the nets 61,105 cwts., the latter amount being no less than 47,798 cwts. below that of the previous year. The decrease is stated to be due to the failure of the spring Cod-fishing in the Moray Firth, but in other places it may also be caused by the lack of energy or the prevalence of bad weather. Dense shoals of young green Cod were again captured in Orkney. Torsk and Conger showed an increase.

Trawlers captured 1,938,274 cwts. of round fishes = £819,731, an increase in weight of 40,260 cwts., but a reduction in value of £55,747—a circumstance due to the large number of small Haddocks at Aberdeen, which, unfit for the market, were sold to

manure merchants. The occurrence of vast shoals of these, of Saithe, Cod, and other Ganoids, in the region north of the North Sea, is well known.

The capture of flat fishes by liners amounted to 71,917 cwts. = £110,495, an increase of 7070 cwts., and £15,317 on the previous year, the value indeed being a record one in the line and net industry. Plaice as caught by both liners and trawlers had improved on the previous year, and so with Halibut, but Lemon-dabs were slightly less, though the price was higher. Turbot fell short of 1910 by 482 cwts. and £2385.

Trawlers procured 138,261 cwts. of flat fishes = £207,390, a diminution on the previous year of 7676 cwts. and £7967. Plaice showed an increase of 2073 cwts. and £148, the latter sum being reduced by the greater proportion of small fishes. Long experience of a particular locality shows that no change had occurred on the average saleable size, and that inshore grounds frequented by young Plaice should be avoided. Turbot, which is largely caught by the Granton trawlers, probably because the Forth and St. Andrews Bay and the adjoining regions are best adapted for its increase, showed a decrease of 482 cwts.

The total catch of all kinds of fishes was 8,709,655 cwts. = £2,978,000, a reduction on the previous year of 533,924 cwts. and £122,387. Thus from year to year fluctuations occur in the most varied manner, yet it cannot be said that there is any cause for anxiety. Of this total 5,120,632 cwts. were due to Herrings, a considerable decrease on the previous year. There was a decrease of 181 vessels, the total being 9543, of which 1486 were steam-vessels, 233 motor-vessels, and 7776 sailing-vessels. The total number of persons employed in the fisheries and various subsidiary industries was 89,153, and of these 38,626 manned the vessels, a decrease of 315 on the previous year.

Besides the foregoing statistics of captures, it is well to remember that a large number (1257) of Scottish fishing-boats land their catches in England and Ireland, the total catch, for instance, in 1910 being 1,397,026 cwts. and the value £498,539.

A thoughtful perusal of the foregoing statistics to the present



date confirms the propriety both of the caution exercised in recommending closures in 1884, and of the deductions made in 1898 in the 'Resources of the Sea,' in so far at least as the safety of the food-fishes is concerned. The larger fishes may to a large extent be swept from a given area by continuous fishing and the rest rendered more wary, but the pelagic eggs of the remaining adults and the swarms of young from the neighbourhood by-and-by fill the gaps.

The agitation alluded to in 1883 was mainly directed by liners against trawlers, and when the scientific report was issued early in 1885, dissatisfaction was felt at the result by the liners, who were largely influenced by various agitators. Yet after the lapse of twenty-eight years the main facts of that report stand, whilst the divergent views both of a section of the public and of some scientific men have been disproved by experience and by the various investigations which have since taken place, especially by the work of the 'Garland' in the closed areas of Aberdeen Bay, St. Andrews Bay, the Forth, and other areas. Still more have the opposite views lacked support from the work of the International Staff in the North Sea. Even those scientific men who attempted to prove the impoverishment of the sea have long been silent, whilst from decade to decade the Scotch Fishery Board's returns have corroborated the results of 1884. The attempt of the Board to prove, by comparing the first five years' work of the 'Garland' with the last five years, that the fishes had been diminished on the areas (from the effects of trawling outside the closed limits), failed both in its methods and results—notwithstanding all the ability and all the opportunities of its advocates. Even if the work of the 'Garland' had been ambiguous, subsequent experience would have shown the true position.

Within the experience of one life not a few of the important food-fishes have become the subject of gloomy forebodings to the fishing population and especially to those who for one reason or another have emphasized their opinions. The Herring, the Cod, the Haddock, the Plaice, the Lemon-dab, the Sole, and the Turbot, have each in turn occupied this position. Yet after all these years is any one of them on the road to extinction, or even to a serious diminution, when the respective efforts to capture

are taken into careful consideration? It is but a slender argument, for example, to point to the statistical diminution of the Plaice in a single rich bay within recent years—without taking cognisance of the fact that in the first brush of uninterrupted fishing, or in the first use of nets, the men used all their energies and every art to capture, whereas, recently, they follow less hardy and less strenuous pursuits—in addition to casual fishing. Some indeed hold that crofting and fishing are incompatible with success in either, and there may be a basis of truth in this view. At any rate, it is not reasonable to point to reduction in captures without an inquiry into the persistence of methods. Fishing needs all the time and all the energies of those fine hardy men in whom every one takes a deep interest; but successful fishing needs likewise freedom from pernicious agitation and the fomenting of class prejudices.

In connection with the supposed diminution, notice on the present occasion can only be taken of the Plaice, which for years has been a source of frequent complaint and solicitude. There is no doubt that a limited area by constant fishing may be denuded of many of its large Plaice, but this does not mean the serious diminution of the species, for it is so widely dispersed over the North Sea as to be most favourably placed for survival. The gaps made by the removal of the large forms are by-and-by filled by the smaller forms, which on almost every sandy beach swarm in vast multitudes. So long as this continues there is little danger for the Plaice. Besides, it is well to remember that Nature is able to supply the whole of the Common Eels of the western border of Europe and of the Mediterranean from eggs shed in the middle of the Atlantic, as Dr. Schmidt has so graphically told.\* Compared with this remarkable condition, what difficulty is there in maintaining a species scattered all over the North Sea, and which also spawns so near our shores, and the eggs, larvæ, and young of which are in countless multitudes on every suitable site? Further, as if to emphasize the lesson, the vast destruction of young Soles which daily takes place by the shrimpers in the estuary of the Thames, and which has taken place for hundreds of years, has not extirpated the adults in that locality. There is, therefore, reason to believe that the

\* *Vide* 'Nature,' August 22nd, 1912, and various Danish journals.

future of the Plaice is not without hope, and that the species will long continue to furnish the nations bordering on the North Sea with a valuable food.

On the subject of the artificial hatching of marine fishes little more can be said than in 1907,\* though the scientific superintendent of the Scotch Fishery Board, Dr. Fulton, has since published the results of the transportation of larval Plaice to Loch Fyne (a long and narrow sheet of water) for a period of seven years, and contrasted the condition of the margin of the beach as regards young Plaice with the subsequent six years in which no larval Plaice were deposited in the loch. The fact that the captures of such young Plaice varied during the first seven years from 24 to 174 per hour, and in the second from 8 to 112, and, further, that the second highest capture occurred in the second period, when no larval Plaice were put in the loch, create a desire for further information as to methods, weather, and condition of the sea in the respective periods. The reporter of this experiment in Loch Fyne in 1908 did not give full weight to the wide distribution of the Plaice over the whole of the North Sea, and rested his argument for artificial hatching on the supposition that out of two or three millions of the ova of such a fish as the Cod "only two reproductive individuals survive." Further, in dealing with the great diminution of larval and post-larval forms as contrasted with pelagic eggs in the tow-nets, no account is taken of the activity of the larval and post-larval fishes which from a very early stage avoid to a greater or less extent instruments of capture. If demersal fish-eggs like those of the Herring can produce larvæ in such prodigious quantities as to form a carpet for a considerable bay, in the midst of similar enemies to those of the pelagic forms, it is perhaps somewhat premature to place too much weight on the supposed enormous losses in the pelagic types, especially in estimating the value of hatcheries for marine forms. Again, the statement† that it is probable that 12,000 adult Plaice, living under natural conditions, would be required for the production of

\* First Lecture Roy. Instit. 1907, pp. 14 and 15, and including an allusion to the absence of any result of the artificial hatching after fifteen years' work by the Scottish Board.

† Report S. F. B. xxvi. part. iii. p. 45, 1908.

100,000,000 larvæ is somewhat fanciful. One of the strongest points made by Dr. Fulton is the comparative captures in July during each of the periods, that in which larval Plaice were introduced supplying more than double the number of the blank period. On the whole, while the experiment in Loch Fyne is most interesting, and does credit to those concerned, we are yet in want of more conclusive proof of the benefit of marine fish-hatcheries for the open sea.\*

\* Amongst those who spoke on the communication, Prof. Hubrecht, of Utrecht, expressed his pleasure at listening to the result of many years' work, and pointed out that Prof. Huxley had similar views as to the resources of the sea. Dr. C. J. Petersen, of Copenhagen, one of the International workers, hesitated to express an opinion at present, pending the conclusions of the North Sea Committee, whilst Prof. Ewart emphasized the erroneous ideas of the fishing population as to pelagic eggs in the eighties of last century.

THE FULMAR: ITS PAST AND PRESENT STATUS  
IN THE NORTH ATLANTIC AND IN THE  
NORTHERN PARTS OF EUROPE AND NORTH  
AMERICA, AND SOME ACCOUNT OF ITS  
GREAT INCREASE IN GREAT BRITAIN.

By J. A. HARVIE-BROWN.

INTRODUCTORY REMARKS.

BEFORE speaking directly to the subject of this paper, under its full heading, we desire to set at rest, if that be possible, some very old and serious misconceptions and errors which have had some effect upon not unimportant statements in the life-history of the Fulmar.

Much as we—and all who go down to the sea in ships—must feel indebted to Captains Thomas and Otter for their admirable surveys of the seas and isles, stacks and skerries, of the West Coast of Scotland, there still remain uncharted many sunken reefs and unnamed dangers. And besides, there are the names of certain others which have handed down confusion even to the very present time, this confusion becoming even worse confounded with almost every repetition or requotation. But the same causes of confusion which still exist to-day—as we hope finally to show—are those self-same causes of the original confusion dating back—in at least one case—as long as 1746, and how much longer we cannot now say.

The first we speak of may not have been caused by quite such ancient misapprehension, and the results may not have developed such important consequences, but it does apply directly to the subject of our particular study—"The Fulmar and its Status, &c." Captains Thomas and Otter *did* distinguish in this instance, and any confusion since ought not to be laid to their charge. The islands we speak of are North Ronay and North Barray (the latter likewise correctly termed *Sulisgeir*).

North Rona or Ronay is confused (by strangers to the isles) with three other islands of the same name, Rona or Ronay. There are in all four isles, or groups of islets, which bear the names of Rona, *e. g.* North Ronay, situate north-east of the Butt of Lewis, and north-west of Cape Wrath, and forming the apex or north point of an equilateral triangle, having for its base a line drawn between the Butt of Lewis and Cape Wrath. Closely associated with it is North Barray or *Sulisgeir* (i. e. if sixteen miles by sea be considered association, and of which we have more to say in the later part of this paper). Then we have South Ronay, which is synonymous with Ronin, or the Island of Rum, and East Ronay, which lies close to and immediately to the north of the Island of Raasay (*sic*), between Skye and the Mainland. And, lastly—so far as we are here concerned—we have West Ronay, an island lying close to and at the south-east extremity of the Island of North Uist.

The error which originally appeared, however, whilst affecting these positions in an indirect sense, or complicating the issues, really was more clearly caused by a confusion of the positions of several islands and islets of the name of Barra, Bara, or Barray. Shortly stated, these are North Barray (or *Sulisgeir*), already mentioned, and “the South Isles of Barra,” at the southern extremity of the Outer Isles, and which include Barray, Mingulay (*sic*), Muldonich, Vatersay, Pabbay, Barra Head or Berneray, and other smaller rocks, islets, stacks, and skerries. North Barray and the Isles of South Barra are some one hundred and sixty-five miles apart.

Atkinson appears to have been the first person to have stated that Fulmars nested not only on St. Kilda, but also “*on the Isles of South Barra.*”\*

This, in part at least, but somewhat indefinitely, was quoted by John Wolley. He evidently intended to correct Atkinson’s statement, and says: “It is, however, said to breed in the Island of Barra—*perhaps not South Barra*—and on Rona” (the italics are those of the present writer). But Wolley, in his statement explanatory, introduces a further trouble by speaking of Rona and “*Sulisgeir*” (or North Barra) as two rocks lying “far to the north

\* *Vide* ‘Transactions of the Nat. Hist. Soc. of Northumberland, Durham, and Newcastle-on-Tyne,’ vol. (or part?) ii. p. 222 (1832).

of Cape Wrath."\* Truly speaking, these lie *north-west* of Cape Wrath, and north-east of the Butt of Lewis, and with these angles of an equilateral triangle form the apex to the north, as already shown under the notes on Ronay.

Thus, as will be seen, and as I hope finally to prove, confusion again became repeated (*i. e.* repeated from Charts and Books of Directions of the Admiralty, carried down and still increased in confusion to December, 1910), as I will show later on.

Again, Mr. Robert Gray, writing on and referring to previous statements without authorities, still further complicates the matter by saying: "But [the Fulmar] has now entirely abandoned that locality—*i. e.* the Isles of South Barray—none having been seen there in the breeding season since 1844." Mr. R. Gray gives no authority for the original statement—not even Mr. Atkinson; a very considerable confusion also being quite apparent in several people's minds as between Fulmars and Manx Shearwaters. It is many years since that confusion was cleared up as regards stated nesting-places of the Fulmar in Skye, in Mull, and—by native spokesmen—"in many places in Skye," besides the one specified to Gray by Cameron, of Glen Bhreatail.† And it seems almost unnecessary to repeat here that the evidence quoted by Mr. Gray, on the authority of "the light-house-keeper at Barra Head" some years previous to said information (*op. cit.* under Shearwater, p. 503), is quite too vague and confused to warrant any belief in the Fulmar ever having nested at Barra Head, and certainly not within the memory of any man then alive. Here the confusion is not in the names of places, but in the identities of the two species. It seems to me to be evident, from Mr. Gray's statements, that he simply desired to express the one fact that, "so far as his knowledge of these Hebridean Isles was within his own grasp, no Fulmars had been seen at Barra Head in the breeding season since 1844," but he does not affirm *on his own account* that they *did* breed there *before that date*, nor does he quote Atkinson, and

\* "*Far to the north of Cape Wrath*" might lead to the supposition by the unwary reader that the Stack and Skerry Rocks, erroneously called also *Suliskerry*, were intended as so situated, *i. e.* the two groups having changed places! J. Wolley: "Observations on the Ornithology of the Faroe Isles" [*sic*] Col. H. W. Feilden corrects this, however, to "*The Faroes*"] in 'Contributions to Ornithology' (1850).

† 'Birds of the West of Scotland,' pp. 449-500.

only speaks of the "lighthouse-keeper" under Shearwater.\* Of the much later actual residency at Barra Head we speak later on in its proper chronology.

St. Kilda we hold alone of all these Hebride Isles was the home, in British seas, of the Fulmar Petrel in the nesting season.

We now come to speak of the still greater confusion which has lasted—as, I hope, finally and once for all to prove—at least from some time previous to 1746, which is the date of Rev. Geo. Low's MSS. Notes.† This confusion applies to the names carelessly spoken, carelessly applied, and confounded down to the present time, and still more confused even as late as Dec. 31st, 1910, the date of the latest issue of the 'Chart Index of the Hydrographical Department.'‡

We first take Rev. Geo. Low's MSS., where there occurs a very pointed and significant passage as follows—and as it is in all probability matter fresh to most of our readers, and of considerable interest besides to naturalists, I give it in full and literally transcribed:—

"About ten leagues W.N.W. from Hoy lies Soul-Skerry (more properly Seal-Skerry),§ a small islet, omitted by all the writers I have had an opportunity of seeing; it is said to be about a mile and a half in circumference; it hath only one landing place for boats, and in the middle of the island is a small lake. For some years past the people of Stromness have gone in the months of October and November to this island for Seals, which lie here in thousands amongst the luxuriant herbage. There is always a number of men upon this expedition,

\* There would almost appear to be a fixed determination to keep these errors afloat, and to despise the correct place-names. Thus, and at this eleventh hour, we find the confusing repetition: "The most southerly breeding-place in the British Isles is Barra" (cf. 'British Birds' (Maga), July, 1911), and, as if one error was not enough at a time, that *Maga* supplements the above by a second, viz. that "the only other nesting haunt on the mainland being Cape Wrath, Sutherland, which was first discovered to be the resort of these birds in 1901"; and this is perpetuated by 'Nature' of August 10th, p. 200. The correct statement is: "The most southerly breeding-place in the British Isles is Barra-Head, two hundred and sixty-five miles south of Barray" = North Barray or Sulisgeir. They have not been correctly quoted as nesting at Cape Wrath, but they do so at Clomore cliffs. They have also been recorded as nesting in Caithness, at Dunnet Head (see *infra*, part iii.).

† 1778 being the date of his printed account; see *infra*.

‡ Whereupon Stack-and-Skerry are named "Sule Skerry" and "Stack Skerry," again making confusion.

§ *i. e.* "more properly Seal's Skerry."—J. A. H.-B.



and whenever they land (which they do quietly in the grey of the morning) they immediately surround the island to prevent the Seals getting into the sea upon the alarm : and each having a strong baton (*sic*) knocks the Seals on the head and fells them as they attempt (*sic*) the sea ; in this manner they go round and round the Isle, always describing less and less circles until they reach the centre, where they find the harassed Seals swimming (*sic*) in great numbers in the above Loch (*sic*), which they likewise kill, for the loch will not take a man above the haunch. I have been told that in two or three hours they will kill four or five hundred Seals. As soon as they are done killing, they take off the Fat with the Skin, which they separate from it after they return home ; for they must not delay to do it there, for if a storm should arise they would not get off to the ship which lies at an anchor about half a mile from the isle. It appears somewhat strange that tho' they leave such a number of carcasses in the island, that when they return next year they will not even find so much as a Bone. From this it seems probable that the living Seals carry off their bodies into the sea, for suppose them to eat the flesh, which is contrary to nature, what do they make of the Bones ?

“ They never go to *Seal-skerry* (*sic*), but in a S.E. or an East wind, for when the wind is from any other point the sea is so rough that they cannot land.

“ This island till of late was the property of Mr. Graham, of Brackness, who had a Tack\* (*sic*) of it from Lord Duffus : and in it there is the remains of a house built by one of the family of Brackness. There hatch in this isle and in a high rock near to it called The Stack (*sic*) a number of different Sea-fowls, particularly the *Pelicanus bassanus* Linnæi (Soland Goose).”†

That the above should have generally escaped observation

\* *Tack* (Anglicé = *Lease*).

† 1778. Rev. Geo. Low, “ Journal of a Tour thro' the North Isles, and part of the Mainland of Orkney, in 1778.” This is the title given by Sir Arthur Mitchell in his ‘ List of Travels in Scotland,’ and he has added a note as follows (*loc. cit.*) : “ Manuscript in my possession. In the same volume there is a translation by Mr. Low of the parts of Torphæus which refer to Orkney.” The above excerpt is from p. 21 of the original MSS. now in my hands, at Dunipace (J. A. H.-B.). The volume was Lot 740 of Dowell's Sale Catalogue of date December, 1911, and, with others, was purchased by me. The Gannet has never frequented the Skerry, and is confined to the Stack, or the *Stack off the Seal's Skerry*.—(J. A. H.-B.).

and registration before is scarcely to be wondered at, but it is worth while to give here also what Rev. Geo. Low actually published, the finished MS. of which is said to have disappeared:—

“The nearest land to Orkney where the Solan Goose breeds is a rock called the Stack of Soliskerry (*sic*), where many hundreds breed every year, *as the Seals do on the Skerry*”; and then he relates how “some time ago a ship . . . brought back a great quantity of Solans,” and so forth.\*

We have given the above excerpt and the references for the reason already mentioned, and also because we think it should for ever set at rest the past and present confusion that exists.

I do not intend to go over ground I have frequently traversed before to try and impress the truth, though my doing so has rather partaken of the nature of a “voice crying in the wilderness.” But I cannot pass by the latest added confusion given so lately as in the Index Chart C of the ‘Catalogue of the Admiralty Charts,’ dated 1911, and said to be corrected to date of December 31st, 1910.

I find here the misnomer (or error) repeated—“Sule-Skerry” (*sic*), and alongside it “Stack-Skerry” (*sic*). If anything, this makes confusion worse confounded yet once more. There would be no confusion if the joint name “Stack-and-Skerry” were adopted, as I have heard it used as long ago as 1863, when residing for some six or seven weeks in Joseph Dunn’s house in Stromness. “Sule-Skerry” is a misnomer, because Gannets do not and never did frequent the Skerry, or ever willingly, I feel confident, ever place *flat feet* upon it. “Sule-Skerry” also, besides being a misnomer, is also merely a confusion of the colloquial expression, *The Seal’s Skerry*, as I have heard it used by the sealers, who, equally with the Stromness men, or, it may well be, subsequent to their visits, went out in October or November from Tongue; of which parties my old friend, the late Mr. John Crawford, of Tongue (factor to the Duke of Sutherland), used to be one participant, and his two sons also went up to the date of about 1870 to 1872, and as I can well remember *they* “never went to the Stack,” or *Gannet Rock*.

Further, “Stack-Skerry” is a misnomer and an error as a place-name. That the Admiralty Office still remains in doubt

\* ‘Fauna Orcadensis,’ &c., iv. p. 148.

is evident, because I find, in the General Index to the Catalogue of Publications, all three names given to North Barray, thus: “*Sula Sgeir*,” *Sulesker*, and *North Barra* (*i. e.* near North Ronay), but there is no index reference whatever to “*Suleskerry*” (the misnomer), though, as I have shown above, *on the Index Chart* are “*Sule-Skerry*” and “*Stack-Skerry*”! More I cannot say, but, with all my previous experiences, I shall still wonder if I have said enough. I daresay, at least, my readers may think so, but I hope they will not blame me!\*

Although the succeeding notes bear no direct reference to the subject of the Fulmar’s distribution and dispersal, yet I cannot conclude this introductory part without once more calling attention to a still more important *neglect*, which I have also spoken of fully before, and that is as regards that most dangerous obstacle to safe navigation—the Helen’s Reef—which is a submerged ridge forming a long shoulder of the great submerged mountain, of which Rockall forms the only visible top above water, which top is 72 ft. in height and 300 ft. in girth, as was pointed out by Captain Basil Hall in his ‘*Fragments of Travel*’—an old statement that “the best account written regarding Rockall” was merely a fanciful picture by a person *who confessed to me in a letter* that he had never been at Rockall (*sic*). I have elsewhere quoted that communication fully, and need not repeat it

\* Perhaps the following adaptation of a well-known piece of “poetry” may help to fix the fact in the memory:—

“ And now, me bhoy, hould up yer head,  
 And look like a gentleman, Sor;  
 And tell me where *Suleskerry* is;  
 You can tell me if you’ll try, Sor’:  
 ‘ O there nivver wasn’t no such place,  
 And it’s all a bluidy loi, Sor.’

“ Right ye are, me bhoy . . . .  
 Now tell me where *Seal’s Skerry* is?  
 Spake up like a gentleman, Sor!’  
 ‘ O Skerries are simply lumps o’ rock  
 Which were christened by Julius Cæsar,  
 They were carted acrass from Norraway  
 When there wasn’t then no seas, Sor.’

“ Right agin, me bhoy, . . . .  
 Where did ye fetch yer knowlidge?’  
 ‘ O just in the same place as yerself—  
 In my Mother’s milk—and Porridge.’  
 ‘ Perhaps, but of this I can’t be sure,  
 In some Silly Skerry’s College.’”

here.\* It might have been well also if the gentleman who confessed so much had confessed to all, and that his whole essay to 'Chambers's Journal' was simply Captain Basil Hall's admirable account of that distant rock (*which* "was the best account written of Rockall"), or if not the same, not sufficiently disguised, and at the same time *betrayed* by his allusion to *Little Auks nesting* upon it. This, had such a phenomenon been in existence, would have thrown even the vast isolation of the St. Kilda colony of Fulmar Petrels far into the shade. And this brings us back again to St. Kilda, about which I desire to say just a few words here.

I may say at once I have utterly failed, after much searching vainly, to carry any history of the Fulmar in St. Kilda further back than Martin Martin's writing in 1703, *i. e.* some two hundred and fifty years. Behind and beyond that even tradition fails to provide a clue.

No writer that I have access to mentions the Fulmar as a native of St. Kilda prior to Martin's writing. Linnæus gives no sign of his knowledge of the colony, his statement regarding its general status simply being "*intra tropicum arcticum.*"† I find nothing in Aldrovandus nor Ray, and I have failed to find any quotations from these writers or Gesner which indicate its presence there, except Brisson, a reference to which Linnæus gives.‡

Careful consideration of the Gaelic name of the bird and correspondence with authorities on Celtic languages force me to the conclusion that none other exists except the simple "*Fulmair,*" as adopted from the English name, *Fulmar*. To arrive at this definite result has cost a lot of trouble: *done, it may save such again.*

We must, therefore, be content to believe the *oldest past* of the colonizing of St. Kilda by Fulmars is beyond our ken, and turn to its comparatively more recent existence as a British bird.§

\* 'Annals of Scottish Natural History,' 1892, p. 197.

† 'Systema Naturæ,' 12th edit. p. 213, 1766. (We do not quote the 10th edit.)

‡ Quotes Brisson's account of a specimen sent to Paris.

§ Which portion of this paper, as already stated, has been contributed to the pages of the 'Scottish Naturalist,' commencing in May, 1912.

## EMIGRATION THROUGH NORFOLK OF THE ROOK AND GREY CROW.

BY J. H. GURNEY, F.Z.S.

THE spring emigration of the *Corvidæ* from our shores has long attracted attention in Norfolk, because it is always noticed. The reason for this is that the passage takes place almost entirely in the daytime, apparently not beginning until sunrise. These annual March flights of the Grey or Hooded Crow (*Corvus cornix*) and the Rook (*C. frugilegus*) were observed by, and their meaning well known to such careful men as the Rev. E. W. Dowell, W. R. Fisher, my father, and others in this county, nearly seventy years ago, and may have been detected long before that by other naturalists whose names are forgotten.

Regularly as March comes round does this striking passage of birds present itself. Sometimes it is so gradual as to attract little attention, sometimes there are days when continuous flocks are travelling overhead, in perfect silence, for hours at a time. Where do they all come from? There was a memorable passage in March, 1886, to which I think attention was drawn at the time (*cf.* 'Zoologist,' x. p. 391). From the 20th to the 29th of that month flocks of Rooks were constantly in view, and the number which travelled through Norfolk, along the coast, more particularly between Cromer and Lowestoft, was enormous—all apparently going in a south-east or southerly direction. Rooks and Grey Crows do not often mingle in the same flock, though both may be visible in the air at the same time, but a company of Rooks frequently has an admixture of Jackdaws in it. Carrion-Crows and Ravens have also been reported on the Norfolk coast, but I have never identified either in the neighbourhood of Cromer.

The height at which these emigrating Crows and Rooks and Jackdaws generally fly, when preparing to quit the coast of Norfolk, is from two to three hundred yards, but at the same

period of the year (spring) Rooks pass over the little island of Heligoland at a much greater altitude than this, according to Gätke. They must therefore mount after leaving Norfolk, and it is probably done gradually. Often, he says, only their calls, faintly audible from above, give indication that they are speeding on their way above the range of human vision (*cf.* "Birds of Heligoland," p. 207). When I was in Heligoland in 1883 I had the chance of conversing with the veteran observer about migration, a subject on which he knew more than any man living. Gätke has a great deal to tell his readers in his admirable book about the Grey Crow and the Rook—witness the many references to the former in the index. He tells us that the number of Grey Crows which pass that island of the North Sea in spring is scarcely half of what pass it in autumn. This he accounts for by supposing that most of them take a shorter route on their return journey (T. C. p. 43), but I think it likely that wind has something to do with it, and one must make allowance for a considerable annual waste of life, which in all probability takes place.

During the present spring (1912) the exodus has been observed as usual on the coast of Norfolk, where it commenced early this year. The following are some notes made by an observer who is situated about a mile from the sea:—

*February* 21st.—Grey Crows, Rooks, and Jackdaws, passing over Northrepps in a south-easterly direction—the wind being light from the west—from 7.45 a.m. to 11.30 a.m.

23rd.—More Grey Crows flying in the same direction. Wind the same.

24th.—More Grey Crows, Rooks, and Jackdaws, passing over. No wind.

*March* 18th.—Grey Crows passing over Northrepps and Overstrand from 6.25 a.m. to 2.15 p.m. A gentle wind from the south.

19th.—Grey Crows passing over from 6.20 a.m. to 12.30 p.m. Hardly any wind.

Having enquired of Mr. Hugo Weigold, who carries on Gätke's work, how these dates fitted in with his observations made at the Biological Institute at Heligoland, he replied as follows:—

On February 21st only four Grey Crows were detected, but on the 22nd one hundred and twenty passed Heligoland, and on the 23rd about three hundred. On March 18th only six Grey Crows and some dozens of Rooks, on the 19th one Crow, and on the 20th none at all. The correspondence in migration during the spring of 1912 was therefore not great.\*

In his recently published and most useful 'Studies in Bird Migration,' Mr. W. E. Clarke has some excellent remarks on the *Corvidæ* (especially in chap. xvi.), with valuable comments on the movements of the Grey Crow and the Rook in spring. Mr. Clarke has cited three instances in chap. xv. of Rooks and Starlings *arriving on the Norfolk and Suffolk coasts in spring* (cf. vol. i. p. 263, note), which is contrary to what one looks for at that time of the year, when they are generally going the other way.

One of the cases which Mr. Clarke quotes is a note of mine in 'The Zoologist' (1902, p. 87), referring to eight dead Rooks and some Starlings which were found by Mr. A. Patterson on the shore near Yarmouth on March 23rd, 1901. But this communication, being badly expressed, has evidently been misread. The meaning intended, which is not very clear, I must admit, was not that these birds had been drowned on their migration to England, but during their usual vernal passage from our coast to the Continent, and their bodies afterwards washed back by a gale from the east. It appears that a similar disaster nearly happened off Yarmouth to the Rooks in 1904 when on their customary spring voyage from this country.

On February 22nd of that year Mr. A. Patterson, of Yarmouth, saw hundreds of what he terms "wind-muddled Rooks," trooping in from the North Sea, which had evidently found the north-west wind, then blowing half a gale, too strong for a continuance of their journey (cf. 'Nature in Eastern Norfolk,' p. 148). In this case it seems that most of them put back to land in time to save their lives, but for aught Mr. Patterson knew many may have been drowned.

Mr. Clarke is of opinion that considerable numbers of Rooks

\* On this subject a table of comparisons, extending over many years' which included many species, was published in the Norfolk Naturalists' 'Transactions' (vol. iv. p. 52).

do arrive in the spring "on the south-east of England, between Kent and Norfolk," having come, I suppose, from Belgium or North-east France. If this is so, they may occasionally meet the bands leaving Norfolk by a south-easterly route at the same time of the year, but a wind which suited one party would be more or less adverse to the other, so it is not likely that they often clash.

Mr. Eagle Clarke's two volumes form an important work, on which great pains have been bestowed, and one which cannot fail to considerably advance the interesting but perplexing study of migration. Chap. viii. contains matter of much value on "Weather Influences" on the birds, particularly as bearing on the spring emigratory movement from the British Isles.

Mr. Clarke considers increase of temperature to be the main influencing factor with birds, and most observers will agree with him here, but he does not attach quite so much importance to the direction of the wind as I should have expected.

Whoever studies either emigration or immigration of birds on the rounded and projecting coast of Norfolk must take the direction of wind into account; of that, after watching their movements for thirteen years in the neighbourhood of Cromer, I feel convinced. However, the position of our county is peculiar, for there is no other part of the East Coast which projects so much into the North Sea until Banff, in Scotland, is reached, and the wind may have more effect in Norfolk than elsewhere.



## NOTES AND QUERIES.

### AVES.

**Starlings on Sheep's Back.**—I have the following note, dated Sept. 23rd, 1903:—"Saw Starlings in a field of fairly long grass. They frequently rose from the grass, in which they could not be seen, to perch on the back of sheep. They apparently used the latter as a look-out, and occasionally pecked something off it. They walked with care on the wool, and did not mind the sheep being in motion."—F. B. KIRKMAN (Letchworth).

**Additional Notes on the Domestic Habits of *Corvus corone*.**—In transcribing my field notes on the domestic habits of the Carrion-Crow, which appeared in 'The Zoologist' (*ante*, p. 321), I inadvertently omitted a series relating to another pair, making the third which I watched. From these I now select three which have a definite value.

*April* 9th, 1910.—I forgot, in my entry of the 7th, to mention the curious intonation of the note of one of these Crows quite near me, though I could not see it through the white morning mist which enshrouded everything. It was not the harsh "arr, arr, arr" any more, but a quite different sounding, "oh, oh, oh," something resembling the human voice (or a less aggravated variety of it), but also with a suspicion of the sound made in uncorking a bottle of wine, or by imitating that sound with the finger and thumb, like the Capercailzie's "kunststück," but far less pronounced. I cannot describe the note any better, and this does very little. This morning, between 6 and 7, I saw the bird, uttering this peculiar note, quite near. It threw up its head, each time, in the usual way, pronouncing it three times, and, its back being turned to me, I noticed how broadly the tail was, each time, fanned out. Is this note the so-called "song" of the male? for the ordinary one is uttered, I believe, by both sexes upon ordinary occasions, and with the same action.

*May* 1st.—Got to the place at 4.30 a.m., and as I cycled by saw the one Crow sitting by the nest, and the other in it—for it was lighter than I had thought it would be at this time. The perched Crow did not appear to notice me, any more than on the other morning.

He seemed asleep, but flew out, once, from the coppice, and back again, just as I was getting into position. I now watched the nest closely (from a cavity in a thick gorse-hedge, where, and from the side on which I entered, I was quite invisible), and just at 5 the sitting bird flew off it. There was no change upon or visit to the nest, the other bird having flown down on to the ground a little while before. On leaving the nest the Crow flew to a tree not far off, and sat there, preening herself and stretching her wings. She then flew down to the ground, where I lost her, as I have the other, and at 5.15 one of the pair, probably she, flew into the coppice, and, having chased some small birds from the nest, sat in a tree near it. At 5.35 she flies away, and soon after this I leave.

2nd.—Got into position by 4 a.m. It was too dark for me to distinguish anything but the black mass of the nest as I passed the coppice, and even this was invisible from my place of concealment till I had sat there for some little while. Gradually I saw both it and the partner bird perched in the adjoining tree. At 4.40 the latter flew, a little, out of the coppice into a tree quite near, and in the same line with it—much as yesterday. At 5 he flew from here, and I lost sight of him, nor did he reappear whilst I stayed. At 5.15 the sitting bird flew from the nest without any apparent getting ready to do so—directly off the eggs, as it seemed. I stayed long enough to make it quite certain that this exit of the sitting bird had nothing to do with the coming up of the other to take its place. The latter did not reappear, and it must have been quite half-past five when I walked into the coppice and struck the quite small birch tree several clanging blows with my walking-stick camp-stool, thus reinforcing (for no bird flew out) the verdict of my eyes.

If all the details of the above two extracts be studied, it will be seen that it would be violently straining all probability to suppose that a change had taken place upon the nest *before* 5 a.m. and 5.15 a.m. respectively. In Kirkman's 'The British Bird Book' it is stated,\* in regard to the Carrion-Crow, that "both sexes incubate." No reference being given, or further comment made, there seems room for a little evidence on the subject, and I herewith contribute my quota. It affirms (within its limits) that there is no change upon the nest between the two sexes of Crow, and that after the nest has been left by the incubating bird it remains empty, generally under such circumstances as make it apparent that the going off of the latter has not stood in any relation to the coming up, to incubate, of its mate,

\* Section I. p. 3.

whilst nothing points in the contrary direction. If it is contended that, for all this, the two sexes do incubate, actual affirmative evidence in favour of this contention should be adduced. Brehm, I believe, was of an opposite opinion.

Both Crows and Magpies are abundant in France, and I should like here to say (as a matter of justice as well as of field natural history) that, though my observations were extended through the whole spring and early summer, they furnished little or no evidence that either of them spent much time in searching for the nests of small birds, and, moreover, the quickness with which in a country where one can go anywhere they disappeared through the intervention of trees, copses, &c., the difficulty of holding them in chase, or of keeping any bird, not more or less stationary, or not in the open, in view for any length of time, convinced me that mere general assertions to this effect ought to be received with great caution, or rather, should not be attended to. Crows and Magpies, whenever I saw them—and I was always seeing them—were not occupied with, nor did they appear to be thinking about, small birds or their nests, but they constantly patrolled the land, looking about for anything they could find upon it. Adding to the time thus spent, that which was socially, domestically, or quiescently occupied, little appeared to me to be left over for those organized tree-to-tree or bush-to-bush birdsnesting hunts, which in books are so frequent, but which I never once clearly saw; nests, of course, are not the only things in trees. One thing was very evident, *viz.* that the laws of Nature, without man's disturbing influence, allowed of an abundance of Crows and Magpies (as also of Jays), and at the same time, likewise, of an abundance of small birds. I also came to the conclusion that from the point of view of the peasant proprietor (who gave no visible sign of hostility) neither of these species was a pest or a nuisance, and a naturalized English farmer corroborated this, and stated that the French Government had at one time thought of thinning the number of Magpies, but abandoned the idea, as they could not find out that they did any harm. My informant had no quarrel with them, and told me he loved the birds. Of course, with the substitution of landlordism and the game laws for peasant proprietorship all this would be altered. With an artificial abundance of large ground-laying birds, a relish for their eggs and, to some extent, their young must be acquired, and two species which, together, add enormously both to the homely charm and gay adornment of the countryside, would become pests to pests, and a nuisance to what is a nuisance. And,

as the concomitants of this, we should have all that usual crop of weeds which lies, ever in wait, to spring up and choke any wild bird's life—hasty conclusions and ignorant prepossessions, undue assurance in regard to the evil complained of, credulous hatred, and an itch to find ropes to hang dogs with. As to the supposed evil, Ravens are abundant in Iceland, and prey, when they can, on the eggs and young of good-sized birds that make their nests on the ground. But these latter are abundant in a still greater degree—indeed, they may be more numerous, on the whole, though less crowded, than Pheasants and Partridges with us. Would they become less so if they counted as game, and were the Ravens declared vermin and pests?—EDMUND SELOUS.

**Black-tailed Godwits visiting Cork Harbour, Co. Waterford.**—These birds have this season visited their old haunt in Cork Harbour, the Blackrock mudbanks, and one bird was shot about the middle of September. They appear for some years past to have visited this haunt pretty regularly. They have also visited County Waterford, where, on Sept. 21st, Mr. R. Ussher, of Cappagh House, on the Shandon Estuary, saw some, where last season he shot a pair. It is interesting to note these birds revisiting their old haunts.—ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

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## BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, DUNDEE, 1912.

### ADDRESS TO THE ZOOLOGICAL SECTION.

By P. CHALMERS MITCHELL, D.Sc., F.R.S., *President of the Section.*

ZOOLOGICAL GARDENS AND THE PRESERVATION OF FAUNA.

(Continued from p. 360.)

THE conditions in Africa are very different from those in India. The land is portioned out amongst many Powers. The settled population is much less dense, and the hold of the white settler and the white ruler is much less complete. The possibility of effective control of native hunters and of European travellers and sportsmen is much smaller, and as there are fewer sources of revenue, the temptation to exploit the game for the immediate development of the struggling colonies is much greater. Still, the lesson of the extinction of the South African fauna is being taken to heart. I have had the opportunity of going through the regulations made for the shooting of wild animals in Africa by this country, by our autonomic colonies, by

France, Germany, Italy, Portugal, and Belgium, and, with the limitation that they are directed almost solely towards the protection of animals that can be regarded as game, they afford great promise for the future. But this limitation is still stamped upon them, and even so enthusiastic a naturalist as Major Stevenson-Hamilton, the Warden of the Transvaal Government Game Reserves, who has advocated the substitution of the camera for the rifle, appears to be of the opinion that the platform of the Convention of 1900 is sufficient. It included the sparing of females and immature animals, the establishment of close seasons and game sanctuaries, the absolute protection of rare species, restrictions on the export for trading purposes of skins, horns, and tusks, and the prohibition of pits, snares, and game traps. Certainly the rulers of Africa are seeing to the establishment of game reserves. As for British Africa, there are two in Somaliland, two in the Sudan, two in Uganda, and two in British East Africa (with separate reserves for eland, rhinoceros, and hippopotamus), two in Nyasaland, three in the Transvaal, seven in Rhodesia, several in Natal and in Cape Colony, and at least four in Nigeria. These are now administered by competent officials, who in addition are usually the executive officers of the game laws outside the reserved territory. Here again, however, the preservation of game animals and of other animals of economic value, and of a few named species is the fundamental idea. In 1909 I had the honour of being a member of a deputation to the Secretary of State for the Colonies, arranged by the Society for the Preservation of the Wild Fauna of the Empire, one of the most active and successful bodies engaged in arousing public opinion on the subject. Among the questions on which we were approaching Lord Crewe was that of changes in the locality of reserves. Sometimes it had happened that for the convenience of settlers, or because of railway extension, or for some other reason, proposals were made to open or clear the whole or part of a reserve. When I suggested that the substitution of one piece of ground for another, even of equivalent area, might be satisfactory from the point of view of the preservation of large animals, but was not satisfactory from the zoological point of view, that in fact pieces of primeval land and primeval forest contained many small animals of different kinds which would be exterminated once and for all when the land was brought under cultivation, the point was obviously new not only to the Colonial Secretary, who very courteously noted it, but to my colleagues.

This brings me to the general conclusion to which I wish to direct your attention, and for which I hope to engage your sympathy. We may safely leave the preservation of game animals, or rare species if these are well known and interesting, and of animals of economic value, to the awakened responsibility and the practical sense of the Governing Powers, stimulated as these are by the enthusiasm of special Societies. Game laws, reserves where game may recuperate, close seasons, occasional prohibition and the real supervision of licence holders are all doing their work effectively. But there remains something else to do, something which I think should

interest zoologists particularly, and on which we should lead opinion. There exist in all the great continents large tracts almost empty of resident population, which still contain vegetation almost undisturbed by the ravages of man, and which still harbour a multitude of small animals, and could afford space for the larger and better-known animals. These tracts have not yet been brought under cultivation, and are rarely traversed except by the sportsman, the explorer, and the prospector. On these there should be established, in all the characteristic faunistic areas, reservations which should not be merely temporary recuperating grounds for harassed game, but absolute sanctuaries. Under no condition should they be open to the sportsman. No gun should be fired, no animal slaughtered or captured save by the direct authority of the wardens of the sanctuaries, and for the direct advantage of the denizens of the sanctuaries, for the removal of noxious individuals, the controlling of species that were increasing beyond reason, the extirpation of diseased or unhealthy animals. The obvious examples are not the game reserves of the Old World, but the National Parks of the New World and of Australasia. In the United States, for instance, there are now the Yellowstone National Park with over two million acres, the Yosemite in California with nearly a million acres, the Grand Cañon Game Preserve with two million acres, the Mount Olympus National Monument in Washington with over half a million acres, and the Superior Game and Forest Preserve with nearly a million acres, as well as a number of smaller reserves for special purposes, and a chain of coastal areas all round the shores for the preservation of birds. In Canada, in Alberta, there are the Rocky Mountains Park, the Yoho Park, Glacier Park, and Jasper Park, together extending to over nine million acres, whilst in British Columbia there are smaller sanctuaries. These, so far as laws can make them, are inalienable and inviolable sanctuaries for wild animals. We ought to have similar sanctuaries in every country of the world, national parks secured for all time against all the changes and chances of the nations by international agreement. In the older and more settled countries the areas selected unfortunately must be determined by various considerations, of which faunistic value cannot be the most important. But certainly in Africa, and in large parts of Asia, it would still be possible that they should be selected in the first place for their faunistic value. The scheme for them should be drawn up by an international commission of experts in the geographical distribution of animals, and the winter and summer haunts of migratory birds should be taken into consideration. It is for zoologists to lead the way, by laying down what is required to preserve for all time the most representative and most complete series of surviving species without any reference to the extrinsic value of the animals. And it then will be the duty of the nations, jointly and severally, to arrange that the requirements laid down by the experts shall be complied with.

(To be continued.)

## NOTICES OF NEW BOOKS.

*Wild Life in the West Highlands.* By CHARLES HENRY ALSTON.  
Glasgow: James Maclehose & Sons.

THIS volume consists of a number of essays on natural history subjects, in which personal observation is combined with an up-to-date knowledge of the writings of most of our best authorities. This opinion implies that the book cannot be listed with those many publications which are usually described as "nature books." Some, at least, of these essays have appeared elsewhere, as obligations are acknowledged to "the editor of the *Scotsman* for his kindness in permitting me to reprint such of these papers as appeared originally in its columns."

The chapters on "The Recent Increase and Dispersal of some Birds in Scotland" and on "Birds and their Changing Habits" are worthy of close attention. The discussion on "What is a *Ferox*" disposes of the claim of *Salmo ferox* to be considered as a distinct species, and concludes with the assertion that "in Great Britain and Ireland we have, in all its varied forms, but one species of fresh-water trout, *Salmo fario*." Anglers will find a judicious consideration *pro* and *con* of the colour-sense in fishes particularly applicable to the problem of angler's artificial flies. Do fishes perceive the differences of colour, and do those colours produce the same effect on the fish's as upon the human eye? There is very much to be said on both sides, and the question is still *sub judice*; but this may be affirmed, that when fish are fully on the feed—a circumstance none too frequent in the experience of the ordinary angler—the colour of the fly, or, with coarse fish, the colour or nature of the bait, seem to be a secondary consideration. The *scientific angler* is often a misunderstood term; the practical or observing angler has usually the fuller basket. This volume is not for stern biological study, but for the pleasant perusal of the naturalist and sportsman.

*The Arctic Prairies; a Canoe-Journey of 2,000 Miles in Search of the Caribou, &c.* By ERNEST THOMPSON SETON. Constable & Co., Ltd.

MR. SETON has written a lively account of a hard journey in a dismal land—the realm of the Hudson Bay Company. The book is very fully and well illustrated, but these artistic embellishments only more accentuate on the mind of the reader the impression of a barren and lonely region.

The animal life of this area is subject to vicissitudes. Sudden rises of the water after the ice has formed, or a dry season followed by severe frost, are sinister agents in the promotion of a high death-rate. In 1900, Mr. Seton was assured that along the Mackenzie “one could shoot 20 Muskrats in an hour after sundown. Next winter the flood followed the frost, and the Rats seemed to have been wiped out.” In 1907, Mr. Seton spent “six months outdoors in the region, and saw only 17 Muskrats the whole time; in 1901 the H. B. Co. exported over  $1\frac{1}{2}$  millions; in 1907, 407,472. The fact that they totalled as high was due, no doubt, to their abundance in eastern regions not affected by the disaster.” As the author remarks, “there is only one continuous statistical record of the abundance of animals, that is the returns of the fur trade,” and he secured the Company’s returns for the eighty-five years, 1821–1905 inclusive. The analysis of these returns is, zoologically, perhaps the most valuable element in the volume. The expedition seems to have been a successful one, though the wreck of a canoe almost caused the loss of “three precious journals; 600 pages of observation and discovery, geographical, botanical, and zoological, 500 drawings,” &c. That this catastrophe did not ensue is a matter of scientific and personal congratulation. There are appendices, both botanical and zoological, and though a large part of these have appeared elsewhere, their absence from this volume would have been deplorable.



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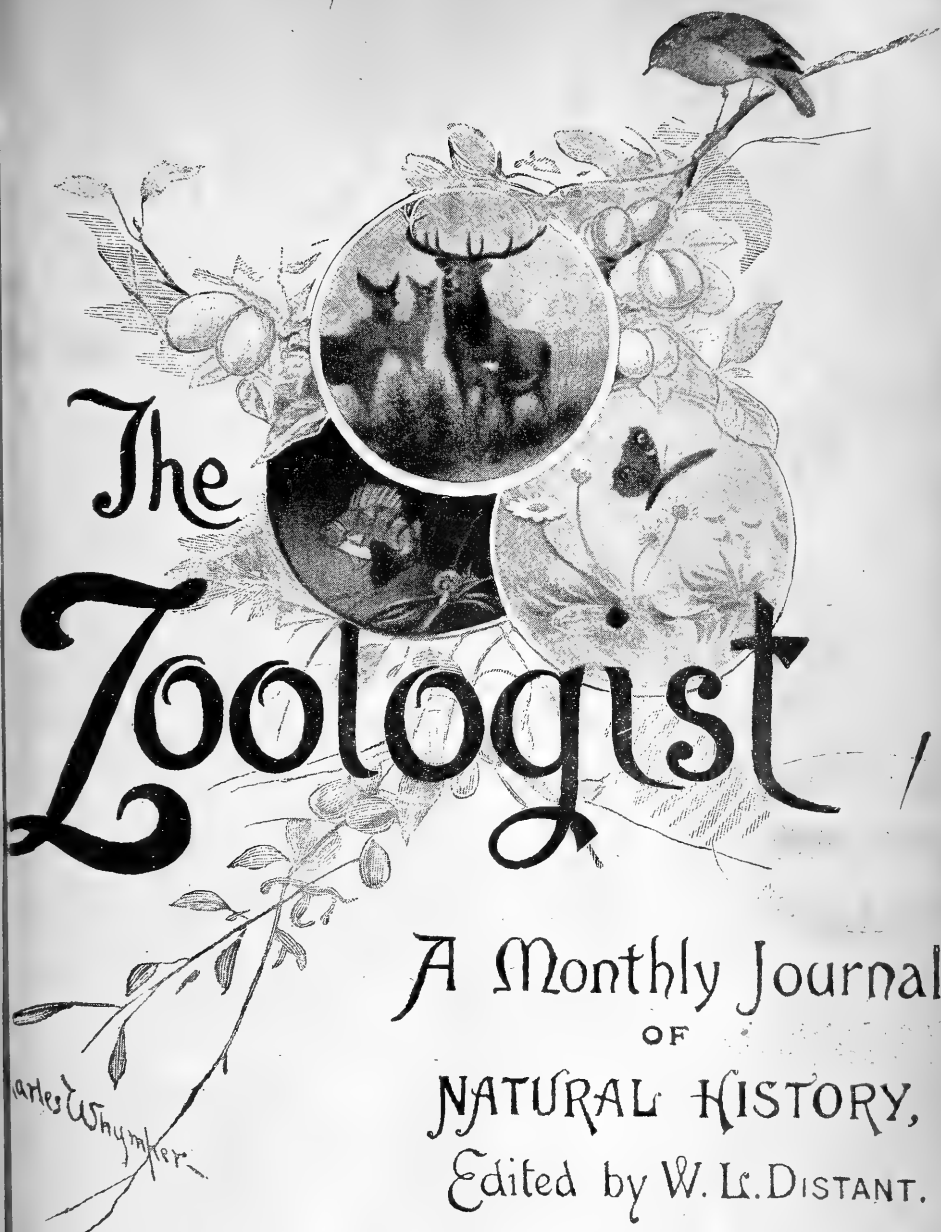
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# THE ZOOLOGIST

No. 857.—November 15th. 1912.

THE FULMAR: ITS PAST AND PRESENT DISTRIBUTION IN THE NORTH ATLANTIC AND IN THE NORTHERN PARTS OF EUROPE AND NORTH AMERICA, AND SOME ACCOUNT OF ITS GREAT INCREASE IN GREAT BRITAIN.

By J. A. HARVIE-BROWN.

(Concluded from p. 388.)

(PLATES I. & II.)

## FOREWORD.

DARWIN tells us that the Fulmar Petrel is "the most abundant of all Arctic birds." We may rest satisfied, as we fully may, on such an authoritative statement—at least, until such times as better methods of taking a census of bird-life be divulged—say, by cinematograph photography—and so be content—

"To dream of the womb of the Future,  
Charged with the fulness of Time."

## GENERAL DISPERSAL.

There are three causes which appear to have influenced and regulated the dispersal of the Fulmar Petrel and its successive occupation of new nesting sites in recent years, one of which seems to be the most important, and the other two less so and more local in action.

The first of these, the earliest and almost assuredly the really dominating force, has been the rapid increase of their numbers at their more northerly breeding stations, and the natural expansion caused by the congestion in an outward and a southerly direction.

The present writer does not consider it necessary to go far back for evidence of this increase, *i. e.* to consult the evidences adduced by the very earliest Arctic voyagers. For present purposes it seems sufficient to trace the advances from the more important localities in Arctic Seas, and, supplementary to that, those, if any, from our oldest and only previously recorded and much further southern locality of St. Kilda. It is satisfactory to find the existence of this far southern locality, and that we have records dating back for *at least* two hundred and fifty years.\*

Another cause has been assigned, *viz.* the comparatively recent development of the Whale fishery, and certainly it seems to be favoured by the evidence of Whale-fishing accounts in the past. Pennant says: "The Whales are often discovered at sea by the multitudes of Malle-mucks flying, and that, when one of the former is wounded, prodigious numbers follow its bloody track."

But the present writer may at once say that the influence of that industry does not seem to him to have had any really extensive sway over their dispersal, unless possibly in the very earliest and minor stages of the procedure. It is true that Bear Island, lat.  $75^{\circ} 30'$  N. and long.  $15^{\circ}$  E., is now—A.D. 1911—much more densely populated by these birds than in the earlier times to which I have referred, and this has been credited to the influence exerted by the whaling operations carried on by the Norwegians on the north coast of Finmark. Dr. W. Bruce is of the opinion that these operations *did* have something to do with the increase at Bear Island, as offering an additional inducement to the birds to further colonize the place. While that may appear to be quite within the possibilities, we cannot compare its force with the natural influence exerted by over-

\* 'A Late Voyage to St. Kilda,' &c., by M. Martin Gent (London, &c.), MDCXCVIII. It cannot be affirmed that we have any true and reliable record of the species having bred on the South Isles of Barra of the Outer Hebrides, all endeavours to trace a reliable and scientific relation of this as a fact having failed, though it has been included and quoted as an old-time British nesting haunt. We reserve statistics for later treatment under the several localities, and only use the general fact here to show how suitable cliffs may not have been within the ken of the ocean-loving birds which rarely came near the land except in their nesting season; and, on the other hand, to give a reason for the exception. This we endeavour to explain later when treating more directly of the British dispersal in recent years.

population at the older centres further away to the north, and the far-reaching impulse of the first outward pressure and ever-gathering force afterwards as each successive colony in turn became overcrowded.

This widespread and more general movement towards the south no doubt became accentuated and doubly enforced when the independent ranges of these "northern hordes" overlapped with that of the long separated and furthest south colonies of St. Kilda. The probable result, if these ranges did overlap, was the mingling of the sexes of both, and renewed vitality. It appears to the writer, and may appeal to the careful student of Dispersal, that whilst the main army, so to express it, advanced rapidly and covered great expanses of ocean between Iceland and other more northern stations, and Bear Island and Faroe, and even further south still, the natural increase of the population of the St. Kilda colonies also caused an overflow of the population, which in its initiatory stages took a northerly direction; and that those which wandered furthest to northward met the south-advancing host, and later became, as it were, overpowered, and ceased to penetrate much further, and thus an added impulse may well have been given to the more general advance. We should explain here that there cannot be any reasonable doubt about the increase of these birds at the St. Kilda group of islands during recent years, as there appears to be abundance of evidence of the fact.

If the dispersal of these and other added colonies did take a northerly trend, and the superior forces met and overcame them, this may present a sufficient explanation of the great rapidity with which so many Scottish stations have been taken up since their earliest advent at Faroe in 1838, and Shetland in 1878.

As regards the still further extensions to the west coast of Ireland, as related by Messrs. R. M. Barrington and Ussher,\* that may also have been accelerated by the blending of blood and increased vigour; but, putting that aside, the Irish occupations may well be due to the direct influence of the greater southward general movement which appears to have taken place all over the North Atlantic.

\* 'Irish Naturalist,' September, 1911.

A third cause. How far these causes may have been accelerated by another is more difficult to gauge. But quite in recent years the results of an abnormal loosening of Arctic ice and the far drifting southwards of the caved-off icebergs may perhaps be guessed at by a careful study of the series of the U. S. American Ice-charts. We need not lay too much stress upon the undoubted facts, so well known to those who "go down to the sea in ships," and who cross and recross the North Atlantic between Europe and the continent of America, whether by the "north-about" or the "south-about" routes, but we consider it is worthy of mention as a possible influence. Such natural developments can scarcely fail to produce effects upon the habits and distribution of even such an ocean-loving bird as the Fulmar, though it may not always be easy to define the direct action. And it is worthy further of mention in the connection that such influences upon the migration of Seals has been very distinctly observed upon the Newfoundland coast, and especially in the Sound of Belleisle between Newfoundland and Labrador, and which has been commented upon during at least one year of the last decade, when the Seal fishery usually conducted at the time of the annual migration of these animals northward proved a complete failure; and as we write it may be stated again there has been a failure in the Seal fishery off the Banks for similar reasons in 1911. The further extension of the oceanic dispersal on the western side of the North Atlantic may have been simultaneous with or dependent upon the abnormal southerly drift (or "migration") of the Arctic icebergs, which have been shown in recent years to reach southward to 45° N. lat. on the European side, and to 41° or further south on the American side.

Of the oceanic space covered by the flight of the multitudes of these birds—*i. e.* the species of North Atlantic Fulmar Petrel—Linnæus gives early indication, though he did not appear to have been aware of the St. Kilda colony. He simply writes of its general range: "*Habitat in Mari glaciali, s. intra tropicum arcticum, Nidificat in Grönlandia, Spitzberga,*" &c. It is true, however, that Brisson was aware of the St. Kilda colony, and Linnæus quotes the reference and the authority in turn, for Brisson's statement is no doubt simply an adaptation from

Martin Martin's still earlier account, verified by a specimen sent thence to Reaumur's Museum in Paris.\*

The range of the species is vast, covering nearly the whole Northern Atlantic, even to the verge of the fixed Polar ice, and as far as the open sea will lead them, or, more definitely, and according to absolute record, as far as  $85^{\circ} 5''$  N. lat., as recorded by Collett and Nansen. These writers tell us: "The last *Fulmarus glacialis* of this year was seen on Sept. 14th, and was the last bird observed that autumn. On that day the 'Fram' was in  $85^{\circ} 5''$  N., and this is the highest latitude in which birds have ever been known to be observed."†

Southward the species ranges as far as the Mediterranean ('Yarrell,' *loc. cit.*), and, as we have just shown, to  $45^{\circ}$  N. lat. on the European side, and to  $41^{\circ}$ , or further south, on the North American side.

We cannot definitely fix what may be the range of individual birds of the species, nor even that of the inhabitants of any one colony, either singly or in a body; but we may be allowed to believe that the range is dependent upon the necessities of the pioneers in the earliest stages of the movement.

The flight of the Fulmar is for the most part low and gliding over the trough and billow, the birds rarely ascending to any marked elevation when far out at sea. Their vision is therefore limited, and their horizon circumscribed. Whilst nearly all previous writers speak of these birds as a purely oceanic species, and record that before the occupation of the later nesting places the birds were seen principally by fishermen out at sea, and some miles removed from the nearest land—as will be gathered further on in this article—such is not to-day so conspicuous a

\* 'Ornithologia sive Synopsis Methodica,' &c., MDCCLX. Vol vi. Parisii, MDCCLX., p. 143, t. 12, f. 2. (The copy now in my possession belonged to the late Prof. Wm. Macgillivray, and bears his beautiful sign-manual upon each illuminated title-page of the six volumes. The text is in double column, in Latin and French, and the full title-pages have two printed strips of paper pasted on, bearing the legend, "Monsieur Challan, Procureur du Roi," on one line, and "A Meulan-sur-Seine.") The passage referred to is at p. 145, and the last sentence of the article, "Il a été envoyé de l'Isle S. Kilda à M. de Reaumur par Milord Morton."

† 'Account of the Birds of the Fram Expedition,' Christiania. London, 1899, p. 50.

trait in their behaviour, because many are now to be seen quite in more or less land-locked seas, and close round their nesting sites—as, for instance, in the narrow Sound of Sleat, in the waterways of the Outer Hebrides, and the North and South Minches between the Outer Hebrides and the coast of the mainland of Scotland. And it may well be worth mentioning here that a remarkable exception to the rule of previous circumscribed horizon—if failure of the birds to colonize be due to that fact—is that the long-tenanted cliffs of St. Kilda and the high cliffs of Mingulay and Barra Head are clearly within view of one another; but that it has not been till within quite recent years that Fulmar Petrels have colonized the latter. We instance this exception to illustrate the fact that pressure from the over-populated cliffs of the St. Kilda group *did not*—if the chronology can be trusted, which we uphold it can be—*cause great expansion in a southerly direction* from our solitary Fulmar station, or *otherwise it has been long delayed*.

Of the great and general abundance of the species it may not be out of place to speak here. This may best be done from the records of previous observers. Thus, twenty thousand to thirty thousand birds are taken annually on the Westmannjar Isles of Iceland.\* In the island of Jan Mayen the species breeds in thousands.† After a north-west hurricane the mortality of Fulmars on that inhospitable rock was vast. The birds return to the cliffs at Jan Mayen with every south wind, and as late as September 19th, “nearly as numerous as in summer, but disappeared with every north wind.”‡

Another point is, if any real specific difference exists between the more Arctic form and the more abundant southern form, it is here worthy of notice that it is only in autumn or the end of September that the “grey-coloured young” (*sic*) were seen frequenting Jan Mayen.

Following up the argument regarding a great general movement southwards, it may be well to speak here of these two supposed forms or so-called subspecies. Personally, however,

\* Yarrell, ‘British Birds,’ ed. iv. vol. iv. p. 6.

† “Vogel von Jan Mayen,” translation; Zool. 1890 (Jan. and Feb.), by Dr. F. Fischer and August von Pelzeln.

‡ Yarrell (*loc. cit.*).

the present writer has never been able to obtain a single specimen of the grey-coloured birds in British seas apart from what may have been mere plumage phases dependent on age. These grey birds are spoken of as frequenting Spitzbergen seas in certain proportions to the lighter-coloured birds,\* and to inhabit the island of Grimsey within the Arctic Circle, to the north of Iceland, to the exclusion of the other form, and they are even credited as possessing a distinctive local name, *e. g.* "Smidur," or the Hammerman.† Specimens from British seas, however, still seem to be desiderata in collections. Therefore these do not help us greatly in tracing dispersals at present, though they may yet become helpful.‡ It would appear, however, from their much greater scarcity in the south of their range and the isolation or local distribution of nesting sites in the north that the form is probably a disappearing one, and that in all likelihood merely an illustration of dimorphism. But many authors have recorded these peculiar forms. Trevor Battye seemed to find all the birds in the Spitzbergen seas to be what he terms "a dirty light shade." The lightest he obtained is now in the National Museum, "where"—as he says—"it can speak for itself, and"—as he further remarks—"whereas Howard Saunders says both forms are very numerous and the light form breeds in thousands," his (Trevor Battye's) experiences appear to have been somewhat different,§ though not clearly defined by him.

In the North of Europe the range has not been found to extend eastward of the Kara Sea; at all events, records thence are scarce or negligible.

In Spitzbergen it has long been found in vast numbers (*vide* A. Newton, 'Ibis,' 1865).

In Novaya Zemlya the Fulmar was abundant on the north coasts of the North Island, and was observed at the highest latitudes attained, but was not seen by Markham in the Kara Sea.||

\* Newton, quoting Faber (*cf.* 'Naumannia,' vii. p. 437).

† See also Newton in Appendix to Baring-Gould's 'Iceland,' p. 419. Also Howard Saunders's 'Manual,' 2nd ed., 1899, p. 751.

‡ Yarrell (*loc. cit.*).

§ 'Ibis,' October, 1897.

|| *Idem*, October, 1897; Feilden, *op. cit.* 1870, pp. 303, 310; and Von Heuglin, *op. cit.* 1872, pp. 60-65.

In Franz Josef Land, it was found at Cape Hvitenland, Frederick-Jackson Islands, and breeding at Cape Fisher and the east end of Mabel Island; and nesting on basaltic columns.\*

At Waigatz Island, the Fulmar was only seen at sea off Novaya Zemlya, and at Lutke Islands.†

At the coasts of North America, and over the seas of the Western Atlantic, Fulmars were seen off Belleisle on Aug. 20th, and found in increasing numbers northwards both inshore and out at sea. All were seen in autumn. Most were light-coloured. Ludwig Kumlein says‡: "I saw none so dark as I did in the spring." He continues: "A few of these dark-coloured birds—darker than ever I saw in the fall, breeding near Quickstep Harbour in Cumberland"; and this author appears to differentiate them. He adds: "To the northward of Exeter Sound the dark variety predominates." He arrives at the conclusion that, "the dark birds being oftener seen in spring than in fall, the dark plumage cannot be characteristic of the young." So far, Kumlein; and he is recognized as a careful observer.

On the other hand, in another area of sea, Heneage Cox first saw the birds when *en voyage* to Spitzbergen, in the open sea to the north of Norway, on July 24th, and found them becoming more numerous to the northward up to the edge of the ice-pack. The grey birds seen and treated of by him seemed "to be in a state of plumage intermediate between that of the adult and that of the young in the second summer."§ And A. Chapman, when on the same expedition as Heneage Cox, also remarks upon these different appearances of the plumage of individuals in the Spitzbergen seas.

Prof. R. Collett tells us that "the Fulmars are to be seen all down the coast [*i. e.* of Northern Norway] as far as Trondhjem, but never south of that point, and between August and spring it is not met with there, but it may be found to breed within the Arctic Circle." Collett is more scientific with his "*may be found*" than Wheelwright's looser statement.

In Wheelwright's 'Ten Years in Sweden' occurs the passage,

\* Eagle Clarke, 'Ibis,' April, 1898, p. 274.

† Pearson, 'Ibis,' 1898.

‡ 'The Howgate Arctic Expedition,' 1877-79, p. 102.

§ *Vide* Yarrell, 3rd ed., p. 642, as quoted by Heneage Cox.



and this was no doubt considered by Prof. R. Collett later, as may be rendered more correctly, and considered more scientifically accurate. The Old Bushman has it thus:—"It [*Procellaria glacialis*] is not seen on the Swedish coast in summer, but occasionally in autumn and winter. Never further south on the Norwegian coast than Trondhjem. Breeds in the far north in the islands off Norrland and Finland."

In Greenland, again, it is not found nesting further south than 69° N. lat., but was seen, but not nesting, as far north as 82° 30" in Grant Land.

So far as we have shown up to this point, the evidence, we think, points to what we have already indicated, *viz.* the principal cause of dispersal and its general direction.

In 1863, Herr Müller published his excellent treatise on the Birds of Faroe,\* and, amongst other interesting information, he quotes Mohr in his Icelandic Natural History,† *that it only bred on Grimsey*; but Herr Müller goes on to say: "Now [*i. e.* 1863] it certainly breeds in numbers on the Westmann Islands!" Grimsey is an island off the north coast of Iceland, and lies within the Arctic Circle, whereas the other localities in Iceland for the nesting haunts of the species are all southward of the Arctic Circle. As we have seen (*ante*, p. 407), birds nesting on Grimsey—as related by Prof. Newton—present the *grey form* of plumage to the exclusion of the light form, and was considered sufficiently distinct to receive the local name of "Smidur," or the Smith or Hammerman. But if we credit Mohr, as above quoted by Müller, may this not have been its *only* name then known in Iceland, and not one meant to distinguish between two forms? We mention this as having a possible bearing upon the earlier history of the species and its subsequent dispersal.

#### THE FAROES.

We now come to treat of the next great movement, which resulted in the populating of the Faroes.

First, let us for a short space revert to the earlier writers—Svabo, Landt, Faber, Mohr. These earlier chroniclers have

\* 'Faeroernes Fuglefauna,' Kjobenhavn, 1868.

† 'Icelandske Naturhistorie.' 1786, p. 29: "Bijgger allene paa Gairnsee," p. 29.

told us of the status of the Fulmar in northern lands and seas prior to the occupation of Faroe, which latter, as will be shown, dates to 1838 or 1839. All these writers have spoken of the almost universal occupancy of these Arctic regions by the species, and they have enlarged upon its extraordinary abundance. Messrs. Baird, Brewer, and Ridgeway considered that Iceland was the most densely populated land of the Fulmars when they wrote, and mentioned four stations. These were (quoting Faber) : Grimsey, within the Arctic Circle, Latrabjarg, Krisuvixrberg, and Westmanseyar, where, adds Faber, "they are the commonest of birds."

Beyond Iceland and Arctic limits, St. Kilda alone has a Fulmar history, which extends back to some two hundred and fifty years.\* It might, indeed, well be that a differentiation in plumage should have evolved between these far-separated colonies of Fulmars! Indeed, to some it may appear more extraordinary that such has not resulted, even if they had been previously continuous and united. But that interesting question must now remain, we fear, for ever undiscovered. Is the space of two hundred and fifty years sufficient for Nature to achieve such changes? Perhaps not; but how much longer may the St. Kilda colony have been separated from its nearest kin in the Arctic? Is there not in the facts as they stand another argument in favour of a pure case of dimorphism in the species?

We now take up the accounts in chronological order of the records. According to Mr. John Wolley's early account, it would appear that the earliest colonies occupied portions of Faroe Isles about the year 1838 or 1839, and that the first few pairs were seen to breed at the cliffs of Qualboe in Suderoe; then later in Skuoe and Great Dimon, at which place John Wolley saw their nests in 1849. Even then, or when he wrote in 1850, he expressed his surprise at the remarkable change of locality by a bird supposed to be so constant in its attachment to certain breeding places. This remark of Wolley's has considerable significance when our more recent history of its wanderings is considered, as I think will appear still more evidently as we proceed. For the present it is enough to direct attention to his

\* Martin Martin, *op. cit.*

remark, and to suggest that when he made it he had St. Kilda in his mind as well as the Iceland localities.\*

Continuing in chronological authors' sequence, we find that the increase of these birds in Faroe has been a fairly steady one, if slow, whichever site was first occupied. Herr Müller gave Colonel Feilden all his information to date of the latter's visit to Faroe, and these and the writings of Wolley and Müller's 'Faeroernes Fuglefauna' were utilized by Colonel Feilden in his notes on the birds of these isles in 1872.† There we find the additional stations occupied, *viz.* Mygganaes, Videroe, and Fugloe, and these Colonel Feilden added from his own observation; and he draws my attention to the fact that Wolley does not *say* that Qualboe (he writes Quelboe) was the first colony of Fulmars, but "somewhere about the year 1839 it was observed by the rock-climbers, *breeding for the first time near Qualboe in Suderoe.*" Feilden adopted Wolley's statement, but Feilden adds: "I do not *say* it was the first colony to arrive in the Faroes" (*in lit.* to the present writer, Jan. 30th, 1912).

Whilst Herr Müller, both in his printed account (*vide ante*) and in his information given to Colonel H. W. Feilden, gives Suderoe as locating their first arrival there, followed by most of the later authorities and supported by Wolley, it is a little puzzling to find that the late Prof. A. Newton, in the tenth edition of the 'Encyclopædia Britannica' (1879), and in his 'Dictionary' (1893), credits Mygganaes Holm—the furthest western island of the Faroes—as receiving the earliest pioneers, and the statement reappears in the eleventh edition of the 'Encyclopædia Britannica,' as revised by Dr. Chalmers Mitchell without alteration (1910). The passage is as follows: "Northward it established itself about 1838 on Mygganaes Holm—one of the Faroes." Perhaps later on, and chronologically, this may come to be explained. It may be said, however, in this place that, whilst Newton's statement is contrary to previous writers, and is therefore somewhat puzzling, it is also worthy of note, by careful readers of the Norsk and possible (?) alternative translations, that some reason may be found for it, *more especially* as

\* "Some Observations on the Birds of the Faroe Isles" (Jardine's 'Contributions to Ornithology' for 1850).

† "The Birds of the Faroe Islands" ('Zoologist,' 1872).

Newton gives no authority. Newton had a correspondent or correspondents in Faroe, and he knew Herr Müller.

I give the passage which I find in Herr Müller's MS., written by him up to date of 1894, when he gave it to Harvie-Brown at Thorshavn :—

“Det forste Sted hvor den satte sig fast var paa den Westlige side, Nordliqst paa Sudero.”

“The first place where it settled was on the western side, towards the north of Sudero.”

There is no doubt about the word “*Westlige side*”—towards ! the north of Sideroe, or rather the superlative of towards = “*nordwardst* of Sideroe,” says the translator of the passage. Can any misconception of the passage have occurred to confuse this with Mygganaes? Does anything occur in the Danish to lead to the conception that “on the western side” refers to the entire group of the Faroes, and that further it may read the superlative “*nordwardst*” *from Sideroe*. If not, it must remain a puzzle how Mygganaes Holm has been credited as the locality of its first occupier, on Newton's authority. Yet Mygganaes Holm does appear to be more likely than Suderoerne !

Colonel Feilden, in correspondence with Harvie-Brown during the preparation of this paper, says : “I am perfectly satisfied and convinced that Newton had good reason for giving Mygganaes as the first Fulmar settlement in these islands”; and Feilden further adds a remark with which, I think, all will agree, as the present writer does : “My reason,” says Feilden (*in lit.* as above), “for accepting his statement is that his veneration for John Wolley was so great that never would he have put aside the latter's statements unless he had an absolute basis of fact to go by.” And I am glad to find also that Feilden perfectly agrees with the present writer in that; as he puts it : “It seems almost a certainty that the Atlantic roaming Fulmar would adopt the isolated western and almost inaccessible Mygganaes (holm) for its first settlement, and not the more protected and inland site of Qualboe.”

Though the following information is not strictly chronological, we think it advisable to give it here, as having some direct connection with what has preceded it.

When Harvie-Brown was in the yacht ‘Daydream,’ and that

vessel was on her return voyage and laying a course for Kirkwall (Orkneys), he had occasion to meet and converse with a native of Mygganaes of the Faroes—a Captain Andresen—who was working his passage to Scotland in connection with his own business in Faroe, *i. e.* owner of several fishing and trading craft there. He was going to Scotland to endeavour to purchase a steam-vessel, with which he proposed to run the mails amongst the islands.\* Amongst much other interesting matter relating to both the Faroes and Rockall, he made mention of a presumably earlier occupation of Mygganaes Holm, spoken of by the people of the island within his [Andresen's] recollection, and then of a subsequent decrease and disappearance thence, and an increase again later, and of their having spread to many other parts of the cliffs. "The Fulmars," he said, "came in numbers, but became soon afterwards rare at Mygganaes; but again returned and became quite abundant." Harvie-Brown put Capt. Andresen's age at about thirty-five, but now believes that to have been a not very accurate estimate. Andresen lived at his home at Mygganaes, and remembered hearing of the above when he was a lad of about ten years of age. Mr. Andresen (we quote from Harvie-Brown's journals), "who is certainly a man well worthy of credence and altogether a superior and able man, speaking but not reading nor writing English fluently," gave Harvie-Brown these particulars, along with much other interesting information, apart from the subject of this paper. Though the above items alone may not be exact enough to prove a fact, yet, taken in conjunction with others, we think them worthy of admission here.

The present writer had the pleasure of sailing among these interesting islands in the summer of 1894. The Fulmars were met with in fair abundance during the cruise, but more plentifully on the south coasts of the northern group than on the great walls of cliff to the west of Eide Fjord, on the north coast. We may here quote a few passages from Harvie-Brown's diary of 1894. Relating to the north coasts, we find:—

"Fulmars are evidently nesting on these high cliffs, as I saw many sailing high in air above the highest cliff-edges and along the cliff-faces. . . ." Again: "Yes; Fulmars do breed on the

\* *Vide* 'Trans. Royal Irish Academy.'

grassy slopes high up in these northern headlands. . . . A few years ago only two or three pairs did so, but of late years more have come, and since Herr Grön began his whale-fishing operations at Eide Fjord they have become very (*i. e.* comparatively) abundant inside the fjord, and close up to the harbour or landing-stage. This means a considerable extension of range, and may point to a direct cause; just as at Foula (Shetland) a great stranded whale was said to have first influenced the birds to take up quarters at the Kaim of that island (see further on). A few years before Herr Grön's advent they were not known to come inside the 'jaws' of the fjord. A great increase may now be looked for." And, again: "All along the south cliffs near Soorvaag and Midevaag, and close to the towering precipices, 'Mollymauks' were flying, but we noticed that the cliffs here do not rise in successive or in parallel ledges as almost invariably is the case in our Scottish nurseries; rather are they honey-combed by cavities, holding at most a few pairs of birds, or even single nesting pairs. Thus the colonies are more scattered and not massed together. The cliffs are amygdaloid, with bands of basalt, with studded crystals of scolecite;\* and the cliffs visited by the yacht's gig on June 30th literally overhung our boat, and may have been some 1700 ft. in sheer height. (The Malin Head at Eide, on the north coast, is over 2800 ft. in height, and some comparatively lesser stacks along its base are 1000 ft. in altitude.) It is only at close quarters that one can realize the vastness of their height, or the bird population. At a distance of even half a mile only a few places show white from the deposit of the birds' guano. Nowhere did we see any bird colonies to compare in density with many of our Scottish nurseries, unless it was at Mygganaes. For many miles of cliff-face there is scarcely a symptom of bird-life, and it is not even at quite close quarters that it is always easy to understand why they should be so unoccupied.

"Harvie-Brown's party had no opportunity of close acquaintance with the south isles of their earlier habitations in Suderoe, Storre, and Lille Dimon. Finally, in the list of birds seen in Faroe, we find it summed up: Fulmar Petrels—old and young—

\* Auct. Prof. Heddle, who accompanied Harvie-Brown, and who had also previous personal acquaintance with Faroe.

were seen half-way between Shetland and Faroe. Afterwards abundantly all along the coasts of Osteroe, Stomoe, Vagoe, and Mygganaes; also along the coasts of the latter—Vagoe and the south of Mygganaes—close in to the shore, flying often very high and far above the altitudes of the highest cliffs, just as we have seen them do at St. Kilda, Handa, and elsewhere. To the east of Eide Fjord, and between the entrance to the fjord and Kalsoe Fjord, or between Kodelin and Malin Head, only a few pairs bred until of late years, when a decided increase in their numbers took place. Since the whale industry has been instituted—*i. e.* in June, 1894—by Herr Grön, the Fulmars have increased, and have come into the Eide Fjord at the time of the ‘flensing.’ At Soorvaag’s Fjord village we saw eggs, and bought two, just as a reminiscence. These were taken a little to the north of the entrance of that fjord on the Vagoe side.”

When we saw Herr H. C. Müller at Thorshavn, whom we had known for many years, he told us of the “vast” increase in their numbers—*i. e.* by 1894—and the MS. he gave us at that time had been brought up to date of that year.

*A Chronological Note of the Occupation of Faroe by the Fulmar.*

We give a list of the writers whose works we have consulted, and a few others whom they quote—such as Svabo and Winge, &c. :—

1598.—Martin Martin.

1676.—Debes.

1760.—Brisson; Svabo.

1766.—Linné, 12th ed. We do not quote Linné’s 10th ed., but his ‘*Editio Duodecima Reformata.*’ Linné does not mention the Fulmar in his unreformed ed. 10 (1758).

1786.—Mohr.

1799.—Landt.

1845.—Winge. Four birds seen at Great Dimon.

1850.—John Wolley.

1860.—Herr H. C. Müller. Seen at Mygganaes, and at Troldhovet (‘*Faeroernes Fuglefauna,*’ 1868).

1862.—Herr H. C. Müller. MS. *to date*, given to Colonel H. W. Feilden.

- 1872.—Colonel H. W. Feilden. Seen at Videroe and Mygganaes.
- 1879.—A. Newton, 'Encyclopædia Britannica.'
- 1893.—A. Newton, 'A Dictionary of Birds.'
- 1894.—Harvie-Brown, MS. Journals. Herr H. C. Müller, MS. *to date*, given to Harvie-Brown at Thorshavn.

Before treating of the dispersal in the British Isles,\* it seems desirable to ask: How far has direct pressure influenced the extension southwards to Shetland, the rest of Scotland, and to the west coast of Ireland? How far has St. Kilda influenced the rest of Scotland and the west coast of Ireland? Or has any such influence, exerted by increase of the population in Faroe and in St. Kilda (and all subsequent occupancies in Britain), been simply merged in one vast movement from the original habitation (or habitations?) within and around the Arctic Circle? And if such a great pressure outward has taken place, whether purely from congested areas or from climatic alterations and food-supplies and other circumstances favourable or unfavourable to the healthy existence of the species—whither has the direction of the wave of pressure come—from the north and west, or from the north and east, or up from the ocean as from west to east?

We may not be able to satisfactorily answer questions such as these, but at least they may give some interest to future inquirers. It does appear known that their way is blocked to them east of the Kara Sea by the ice which, off the North Asiatic coast, leaves but a narrow lane of open water, and that for but a short time—and *not always even that*—in the short Arctic summer. It may, at all events, be conceived that many, or most or all, of the suitable haunts in the north-east *are congested by long years of almost unchecked increase*, and that only by the partially artificial actions of man in his whaling operations is their food supply maintained at a "living wage" level.

\* A further extension of this paper in so far as it relates to Great Britain "has appeared" in 'The Scottish Naturalist,' new series, vol. i. (*i. e.* to date of May, 1912, and June, 1912).—ED.



## SOME MISCELLANEOUS NOTES FROM GREAT YARMOUTH.

BY A. H. PATTERSON.

It was suggested to me some time ago by Mr. J. H. Gurney, whose "Norfolk Notes" have become an institution in this Journal, that I should send my own direct to the 'Zoologist'; and I do so with the assurance that they will detract nothing from the interest attached to his annual contribution.

The past year has not been marked by any great ornithological or other event in this neighbourhood; and the abnormally unpleasant month of August—my month of leisure—saw but scant entries in my notebooks.

Many hundreds of Dunlins came to Breydon during the first week in January. Wind south-east to north; whilst "bad" weather drove crowds of wildfowl south. On the 17th, on a cruel east wind, thousands of various ducks must have passed along the roadstead. I saw a flock of quite sixty Brent Geese; finding the remains of an Oystercatcher and a Gannet washed up at the tide-mark. On the 20th many of the stalls in the Saturday's market were decorated with various fowl. The Broads had been visited by considerable numbers; Mr. Vincent, writing from Hickling, stated that he had seen several thousand Wigeon and about five hundred Pochards, Tufted Ducks, and Scaups. He saw fifty Sheld-Ducks on one morning, with eleven Goosanders, two immature Black-throated Divers, one Red-throated Diver, two Smews, and several Golden-Eyes. Many species of waders passed; and he had never seen so many Jack-Snipe in January before. A day or so before five Long-tailed Ducks had been seen. Several Pink-footed Geese, driven from the well-known Wash herd, were seen in East Norfolk; two having been exposed for sale in the market that had been killed at Palling. Oystercatchers were unusually numerous.

Writing from Sheringham, Mr. W. A. Smith, on the 21st,  
*Zool. 4th ser. vol XVI., November, 1912.*

testified to the hordes of duck working south on the strong east wind. He recorded, among others, a Green Sandpiper, a Temminck's Stint, and a Little Auk, taken during the bad weather.

During the scouring tides of the middle of January I saw many Radiated Trough Shells (*Macra stultorum*) washed up at the harbour mouth; and considerable quantities of Whelks were thrown up on the Gorleston side. Huge quantities of coarse brown Wracks were flung ashore also.

On January 24th a person living in one of the oldest streets produced for my inspection three House-mice which had been trapped. There were white, floury-looking, fungus-like growths on their heads; in one instance the eye and part of the head seemed to have been eaten away. Subsequently I had two or three others shown me. The "affliction" answered to the description of "favus," a parasitic fungus known as *Achorion schoenteinii*, a conviction confirmed by one or two medical gentlemen to whom I sent specimens. The county analyst succinctly remarked that "cats play with these mice and pass the disease on to their human playmates," a possibility I was afraid of; and I, in consequence, impressed upon the mother of the household to keep her youngsters away from contact with any traps or dead mice, advice that proved not unnecessary, when, later on, she assured me that among some kittens born not long after, one of them was already afflicted by the disease, and was destroyed. Since then the "breed" appears to have been exterminated. A local doctor, with knowledge of slum-life in Edinburgh, assured me he had seen cases in human beings where the disease had obtained a hold not easily or quickly eradicated.

On January 24th a local gunner out with a shoulder gun on Breydon water saw a large bird crouching in a stranded fish-basket; on kicking it over, the bird—a Bittern—flew out, and was promptly killed, an infraction of the Norfolk Protection Act that passed unheeded.

Several Little Auks came in with the advent of February. One caught alive was brought to me on the 2nd. Another was captured at Upton, near Acle, and unsuccessfully persuaded to feed on turnips by its captor.

Rooks were flocking to their nesting trees in the centre of Yarmouth within sight of the market-place, as early as February 18th; on the same date a flock of Jackdaws had taken up their quarters in the parish church steeple.

Bearded Tits were noticed in an extensive patch of reeds on the Waveney early in March, a few miles from Yarmouth. I have every reason to believe that some nested there, and am assured that in years gone by a colony was not unknown on the Waveney. It is to be hoped that protective measures will be afforded this characteristic Broadland bird.

Early in March a Hoopoe alighted in a tired condition on the 'Hasbro' light-vessel, and was captured by one of the men, who tried to induce it to feed upon snips of beef. It however succumbed, and was hopelessly spoiled in an endeavour to preserve the skin.

On March 27th what looked very like a migration of Rooks and Stock-Doves took place; wind strong from the north-west. The former beat inshore as if afraid of being blown to sea, or they may have been wing-weary.

A Bar-tailed Godwit, on April 14th, passed overhead at night, Breydonwards, calling loudly.

On May 5th I saw two Spoonbills on Breydon, one an undoubtedly fine male, with a crest like a mop. About a score of Godwits, backward in colour, a number of Whimbrel, and five Shovellers made a pleasing variety on the mud-flats. A Whimbrel will tackle a Shore-Crab (*Carcinus mænus*) much too large to be swallowed. It shakes off all the legs, which it then picks up and devours, and should the carapace prove un-negotiable, it will pick the softer under-part to pieces and eat the inside. Many Herons were dotted around eel-catching.

A third Spoonbill had joined the other two on the 9th, apparently another male. He did not seem to be made welcome by his rival in the affections of the lady bird.

May the 11th saw a variety of shore-birds on the mud-flats, many Ringed Plovers and Dunlins; several richly attired Grey Plovers were noted in a flock of eleven.

The only "show" of *Tipula* (daddy longlegs) was noted on May 14th, when numbers flew from the grasses as I brushed along the crest of the "walls." The usual enormous numbers

seen in September were conspicuously absent this year, probably owing to the heavy storms of August, when the marshes were inundated by the deluge, the larvæ assuredly having been drowned.

On June 5th three Spoonbills (undoubtedly those from Breydon) had been seen at Easton Broad, near Southwold, by the Rev. Julian Tuck. These birds evidently come and go, for they are seen a day or two, then lost sight of, and once again return; and if unmolested will spend the best part of the summer in and around the neighbourhood.

On June 9th I saw nine Shovelers on the mud-flats, in all probability feeding on the *Hydrobiidæ* found abundantly on the blades of the *Zostera*.

That a Starfish will produce curious results on a cat that may have eaten one, I well know; but I was unaware that blowflies found *Asteriadæ* deadly until having placed three or four Sun-stars (*Solaster papposa*) on the top of a hen-house to dry in the sun, the aroma drew together a goodly crowd of flies both of the blue and green coloration. They ravenously clung to them, and seemed loth to move. My young Japanese silky chickens as eagerly snapped up many flies. I observed that the flies soon began to show signs of apathy, and tumbled about in the same manner that they will do on having come in contact with Keating's powder. Before long dead flies besprinkled the neighbourhood, and I began to fear for my chickens, which, however, came to no harm.

A Red-backed Shrike was observed in an adjoining village early in June to make several visits to a certain field, carrying away a young Partridge on each occasion. It was shot when bearing away its fifth victim.

A Squacco Heron, which will most likely be recorded in Mr. Gurney's "Notes," was obtained in the neighbourhood in June.

For many years the Swifts to the number of ten pairs annually resorted to the eaves of an ancient house near the Town Hall Quay. In July, when all the nests would be occupied, a length of wire-netting was stretched along the eaves of the house, in order to protect a new advertising board from their droppings. For days the wretched parents hung around their

old time home, and eventually dispersed; some to find new lodgings, which I sincerely hope they will occupy next spring.

In July a Shrike captured a Shrew, impaling it on a thorn, the spike penetrating the skull.

Goldfinches were delightfully plentiful this year in villages south of the town.

July 21st I saw hundreds of Black-headed Gulls, young and old, on a Bure-side marsh, their first appearance in the neighbourhood after nesting.

Saw one Spoonbill in Breydon on July 13th, and two on the 23rd.

On August 12th about one hundred and twenty Swifts had gathered in the vicinity of the St. George's Park, a favourite assembling ground for small birds, and were seen to go away in a body due south-east. Two or three hundred Curlews on Breydon, on August 16th.

I saw, on August 18th, a nice flock of Turnstones on the Breydon flats, near my house-boat. They invariably ran down the wind, now and then with very ruffled feathers; then suddenly turning, they would work back, pushing the prostrate *Zostera* with bill and forehead until it looked rough-ploughed, the weed being piled in heaps almost as high as the birds. In the soft ooze thus uncovered any crustaceans seen were promptly snapped up. Many Redshanks and Ringed Plovers consorted with them, occasionally benefiting by the labours of their stouter companions. This is the only observation I have thought worth recording for the whole of my summer holidays!

During the gloomy September I frequently observed hungry Swallows flying up and down in front of bill-posting stations, snapping at the blue-bottle flies that had gathered here and there to enjoy such little warmth as obtained in a southerly aspect, probably quite as much attracted by the paste kept damp by frequent showers. On one occasion a bird flitted between myself and the hoarding, snapping up a fly disturbed by my coming. On the 14th, when I was walking along Breydon "walls" to my house-boat, these birds flicked round and round me, deftly capturing the dipterous insects brushed out of the grass as I walked. I put out some *Tipulæ*, but never saw one of them taken by these birds.

Some hundreds of Dunlins and Ringed Plovers, with some Curlew-Sandpipers, on the mud-flats. Some Grey Plovers and a few score Knots. During the continuance of the waters upon the marshes, flocks of Grey Plovers, Lapwings, and Golden Plovers were frequenting the neighbourhood, the drowned worms probably being an attraction.

I picked up a freshly-dead Redwing at the tide-mark on the beach on October 3rd, and on the 4th a dead migrant Skylark, with its wing clean cut off by contact with a telegraph wire on the North Denes.

On the 3rd a Woodcock with an injured wing, hurt undoubtedly by telegraph wires, was captured near the fish wharf.

Two Ruddy Sheld-Ducks were shot on Breydon on October 5th by two separate gunners, one of whom, not knowing its species, and mistaking it for an ordinary Sheld-Duck, plucked it, the head, neck and feet only being rescued at the instance of a gentleman who happened to see it. I saw the remains; the head was creamy, but the neck had assumed a decided shade of buff. The other fell to a collector, who had it preserved.

Gulls, I think, are becoming more numerous. Three years ago I estimated the numbers "resting" on Breydon flats, after an early morning's feeding at the herring grounds, at about seven thousand; on certain days lately I have estimated the number at nearly half as many again. Greater Black-backed Gulls of all ages appear to predominate; Black-headed Gulls came next, with Herring-Gulls, mostly immature, and then the Common Gull, in lesser numbers. No one troubles to shoot them, save one old gunner of my acquaintance, who looks every year to make up a gross of victims, utilizing the feathers for sale purposes, whilst he dresses the wings and "parts" of smaller Gulls, finding quite a *clientèle* among certain of the fair sex, who recommend his wares one to another. There will be a hue and cry directly by the fisher-folk, who seem unaware, or forget that the Greater Black-back is exempt from protection.

It is a fine and interesting sight on a fine afternoon just before sunset to see the ruddy light falling upon acres of birds; to hear them cackling their plans for the night's procedure; and to observe them mounting, battalion after battalion, in regular succession, and making for the open sea, whereon in fine nights

they roost, to be in readiness for the morning's chance—to annoy the fisher-folk hauling their nets by snatching at herrings as they come up filled. Fishermen tell me that they actually shake fish out of the nets and devour them, a lot of Gannets and Cormorants assisting from below. I have found the skulls of Cormorants washed up on occasion, and believe them to be the remains of birds that had been entangled in the nets below and drowned.

In the early morning it is curious to see the boats vigorously steaming home, a huge parcel of Gulls, like a swarm of bees, flying above and around, squabbling and scrambling for the broken fish and useless species thrown back into the sea by the men when clearing the nets. They will follow a boat to the harbour, and wheeling suddenly in a body they will make back for an approaching vessel. One may, with a good pair of glasses, observe the boats miles away, surrounded by a swarm of birds; each home-coming vessel being escorted. The birds evidently know the full boats, probably seeing the fish; but never do they make an error by accompanying an outgoing craft.

A live Shag, half dead from bad usage, maybe half drowned by contact with a net, was brought to me on the 8th of October.

The Black Rat is still abundant in the slummier parts of the town, having runs under the floors of the huddled-up conglomerate of cottages, warehouses, and outbuildings, which characterize the "Rows." Walls of huge thickness, but of doubtful consistency, are often riddled with burrows, and all attempts at extermination seem futile. The Rats are impudently tame, and will show themselves in broad daylight; migrating, as food fails them, from fish-house to cottage, and from cottage to sail-loft, just where food happens to be most accessible at the time, whilst grocers' warehouses afford them happy hunting-grounds. Cats weary of killing them, and after a time refuse to eat, even if willing to hunt and capture them. Several houses have recently had their floors taken up and a solid under layer of concrete put in before replacing the boards.

## NOTES AND QUERIES.

## MAMMALIA.

**Rabbits and their Young.**—During the past spring I kept under observation several nesting-burrows of Rabbits containing young. I marked these sealed holes each day in such a way that I could detect any visit by the mother to its young. For many nights, both moonlight and otherwise, I visited these burrows, but found in every instance up till midnight the mother had not attempted to visit her young. On April 4th I took three nests under observation, and decided to watch the night through, visiting the nests at three-hour intervals. At midnight all the holes were still undisturbed. At 3 a.m. one had been opened and sealed again, the second was open, and I presume the mother was in the act of feeding her young; the third nest had not been visited. At 6 a.m. both the latter had been resealed. It is evident only one visit is paid by the old Rabbit to its young in twenty-four hours. Although these facts may at first seem contrary to what we might expect—that the mother would visit her young as soon as possible after dark—nevertheless, by delaying her visit, the Rabbit no doubt avoids many dangers to both herself and young by running less risks from her enemies, which would be more eager hunting their prey as soon as night falls.—J. STEELE ELLIOTT (Dowles Manor, Shropshire).

## AVES.

**Starling on Sheep's Back.**—To see Starlings perch upon Sheeps' backs is something I have been accustomed to all my life, the first thirty years of which were spent at Eastbourne, where, on the neighbouring downs, one could not very well miss the sight. Jackdaws do the same. In the district in which I now live—one of the wooded and enclosed portions of the county of Sussex—I still see the same habit followed out, though to a lesser degree, because the sheep are fewer, and the great flocks of Starlings such as frequent the open downs and levels of the county are absent. Indeed, I saw two Starlings on the back of a sheep this morning. There is one fact we must not lose sight of—all sheep do not have the same wool. I would rather



reckon on seeing a Starling on the back of a "Southdown" than on that of a "Kent"; in fact, I do not know that a Starling has ever been seen by me on the back of any other than a Southdown sheep. It would be interesting to learn from readers of 'The Zoologist' to what extent the practice is followed in those localities where the sheep are mostly of breeds producing long and coarse wools. It is not so often that I see a Starling on the back of a cow or bullock—indeed, one might say seldom—but possibly in the future this will have become quite a common sight, provided the Starling continues to increase in enclosed districts at the same rate that it has done during the past twenty-five years. Both the Starling and the Jackdaw will sometimes alight upon the back of a deer; it is not very unusual to see them on the backs of the fallow-deer in the Hon. H. B. Portman's park at Buxted, in Sussex.—ROBERT MORRIS (Uckfield, Sussex).

**Some Notes on the Carrion-Crow (*Corvus corone*).**—Throughout Somerset the Carrion-Crow is a common resident species, and nests may be found yearly in any part of the county, but it breeds most commonly over the lower portions of the county, the moorlands and central flood areas, getting scarcer when the Mendips are reached. Being an extremely wary bird, it holds its own well, in spite of the persecution it receives at the hands of the farmers and gamekeepers, who, when they can manage it, shoot them mercilessly, whether in the breeding-time or not, by reason of the havoc they commit with the eggs and young of poultry; one farmer assured me that a Crow carried off the eggs from under a hen which was sitting in his yard, so throughout the countryside they are detested as much as Sparrow-Hawks wherever the poultry-yard exists. My experience of the nesting of this species shows that a pair of birds, or perhaps in time their descendants, will return year after year to the same spot, and build a new nest each season in the same or an adjacent tree, until six or more old nests, or portions of them, may be counted. On certain parts of the moorlands they utilize the low birch and alder trees for nesting purposes, the nests being reached without much climbing; another favourite site is the thick top of a fir tree. In these quiet and out-of-the-way spots of the moorlands they get little molestation from the gunner, and breed abundantly and in comparative safety. The nest, when placed in the thin top of an alder tree, is a bulky structure, but small when placed in the fork of a lateral branch of an elm, a favourite nesting tree on the higher ground around Wells, but here the commonest position for the nest is a

*central* fork from twenty to fifty feet up. The usual nesting materials employed are sticks, twigs, moss, hair, and wool; one nest last year was partly composed of pieces of paper picked up from the rubbish on the Wells Sewage Farm, a distance of about three hundred yards from the nesting tree. It is difficult to approach the sitting bird within easy gunshot; it could be accomplished by stealth, but not, I should say, by openly walking across a meadow to the nest, especially when incubation is not advanced. These observations refer to the latter part of March and early part of April, when the trees are destitute of foliage, and the fact of the bird always leaving the nest when I was well away from it enabled me to notice a common habit of the female on her quitting the nest. Immediately on leaving she hops or jumps down, as it were, on extended wings a good yard or more before sailing off with laboured flight across the meadow, to watch from a near tree what is going to take place. She does not leave the nest in the same way as a Magpie does or a Ring-Plover, by flying straight away at the same altitude or higher. I say "she," because I am of opinion that the female alone performs the task of incubation. I have watched the same bird that left the nest return to it again, the other bird being the while in an opposite tree. The full complement of eggs I have found to be commonly five, occasionally four, and rarely six. Sometimes one egg differs from the rest of the set, and resembles very much the Jackdaw type. I have known only one instance of an unspotted egg, one of a set of five. If two or three eggs are taken, the remaining eggs to make up the set are, as a rule, deposited within a few days, and incubation proceeds with two or three eggs, as the case may be. I have not found a full clutch laid again in the same nest, and if a nest be robbed of its full complement it is forsaken. Large birds are not allowed in the nesting tree. Rooks especially are driven away, and chased some distance off with angry cries, the Crow returning immediately to its tree. I have noticed this happens when the nest is being built as well as when it contains eggs.—STANLEY LEWIS (Wells, Somerset).

**Increase of Land-Rail (*Crex pratensis*).**—Has the Corn-Crake been more common generally as a nesting species during the present year, or only partially so? In Somerset it seems to have been more plentiful (*ante*, p. 316), and in Bedfordshire and Buckinghamshire, whence my personal observations have been made, it has nested again in many localities which it had deserted for many years past.—J. STEELE ELLIOTT (Dowles Manor, Shropshire).

**Baillon's Crake in Yorkshire.**—While walking a marsh bordering the River Wiske at East Harlsey, near Northallerton, a small Crake rose from the rushes before me, and flew slowly and with apparent difficulty a few feet above the herbage. I shot it, and found it to be a Baillon's Spotted Crake (*Porzana bailloni*). On dissection it proved to be a female, and is an immature bird. Measurements:—Length, 7.9 in.; wing, 3.75 in.; tarsus, 1.12 in.; mid-toe, 1.52 in. It was very fat. Several Snipe had been feeding in its immediate vicinity; in fact, I shot one of these birds, which rose a few feet from the Crake. This is the fourth example of this species to be obtained in Yorkshire, the last of the previous occurrences being an adult male, killed between Pocklington and Wilberfoss (Mr. T. H. Nelson, 'Birds of Yorkshire'). Unfortunately, my specimen fell into the none too gentle "hands" of the fox-terrier at Harlsey Hall, where I was then staying, but was luckily rescued while something yet remained. I have, however, managed to preserve all that was possible of it.—J. M. CHARLTON (Brampton, Cumberland).

**Strange Nesting-site of Coot (*Fulica atra*).**—Frequently when Coot have a difficulty to find cover for their nest they will build in quite open situations, even on the bare edge of the water within a foot or so of the land. But with a nest that came under my observation on Southill Pool, Bedfordshire, on June 15th last, no such difficulty of abundant cover occurred, and yet this pair had chosen to build their nest partly on the rowlock and partly on the seat of a half-submerged punt alongside the lake dam, and at a considerable distance from any cover whatever. The nest contained a clutch of six eggs, which were considerably incubated.—J. STEELE ELLIOTT (Dowles Manor, Shropshire).

**Abnormal Clutch of Great Crested Grebe (*Podiceps cristatus*) in Glamorgan.**—On April 20th we visited a lake, in South Glamorgan-shire, where we had observed a pair of Great Crested Grebes during the winter months, and now hoped that they had commenced nesting. As we approached, we saw one of the birds sitting on its nest, which was situated in a small clump of reeds forming the only suitable cover on the lake. On our nearer approach the bird left the nest, after partially covering the eggs, some of which could be seen from the bank, a distance of thirty yards, and on wading out to the nest we were surprised to find that it contained nine eggs, four or five being the usual clutch. Whilst endeavouring to photograph the nest the female continually dived within ten yards of the camera,

but her mate kept to the open water. Unfortunately, the photograph was not wholly successful, the depth of water and the treacherous nature of the bottom of the lake not allowing the camera to be placed far enough from the nest. Later in the season the same pair



EGGS OF GREAT CRESTED GREBE (*Podiceps cristatus*).

of birds laid clutches of five and four, which were not reared in safety. The nesting of this bird in Glamorganshire is an unusual occurrence, and it is peculiar to note that this abnormal clutch was laid in a county where the bird does not habitually breed.—F. NORTON and J. DELHANTY (126, Queen Street, Cardiff).

**Fulmar (*Fulmarus glacialis*) in Suffolk.**—On October 10th, while walking along the beach at Pakefield, just south of Lowestoft, I found a Fulmar on the shore, exhausted but still alive. It is one of the light-coloured form, and probably a bird of the year. The Fulmar is by no means a common visitor to East Anglia. Mr. Patterson records one in this Journal (*Zool.* 1907, p. 388), also found near Lowestoft, but in this case a dead bird.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

**Birds and Butterflies in the Alpes-Maritimes.**—On the early hot days of September, 1911, *Papilio podalirius* was frequently seen

flying and occasionally alighting in a garden in the west of Mentone. During this summer of 1912 I have not seen it at all in Mentone, but I saw it lately on Mount Bellenda, on the Italian side of the frontier, in company with *P. machaon*. Both were there numerous. Starlings on a southward flight were seen in large numbers in the tops of the planes which line the Avenue Félix Faure, on Nov. 26th and Dec. 18th, 1911. They remained for a few days and disappeared. In the beginning of January, 1912, I chanced to see a large stuffed Owl (*Bubo ignavus*) in a house at Sainte-Agnès; it had been killed in the vicinity. This and a dead owl of smaller size nailed to the wall of an outbuilding in Moulinet are the only Owls I have seen in the district. Other birds seen only in the carcass were Song-Thrushes and Redwings, about the middle and end of February. The wild purple anemone was in flower on Dec. 25th, 1911, but the red did not appear until the end of February in 1912, and at about the same time Nightingales came into song, and Chaffinches were singing freely. When the Nightingale alights upon the ground it jerks its tail up and down repeatedly. One of the commonest of spring birds in the gardens of Mentone is the Willow-Warbler, which utters a frequent and not unmelodious strain. Carrion-Crows I saw near Laghet in May. There were five in company. I saw these birds also every day during three weeks at Peira Cava (about 4800 ft.) in July and August. One large solitary Blackbird—it looked larger than the Crows—was seen there also; I could not be certain that it was a Raven. I first saw fireflies at Mentone on June 3rd, and every night thereafter during June and the first week of July at Mentone, Sospel, and Moulinet (about 3000 ft.), but at Peira Cava I saw none. Blackbirds were plentiful near Sospel and at Moulinet in June, and I had a momentary glimpse of a Blackcap near Sospel, and of a Kingfisher near Moulinet. At the latter place a Cuckoo began calling very early—at 3 a.m. one morning—and there also I saw a Rock-Dove, which flew out of a clump of Spanish chestnuts to the east of Bévéra, and alighted on a tree in the open part of the valley. A few days later—on June 29th—as I was sitting on a rock by the side of the Bévéra immediately below the Pont de Mouravi, a Water-Ouzel perched on an adjacent rock, and eyed me curiously for some seconds. Near the same spot, where grow magnificent fronds of *Scolopendrium vulgare*, I saw Blackbirds, Wrens, and a Robin. Siskins were common amongst the pines at Peira Cava, and I saw there also the Greater Tit. There also was a small bird with a bluish-grey back, which ascended the boles of the pines swiftly in a perpendicular

course. I could not ascertain what it was, but I think it must have been a Nuthatch.

Butterflies abounded at all the places I have mentioned, and chiefly so at Moulinet and Peira Cava. At the former place blue *Lycænida* were to be seen in dozens at one time. I also saw there *Aporia crataegi*, and at Peira Cava, *Hipparchia proserpina* and many others. On Aug. 20th Cicadas were stridulating amongst the olive trees on the Pointe de Saint Hospice, near Villefranche, and on the 25th of that month, on the road which leads from St. Laurent to Eze. On the previous day I saw *Vanessa antiopa* at Mentone; it frequently alighted, and enabled me to see the elaborate and beautiful markings of the under side of the wings. Next day, between Eze and St. Laurent, I saw *Colibris edusa*.—JAMES R. McClymont (Mentone, Alpes-Maritimes, France).

**A Correction.**—In the Addenda et Corrigenda of my paper, "Birds of South-east Northumberland" (*ante*, p. 301), I stated that Mr. George Bolam had misrepresented my remarks on the Chiffchaff in his book, 'Birds of Northumberland and the Eastern Borders.' I have since discovered that his statement does not refer to my own paper at all, as I would have seen had I noticed that he gives his reference, 'Zoologist,' 1906, p. 27. I deeply regret making such a blunder.—J. M. CHARLTON (Brampton, Cumberland).

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I SHOULD be most grateful if any readers of 'The Zoologist' would give me any information at all about Wiltshire Birds, records of rare birds in the county, or of the nesting of uncommon birds, &c.; in fact, any record not mentioned in the Rev. A. C. Smith's book, 'The Birds of Wiltshire.'—G. BATHURST HONY, M.B.O.U. (Woodborough, Pewsey, Wilts).

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF  
SCIENCE, DUNDEE, 1912.

ADDRESS TO THE ZOOLOGICAL SECTION.

By P. CHALMERS MITCHELL, D.Sc., F.R.S., *President of the Section.*

ZOOLOGICAL GARDENS AND THE PRESERVATION OF FAUNA.

(Concluded from p. 398.)

AND now I come to the last side of my subject, that of Zoological Gardens, with which I have been specially connected in the last ten years. My friend M. Gustave Loisel, in his recently issued monumental 'Histoire des Ménageries,' has shown that in the oldest civilisations of which we have record, thousands of years before the Christian Era, wild animals were kept in captivity. He is inclined to trace the origin of the custom to a kind of totemism. Amongst the ancient Egyptians, for instance, besides the bull and the serpent, baboons, hippopotami, cats, lions, wolves, ichneumons, shrews, wild goats and wild sheep, and of lower animals, crocodiles, various fishes and beetles were held sacred in different towns. These animals were protected, and even the involuntary killing of any of them was punished by the death of the slayer, but besides this general protection, the priests selected individuals which they recognised by infallible signs as being the divine animals, and tamed, guarded, and fed in the sacred buildings, whilst the revenues derived from certain tracts of land were set apart for their support. The Egyptians were also famous hunters, and kept and tamed various wild animals, including cheetahs, striped hyænas, leopards, and even lions, which they used in stalking their prey. The tame lions were sometimes clipped, as in ancient Assyria, and used both in the chase and in war. The rich Egyptians of Memphis had large parks in which they kept not only the domestic animals we now know, but troops of gazelles, antelopes, and cranes, which were certainly tame, and were herded by keepers with wands. So also in China at least fifteen centuries before our era, wild animals were captured in the far north by the orders of the Emperor, and were kept in the Royal Parks. A few centuries later the Emperor Wen-Wang established a zoological collection between Pekin and Nankin, his design being partly educational, as it was called the Park of Intelligence. In the valley of the Euphrates, centuries before the time of Moses, there were lists of sacred animals, and records of the keeping in captivity of apes, elephants, rhinoceroses, camels and dromedaries, gazelles and antelopes, and it may well be that the legend of the Garden of Eden is a memory of the Royal Menagerie of some ancient king. The Greeks, whose richest men had none of the wealth of the Egyptians or of the princes of the East, do not appear to have kept many wild animals,

but the magnates of imperial Rome captured large numbers of leopards, lions, bears, elephants, antelopes, giraffes, camels, rhinoceroses and hippopotami, and ostriches and crocodiles, and kept them in captivity, partly for use in the arena, and partly as a display of the pomp and power of wealth. In later times royal persons and territorial nobles frequently kept menageries of wild animals, aviaries and aquaria, but all of these have long since vanished.

Thus, although the taste for keeping wild animals in captivity dates from the remotest antiquity, all the modern collections are of comparatively recent origin, the oldest being the Imperial Menagerie of the palace of Schönbrunn, Vienna, which was founded about 1752, whilst some of the most important are only a few years old. These existing collections are of two kinds. A few are the private property of wealthy landowners, and their public importance is due partly to the opportunity they have afforded for experiments in acclimatisation on an extensive scale, and still more to the refuge they have given to the relics of decaying species. The European bison is one of the best known cases of such preservation, but a still more extraordinary instance is that of Père David's deer, a curious and isolated type which was known only in captivity in the Imperial Parks of China. The last examples in China were killed in the Boxer war, and the species would be absolutely extinct but for the small herd maintained by the Duke of Bedford at Woburn Abbey. In 1909 this herd consisted of only twenty-eight individuals; it now numbers sixty-seven. The second and best known types of collections of living animals are in the public Zoological Gardens and Parks maintained by Societies, private companies, States, and municipalities. There are now more than a hundred of these in existence, of which twenty-eight are in the United States, twenty in the German Empire, five in England, one in Ireland, and none in Scotland. But perhaps I may be allowed to say how much I hope that the efforts of the Zoological Society of Scotland will be successful, and that before many months are over there will be a Zoological Park in the capital of Scotland. There is no reason of situation or of climate which can be urged against it. The smoke and fog of London are much more baleful to animals than the east winds of Edinburgh. The Gardens of North Germany and the excellent institution at Copenhagen have to endure winters much more severe than those of lowland Scotland, whilst the Arctic winter and tropical summer of New York form a peculiarly unfortunate combination, and none the less the Bronx Park at New York is one of the most delightful menageries in existence. The Zoological Society of Scotland will have the great advantage of beginning where other institutions have left off; it will be able to profit by the experience and avoid the mistakes of others. The Zoological Society of London would welcome the establishment of a Menagerie in Scotland, for scientific and practical reasons. As I am speaking in Scotland, I may mention two of the practical reasons. The first is that in Great Britain we labour under a serious disadvantage as compared with Germany with regard to the importation of rare animals. When a dealer in the tropics has rare animals to



dispose of, he must send them to the best market, for dealing in wild animals is a risky branch of commerce. If he send them to this country, there are very few possible buyers, and it often happens that he is unable to find a purchaser. If he send them to Germany, one or other of the twenty Gardens is almost certain to absorb them, and failing Germany, Belgium and Holland are near at hand. Were there twenty prosperous Zoological Gardens in Great Britain, they could be better stocked, at cheaper rates, than those we have now. The second practical reason is that it is a great advantage to menageries to have easy opportunities of lending and exchanging animals; for it often happens that as a result of successful breeding or of gifts on the one hand, or of deaths on the other, a particular institution is overstocked with one species or deficient in another.

One of the ideas strongly in the minds of those who founded the earlier of the modern Zoological Gardens was the introduction and acclimatisation of exotic animals that might have an economic value. It is curious how completely this idea has been abandoned and how infertile it has proved. The living world would seem to offer an almost unlimited range of creatures which might be turned to the profit of man and as domesticated animals supply some of his wants. And yet I do not know of any important addition to domesticated animals since the remotest antiquity. A few birds for the coverts, fancy water-fowl for ponds and lakes, and brightly plumaged birds for cages or for aviaries have been introduced, chiefly through zoological societies, but we must seek other reasons for their existence than these exiguous gains.

Menageries are useful in the first place as educational institutions, in the widest sense of the word. Every new generation should have an opportunity of seeing the wonder and variety of animated nature, and of learning something that they cannot acquire from books or pictures or lectures about the chief types of wild animals. For that reason Zoological Gardens should be associated in some form with elementary and secondary education. We in London admit the children from elementary schools on five mornings in the week at the nominal charge of a penny for each child, and in co-operation with the Educational Committee of the London County Council, we conduct courses of lectures and demonstrations for the teachers who will afterwards bring their children to visit the Gardens.

Menageries provide one of the best schools for students of art, for nowhere else than amongst living animals are to be found such strange fantasies of colour, such play of light on contour and surface, such intricate and beautiful harmonies of function and structure. To encourage art the London Society allows students of recognised schools of drawing and painting, modelling and designing, to use the Gardens at nominal rates.

Menageries provide a rich material for the anatomist, histologist, physiologist, parasitologist, and pathologist. It is surprising to note how many of the animals used by Lamarek and Cuvier, Johannes Müller and Wiedersheim, Owen and Huxley, were obtained from Zoological Gardens. At all the more important Gardens increasing

use is being made of the material for the older purposes of anatomical research, and for the newer purposes of pathology and physiology.

There remains the fundamental reason for the existence of Menageries, that they are collections of living animals, and therefore an essential material for the study of zoology. Systematic zoology, comparative anatomy, and even morphology, the latter the most fascinating of all the attempts of the human intellect to recreate nature within the categories of the human mind, have their reason and their justification in the existence of living animals under conditions in which we can observe them. And this leads me to a remark which ought to be a truism, but which, unfortunately, is still far from being a truism. The essential difference between a zoological museum and a menagerie is that in the latter the animals are alive. The former takes its value from its completeness, from the number of rare species of which it has examples, and from the extent to which its collections are properly classified and arranged. The value of a menagerie is not its zoological completeness, not the number of rare animals that at any moment it may contain, not even the extent to which it is duly labelled and systematically arranged, but the success with which it displays its inhabitants as living creatures under conditions in which they can exercise at least some of their vital activities.

The old ideal of a long series of dens or cages in which representatives of kindred species could mope opposite their labels is surely but slowly disappearing. It is a museum arrangement, and not an arrangement for living animals. The old ideal by which the energy and the funds of a Menagerie were devoted in the first place to obtaining species "new to the collection" or "new to science" is surely but slowly disappearing. It is the instinct of a collector, the craving of a systematist, but is misplaced in those who have the charge of living animals. Certainly we like to have many species, to have rare species, and even to have new species represented in our Menageries. But what we are learning to like most of all is to have the examples of the species we possess, whether these be new or old, housed in such a way that they can live long, and live happily, and live under conditions in which their natural habits, instincts, movements, and routine of life can be studied by the naturalist and enjoyed by the lover of animals.

Slowly the new conditions are creeping in, most slowly in the older institutions hampered by lack of space, cumbered with old and costly buildings, oppressed by the habits of long years and the traditions established by men who none the less are justly famous in the history of zoological science. Space, open air, scrupulous attention to hygiene and diet, the provision of some attempt at natural environment are receiving attention that they have never received before. You will see the signs of the change in Washington and New York, in London and Berlin, in Antwerp and Rotterdam, and in all the Gardens of Germany. It was begun simultaneously, or at least independently, in many places, and under the inspiration of many men. It is, I think, part of a general process in which civilised man is replacing the old hard curiosity about nature by an attempt

at sympathetic comprehension. We no longer think of ourselves as alien from the rest of nature, using our lordship over it for our own advantage; we recognise ourselves as part of nature, and by acknowledging our kinship we are on the surest road to an intelligent mastery. But I must mention one name, that of Carl Hagenbeck, of Hamburg, to be held in high honour by all zoologists and naturalists, although he was not the pioneer, for the open-air treatment and rational display of wild animals in captivity were being begun in many parts of the world while the Thier-Park at Stellingen was still a suburban waste. He has brought a reckless enthusiasm, a vast practical knowledge and a sympathetic imagination to bear on the treatment of living animals, and it would be equally ungenerous and foolish to fail to recognise the widespread and beneficent influence of his example.

However we improve the older menageries, and however numerous and well-arranged the new menageries may be, they must always fall short of the conditions of nature, and here I find another reason for the making of zoological sanctuaries throughout the world. If these be devised for the preservation of animals, not merely for the recuperation of game, if they be kept sacred from gun or rifle, they will become the real Zoological Gardens of the future, in which our children and our children's children will have the opportunity of studying wild animals under natural conditions. I myself have so great a belief in the capacity of wild animals for learning to have confidence in man, or rather for losing the fear of him that they have been forced to acquire, that I think that man, innocent of the intent to kill, will be able to penetrate fearlessly into the sanctuaries, with camera and note-book and field-glass. In any event, all that the guardians of the future will have to do will be to reverse the conditions of our existing menageries, and to provide secure enclosures for the visitors instead of for the animals.

I must end as I began this Address by pleading the urgency of the questions I have been submitting to you as an excuse for diverting your attention to a branch of zoology which is alien from the ordinary avocations of most zoologists, but which none the less is entitled to their fullest support. Again let me say to you that I do not wish to appeal to sentiment; I am of the old school, and, believing that animals are subject and inferior to man, I set no limits to human usufruct of the animal kingdom. But we are zoologists here, and zoology is the science of the living thing. We must use all avenues to knowledge of life, studying the range of form in systematic museums, form itself in laboratories, and the living animal in sanctuaries and menageries. And we must keep all avenues to knowledge open for our successors, as we cannot guess what questions they may have to put to nature.

## NOTICES OF NEW BOOKS.

*The Teratology of Fishes.* By JAMES F. GEMMILL, M.A., M.D., &c. Glasgow: James Maclehose & Sons.

WE are told in the Introduction that the primary object of this publication is to "throw light on the structural aspect of the major abnormalities occurring in fishes, particularly in the trout and salmon," and few will deny that "the study of monstrosities among fishes merits a distinct and important place in the biological field."

Among monstrosities some may be described as "spontaneous or autogenetic." Malformations are also capable of being produced by environmental factors acting during the course of development. Those arising in this manner "may be termed acquired, and there is no evidence that they are transmissible," and Dr. Gemmill considers it quite possible that "for some types the instances of *acquired* may outnumber those of *autogenetic* abnormality." These two groups tend to coincide with one another, but in any case "*the fact that a particular abnormality appears spontaneously is an argument for, and not against, the probability that the same abnormality can be artificially produced. The converse proposition carries with it an even stronger degree of likelihood.*"

The Introduction is followed by a bibliography—"Literature relating to the Teratology of Fishes"—which contains two hundred and seventy-six references, and its compiler modestly hopes "that the lists may not show greater defects than are pardonable in a first bibliography on a wide and scattered subject." This catalogue will receive a warm welcome by students, and we are glad to see that the pages of 'The Zoologist' have contributed a small item in the bibliography. We may hope in the future that our Journal may provide more material for these records.

The bulk of the volume is of a more technical nature, and will well repay the study of the biologist and evolutionary scholar. It is excellently illustrated, has a good index, and we are glad to read that the "Trustees of the Carnegie Bequest" have made possible the publication of the work in its present form.

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*The Marine Mammals in the Anatomical Museum of the University of Edinburgh.* By Sir WM. TURNER, K.C.B., D.C.L., &c. Macmillan & Co., Lim.

WE read in the Preface to this well-illustrated and descriptive Catalogue that, so far as these mammals are considered, the Anatomical Museum of Edinburgh, in the number and variety of species, ranks after the British Museum and the Museum of the Royal College of Surgeons, and is believed to be third in the United Kingdom in the number of specimens of Cetacea and Pinnipedia which it contains. But in species of Cetacea frequenting Scottish waters it is larger and more complete than either of those two important collections.

The Introduction contains a full account of the conditions under which bones of prehistoric Whales have been found on the east and west coasts of Scotland, some of these remains belonging to Whales of great dimensions. In the classification Sir Wm. Flower's Catalogue of the Specimens in the British Museum, 1885, has been taken as the Guide, with the principal exception of cataloguing all the Baleen Whales in a single family—*Balænidæ*, which are by Sir Wm. Turner divided into two families, *Balænidæ* and *Balænopteridæ*. The illustrations are full and ample, and have been again made possible by a financial grant of the Executive Committee of the Carnegie Trust.

This book is more than an ordinary Museum Catalogue, and is of great anatomical value.

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*British Plant-galls ; a Classified Textbook of Cecidology.* By  
E. W. SWANTON. Methuen & Co., Lim.

THIS volume describes the galls arising in plant-tissues through the presence of parasitic insects, &c., and fungi, and of which the well-known "oak-apple" is a good example. As the author clearly states: "A plant-gall may be defined as abnormal growth induced by the irritation of an animal or fungus parasite," but "to term the parasite a 'gall-maker,' as many writers have done, is to convey an utterly erroneous idea of its function. It makes nothing, but induces much." The biological chapters are clearly informative, and are supplemented by coloured illustrations—both botanical and entomological—which will be valued by those students of entomology and botany who seek economic knowledge. A classified and descriptive catalogue of British galls brings the subject well up to date, and the bibliography is practically complete, so far as the English language is concerned.

Of the Rhyncotal family *Tingididæ*, Mr. Swanton only refers to two species of the genus *Copium*, which "deform the flowers of *Teucrium chamædrys* and *T. montanum* on the Continent, but I am not aware of their occurrence in Britain." In 'The Zoologist' (1910, p. 395) another Tingid (*Stephanitis rhododendri*) was figured and described as infesting rhododendrons at Fulham, and since then reports have been received of its undesirable presence on rhododendrons in other parts of the country.

The author, Mr. Swanton, is Curator of the Educational Museum at Haslemere, and Sir Jonathan Hutchinson, who is practically the mainstay of that excellent institution, contributes an introduction to the volume.

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*The Humble-bee ; its Life-history and how to Domesticate it, with Descriptions of all the British Species of Bombus and Psithyrus.* By F. W. L. SLADEN. Macmillan & Co., Lim.

THIS is a very welcome contribution to our books on British entomology, and is outside the field of compilation, though happily not exclusive of the work of our best authorities. Seven-

teen species of *Bombus* are well described and figured; these include the reinstatement as species of *B. lucorum*, *B. ruderatus*, and *B. distinguendus*, previously recognized as distinct by Smith, but not by some later authorities. Of the parasitic genus *Psithyrus*, which is not only inimical to, but also so superficially resembles *Bombus*, six species are enumerated. The coloured figures of the species comprised in these genera have reached the highest point in artistic realization and technical adequacy. The chapter devoted to the "Domestication of the Humble-bee" is thoroughly practical, and the result of the writer's personal experience.

Under "Anecdotes and Notes," Mr. Sladen has described some interesting observations, the result of a method which in ornithology is known as "bird watching," and which in modern entomology has reached its highest development in the writings of Fabre, Wheeler, McCook, Forel, the Peckhams, and other patient and skilled observers. The book also contains some good advice on the subject of "making a collection."

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## EDITORIAL GLEANINGS.

WE are indebted to the 'Fishing Gazette' of October 12th for these interesting extracts from the 'Scotsman':—

TECHNICAL TERMS FOR AN "ASSEMBLY" OF BIRDS.—"I have compiled the following list of technical terms, each applicable to an assembly of a particular species of birds, and should be glad to obtain additions:—A covey of grouse and a pack of grouse; a nid of pheasants; a bevy of quail; a herd of swans; a skein of geese (when on wing); a gaggle of geese (when on water); a team of wild ducks (when flying); a paddling of wild ducks (when on water); a lord of mallards; a company of widgeon; a rush of dunbirds; a spring of teal; a bunch of teal; a dopping of sheldrakes; a covert of coots; a herd of curlews; a sedge of herons; a congregation of plovers; a desert of lapwings; a walk of snipes; a whisp of snipes; a fling of oxbirds; a hill of ruffs; a muster of peacocks; a flight of doves; a building of rooks; a herd of cranes. The last three I have taken from the following passage in Washington Irving:—'There appeared to be an unusual number of peacocks about the place, and I was making some remarks upon what I termed a flock of them, that were basking under a sunny wall, when I was gently corrected in my phraseology by Master Simon, who told me that, according to the most ancient and approved treatise on hunting, I should say a muster of peacocks. "In the same way," added he, with a slight air of pedantry, "we say a flight of doves, a bevy of quails, a herd of cranes, or a building of rooks."'—A. B., in 'Scotsman,' Sept. 14th, 1912."

"SIR,—In your to-day's "Nature Notes," A. B. states that he would be glad to obtain additions to his list of technical terms for an 'assembly' of birds. Here are a few:—A bevy of quail, a cast of hawks, a trip of dottrel, a wisp of snipe, a flight of doves or swallows, a plump of wild-fowl, a watch of nightingales, a clattering of choughs. Should not, may I ask your correspondent, a sedge of herons be a siege, a congregation of plovers a stand, and a nid of pheasants a nide? As I am writing, may I be permitted to add a few technical terms in regard to animals—namely, a skulk of foxes, a sounder of hogs (wild boars), a troop of monkeys, a pride of lions, a sleuth of bears, and a gang of elk.—I am, &c., CHARLES E. ROCHE, 71, Leamington Terrace, Edinburgh ('Scotsman,' Sept. 16th, 1912)."



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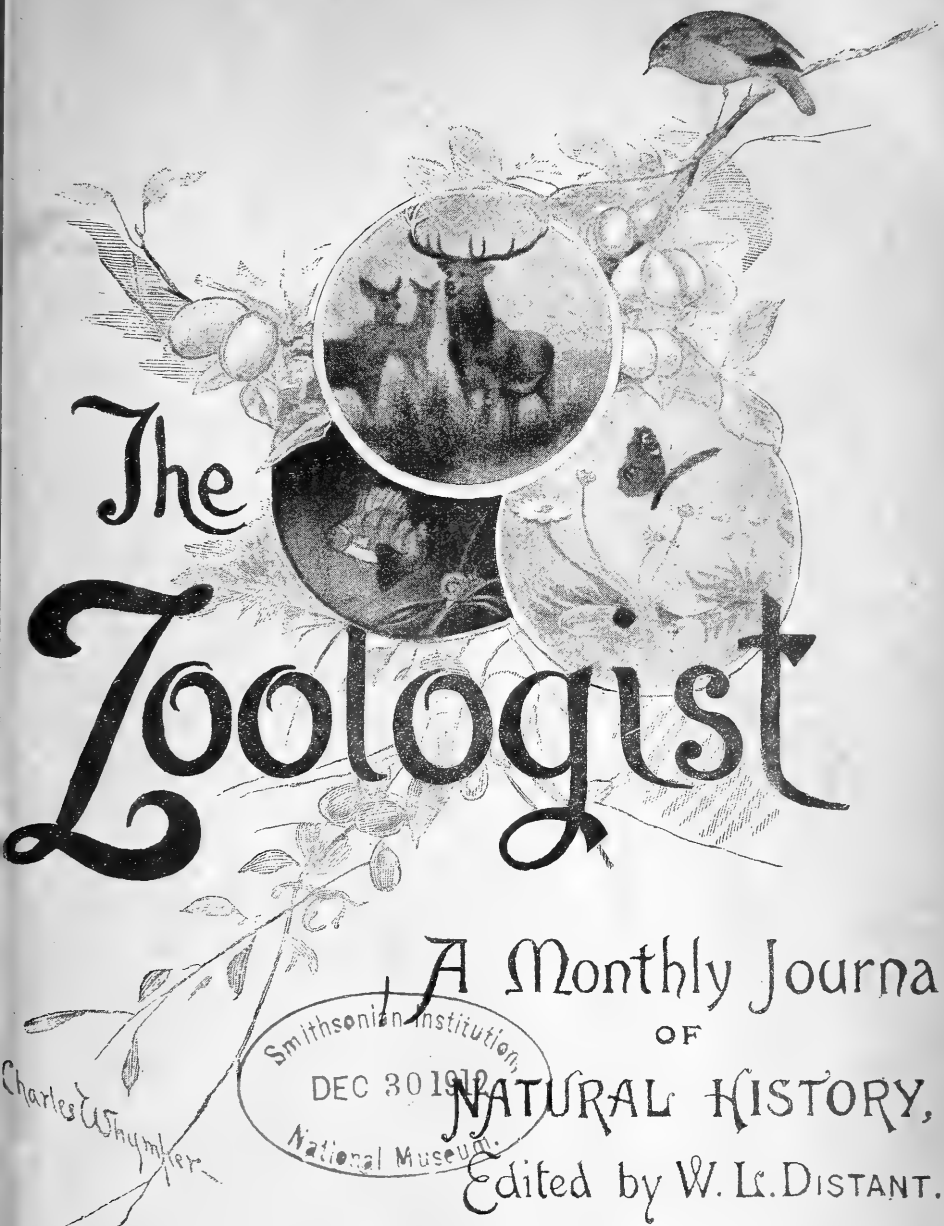
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# THE ZOOLOGIST

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No. 858.—December 15th, 1912.

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## A CONTRIBUTION TOWARDS A SOLUTION OF THE PROBLEM OF MIGRATION.

BY F. J. STUBBS.

IN the following paper an attempt has been made to group together a number of well-ascertained facts with a view to the solution of the ancient problem of migration; but the present essay is merely a preliminary one, for the subject is too vast to be treated adequately here and now. Although the question is very simple, the necessity of explaining a number of separate details gives it a superficial aspect of complexity; yet I think the majority of readers will be able to see the drift of my reasoning before they have covered many paragraphs.

Thanks to the pertinacious labours of an army of workers we are to-day in possession of a mass of accurate observations more than sufficient for the present purpose. The result, to my mind, becomes more than a theory, and this array of facts appears to be governed by a law which, provisionally, may be given briefly as follows:—*The present balance of life on the earth is made possible by the existence of a mobile mass of animal life flowing twice yearly from hemisphere to hemisphere*; and I hope to show that migration, instead of being merely a question for ornithologists, is really a tremendous cosmical function of the utmost importance.

The present discussion confines itself to facts that are the commonplaces of science. There is no necessity to turn for support to matter that is not accepted without question by *all*

naturalists. Indeed, some apology must be made for the inclusion of fragments of the merest elements of science; but I think the best plan is to pass rapidly over this side of the subject, and not run even the very slight risk attached to the step of leaving it altogether to the intelligence of the reader.

Immaterial exceptions, such as plant-eating fungi, animals possessing chlorophyll, &c., have been carefully considered, and will not be referred to again. I do not know of any biological fact that serves as an obstacle in the way of the acceptance of the theory.

Animals live entirely upon plants. There is no exception to this great law, but often it happens that the dependence is indirect, as when a man feeds on the flesh of an herbivorous animal. Sometimes the nourishment passes through a long series of animal forms, but in every case it can be demonstrated that every atom of it comes from the plant, and never from inorganic matters, with the exception of water.

Plants are not to so great an extent dependent upon animals. Their food is inorganic, and most of it is derived from the air. It is a popular error to hold that a plant invariably takes its food mainly from the soil. Very little beyond water is drawn through the roots, and the bulk of the plant is built up from the air breathed in through the leaves. The constituent used is the carbon dioxide ( $\text{CO}_2$ ) present in the atmosphere in the proportion of about .04 per cent. This is extracted from the air, and the plant returns to the atmosphere the oxygen which is a waste product of growing vegetation. The animal, of course, breathes *in* oxygen and breathes *out* carbon dioxide, and in this way each lives on the waste product of the other. Although carbon dioxide may be evolved by volcanoes, or by certain saprophytic plants, or in other ways, the green plant is practically dependent upon animals for the bulk of its nourishment.

Animals, therefore, can only live in direct association with plants. The latter organisms are not, however, bound down to the neighbourhood of animals, for the carbon is carried to them by atmospheric currents; but soil (except in the case of aquatic plants), water, and sunlight are also necessary for the growth of plants. The last is extremely important, and a knowledge of this fact is the very heart and foundation of a knowledge of

migration. Plants can use the carbon dioxide in the air only in the presence of sunlight. Perhaps it would be better to state now that all energy comes from the sun; in the presence of carbon dioxide plants can and do fix this energy, and turn it into living protoplasm, and this energy is passed on to the animal, and by it converted into heat and motion. Those who have not followed the progress of biology are apt to look upon the above as a species of unscientific mysticism, but indeed it is the groundwork of biology, and has long since ceased to be matter for speculation.

A remarkable point about the carbon dioxide of the atmosphere is that it remains constant in its proportion to the rest of the air. Roughly speaking, there are four parts by volume to ten thousand parts of air, but this actually varies from '037 to '062 per cent.—a variation of about '04 per cent. For our present purposes we can state that the amount of carbon present in the atmosphere remains invariable, although animals are ceaselessly adding to it, and plants are removing it. This suggests that the ratio between plant life and animal life remains rigidly constant from month to month and year to year. What this ratio may be I cannot say, but from a long study of balanced aquaria I should assume that by weight the vegetation of the earth is at the very least several hundred times greater than the animal life.

The plant needs no power of locomotion, for, rooted in the soil, water, air, and sunlight will flow to it and provide it with food. A little thought shows that, as the food of the animal is many times greater in size, locomotion becomes the first essential to the growing animal. At the least it must move about the mass of its pabulum, and this power of movement has been developed to a high degree. The typical animal may be described as a plant-eating mouth and stomach provided with locomotive powers, and its movements are due to the potential energy from the sun gathered and stored in the tissues of the plant.

Three things are essential for plant life—soil, water, and sunlight. Under certain conditions the first may be dispensed with, but the other two never. When all three conditions are present, plants flourish. Latitude has little to do with the question of vegetation, and the countries within the Arctic Circle are often

covered in summer with a luxuriant growth of plants. Some districts, as the interior of Greenland, are plantless, and, of course, tropical deserts may be equally unvegetated. But the great extent of the *tundren* around the North Pole supports, in summer only, a wealth of greenery.

These Arctic plants die down at the approach of winter, for the clear reason that life would be impossible, owing to the absence of sunlight. We can perhaps, for the sake of simplicity, dismiss the soil and the water as factors of plant growth, and confine ourselves for the moment to the third ever-present factor, *solar energy* or sunlight. The amount of the plant life of any area thus depends upon the amount of sunlight poured upon this area. At the Equator, with a regular day of twelve hours' sunlight, the amount remains constant throughout the year, but in temperate and Polar regions the amount varies with the seasons. In Britain, with eight hours of sunlight in winter and sixteen in summer, the difference in vegetation is very marked. Within the Arctic Circle, with utter darkness for one-half the year and constant daylight for the other half, the conditions are still more different. In winter the water is congealed as ice, and the land is in darkness and buried beneath a cloak of snow. In summer the returning sun releases the water, removes the covering of snow, and pours down on the awakening plants a flood of energy. The necessary carbon dioxide is present, as everywhere, in the atmosphere, and the result is the amassing of huge stores of potential energy.

The plants thus share the carbon of the air with the plants of other lands, but if the balance of life is to be kept constant, they must indirectly return their share to the atmosphere. This, of course, can only take place by the medium of animal life. Perhaps this is sufficiently clear, without being further elaborated, and I would like to discuss now a very delicate corner of the subject. It is obvious that, as all plants share equally in the carbon dioxide of the atmosphere and equally add the animal requirement of oxygen to the atmosphere, the balance of life can only be maintained by all vegetation being accessible to animals. The sun (and I beg leave to use here a handy freedom of terms) moves slowly towards the North Pole from the South Pole, but the plants cannot follow it. The



alternative is to die down at its departure, and arise again at its advent. The animal has *two alternatives*—it can follow the sun, or it can die down with the plant: migration and hybernation, in fact.

If we could look upon the Polar Region as an area of life separated from the rest of the world, as a sort of "garden enclosed" containing its just proportion of plant and animal life, and sharing its oxygen and carbon with all terrestrial life, hybernation would be quite sufficient. Plants and animals alike would die down each year, as is, indeed, the case with all the vegetation, and with the entire invertebrate fauna of the district. Migration would thus be unnecessary. It happens, however, that there is no dividing line between the Tropics and the Polar Regions. Theoretically, assuming that there were no migration, and that the balance of life were maintained by hybernation alone, we should require a perfectly regular grading of animal sleep—within the Tropics none at all, at the Poles six months, and every intervening spot from a single day right up to the full Polar limit. I confess that I cannot quite see exactly *why hybernation* should be the exception, and *migration* the rule. Undoubtedly it has something to do with the essentially locomotive powers of animals, and perhaps, too, with the vicissitudes of such continents as Greenland or the Antarctic Regions. This is more a question for the student of the *evolution* of migration, a subject that is quite beside the present paper.\* It should suffice to repeat that the present terrestrial biological status is possible only by the existence of either a *hybernating* mass of animal life, or a *migrant* mass of animal life; and it happens that for some reason the method of migration and not that of hybernation predominates to-day.

Viewed in this light, the phenomenon of bird migration, instead of being the esoteric study of the ornithologist, becomes part of a biological law of the utmost importance and magnitude. When we consider this yearly ebb and flow backwards and forwards across the Equator of millions of tons of highly

\* One feels privileged to speculate on the effects of a lessening of the inclination of the earth's axis—this would be followed by the extinction of the *migrants* (or rather *co-migrants*): the birds of to-day, the fishes or flying reptiles of other ages.

organized flesh and blood, and appreciate the indubitable fact that, if it ceased, the whole equilibrium of life would be immediately upset, we are justified in viewing migration as being, after the fact of life itself, the grandest phenomenon of biology.

The present condition of the Antarctic Regions, and the comparatively small area of land within the southern temperate zone, act in disturbing the balance of the annual flow of birds. The data are not available for any safe conclusions on the marine algæ of the southern oceans, and on the migrations of fish and piscivorous birds; but it seems only reasonable to expect that beyond the Equator fishes play a large part in maintaining the equilibrium of life. Towards the north, bird migration oscillates across a line that is considerably nearer the Pole than the Equator, and a great number of species never reach the Tropical Zone, even in winter.

The fact seems to be well established that those birds which reach the most northerly parts in summer migrate farthest south in winter. As a rule, they are remarkable for an apparatus of flight far beyond the ordinarily observed needs of life; and it is very curious that so little attention has been paid to this matter. A Grey Plover, for example, is so powerful a flier that I cannot imagine one being taken by a bird of prey except by chance; and there are many circumstances, unnecessary to mention here, suggesting that the powerful wings of wading birds are not primarily intended for purposes of defence. Certainly they seem out of all proportion to the feeding requirements of the birds, and we can only look upon them as being essentially the organs of migration, and, in a way, merely *secondary* as organs of flight—a paradoxical statement that is yet worth serious attention. Viewed in this way, such long wings enable the bird to overcome the barrier of *distance* protecting the Arctic animals, and are thus analogous to the beak of the Curlew or the eyes of the Owls as specialized feeding organs.

Most wading birds are great migrants, or, rather, it should be put the other way about in saying that many migrants are wading birds. In a general sense a wader is a bird specialized for an existence in non-arboreal marshes. We know that the land around the North Pole, and many other parts of the higher latitudes of the Palæartic Region, are, in summer, typical

marshes, and therefore more or less closed to birds adapted to woods, thickets, or dry fields. They are, however, suited to the needs of *waders*, and these are the dominant summer birds. But later in the year, when emigration takes place, the structures that fitted the waders for a life in the Arctic marshes prevent them spending the winter in places other than those bearing at least a superficial resemblance to the summer home. For the rest of the year they become "shore birds"; and we must look upon the generalized and most advanced form of migrant as birds passing the summer near the Pole, and with a winter range that is nothing more than the slender tracery of the littoral zones of the remainder of the entire globe.

With "land" birds matters are rather different, and the generalizations are unavoidably broad. So many migrants are insectivores that we may well take all these as forming a type species. In England, in winter, food is lacking. In Africa, on the contrary, the "wet season" has been accompanied by an increase in insects, and the birds pass south to utilize this food; and, incidentally, prevent undue increase on the part of the plant pests, with the possible destruction of the vegetation. With the return of summer England becomes again a fit manufactory of protoplasm. The trees and plants break into leaf. Insects appear and increase, and threaten the very existence of the plants; and, at the most critical season, a vast tide of birds flows north to devour the insects and so preserve the vegetation.

Here, in winter, the poverty of solar energy means a dearth of foliage, and a consequent lack of food for the insects. These animals come to a standstill during the cold season. In the Tropics the conditions are not quite the same. It must be remembered that water is as essential as sunlight to the growing plant, and a dry desert is thus as barren as an Arctic winter continent. But in many parts of the Tropics the year is divided into two seasons, a wet and a dry. The former corresponds to the northern summer in being a period of exuberant growth. This is the breeding time of many birds and other animals, and we know that beyond the needs of the sedentary organisms, there is a surplus sufficient to support the migrants that have passed south to avoid the northern winter. In those parts of

the Tropics that are not so much under the influence of seasonal rains the year *must be* (as a logical outcome of our knowledge of biology) divided into a period of insect abundance and impoverished plants, and another of freedom from insects and large opportunities of storing potential energy. The first would thus correspond to the Arctic summer and the wet season of the Tropics.

Leaving out of account the conditions obtaining in the sea (and possibly aerial migration is exceeded by the passage of marine animals), and looking upon the soil of the entire globe as being equally fitted to support plants, we shall find that the areas of what may be termed the greatest biogenetic intensity are precisely those best provided with water and with sunlight. Over these areas plants are most abundant, and here we expect to see the greatest bulk of animal life. But these very biological *optima* are constantly changing, owing to the disappearance or shrinking of one or both of the two essentials, light and water: the freezing of water, of course, removes it at once from the service of plants. The vegetation, being primarily a stationary form of life, ceases to collect and fix the solar energy, and comes to rest after storing a sufficient reservoir for the following season in the shape of seeds or in the form of starch.

The animal life has two alternatives, hybernation, or migration to the opposite biogenetic pole; and, as we know, migration is the course usually adopted. The *general* trend of the movement is from north to south, in the path of the summer; but there is no theoretical reason why the course of migration should not take the form of a series of radii in all directions from a circumscribed area rendered biologically non-supporting by the disappearance of water. It is, however, more than doubtful if these local migrations could have any real connection with the vast currents of the typical migrants that sweep to and fro each spring and autumn with all the precision and much of the magnificence of one of the heavenly bodies.

Seebohm noticed that birds migrated in spring to the *lightest* parts of their ranges, and he was thus led to suggest that the longer northern summer day, as contrasted with the twelve hours of the tropical day, gave the migrants more time in which to seek food and rear their young. Other writers have

been attracted by this aspect of migration, but I cannot read that any one of them ever considered the formidable obstacle provided by the Nightjar. A simpler and sounder explanation is that migration is caused by nothing more nor less than a lack of food, but this was, to my mind, hardly a solution. It fails in omitting to take into consideration the question of carbon dioxide, and it omits entirely to show that instead of being a mere question of ornithology, migration is really a far-reaching cosmical function that is intimately connected with every single atom of life, plant or animal, on the face of the globe.

A far more popular explanation of the phenomenon of migration is that the birds were crowded out from the Arctic Regions by the growth of the ice-cap, and that a species of nostalgia carries them back to the old home each spring. The actual observations in support of this theory are, I submit, non-existent. It appears to me that in order to obtain the maximum amount of life on the globe annual migration must always be, and has always been, in operation. An inherent *nostalgia* (acting under the influence of *two* homes) is, of course, as essential in a migrant as the power of flight itself. It would be as logical to say that the bird returns each year to the north because it has wings! Really this "Polar Origin" theory, which has as complement the assumption (quite unsupported by palæontological evidence) that the Arctic Regions are the cradle of the class *Aves*, is too palpably opposed to the present one to need more than the briefest mention now.

Again I would say that this essay is merely a preliminary sketch of a very extensive subject. While being quite alive to the possibility of the existence of a fatal flaw in my reasoning, I can state that I have not detected it up to the present; and I should be intensely interested in any fact, or series of facts, that proves me to be in error. It is almost unnecessary to add that the existence of perfectly sedentary birds or fishes is no obstacle. Theoretically, there need be no migration of land birds in some Tropical islands.

## THE PHARYNGEAL TEETH OF FISHES.

BY COLONEL C. E. SHEPHERD (Indian Army).

(Continued from p. 209.)

THE *Sciænidae* are provided with strong pharyngeal teeth; those of *Sciæna aquila* have been alluded to in the opening article of this series.\* The illustration given in Günther's 'The Study of Fishes' shows the formidable array possessed by *Pogonias chromis*. Others will now be dealt with in more detail.

## SCIÆNA AMAZONICA.†

This fish has eighteen horny gill-rakers on the first ceratohypobranchial arch, the last seven of which are small to rudimentary; they all carry teeth. The longest one at the angle is about the length of the gill lamina below it. There are seven on the first epibranchial, also toothed, of which two are rudimentary. The second, third, and fourth arches have a number of tubercle gill-rakers, all bearing a cluster of cardiform teeth. The upper pharyngeals consist of an elongated patch of small cardiform teeth at the head of the second epibranchial, and a smaller patch of similar teeth on the arm of the third epibranchial. The heads of the third and fourth epibranchial each carry two bones, the upper one with large cardiform teeth, the lower with similar but slightly smaller teeth; this bone also stands well away at its lower extremity from the lining membrane of the mouth. The lower pharyngeals form a broad V on the floor of the mouth with small cardiform teeth, except that along the margins where the fifth branchial arches meet and at the margin next the œsophagus there is a row of strong cardiform teeth.

## CORVINA NIGRA.‡ Fig. I.

In this fish nine horny gill-rakers are found in the first ceratohypobranchial and seven on the first epibranchial arch.

\* 'Zoologist,' 1910, p. 418.

† From British Guiana and South America.

‡ From the Mediterranean.

All these are toothed ; they stand on the outer edge of the arch. Along the inner edge of the first arch and on both sides of the next three arches the gill-rakers are tubercles which are toothed ; the tubercles alternate with each other, but are so placed as to leave clear spaces between them for the outflow of water to the gills. The upper pharyngeal teeth are in three portions on each side ; the upper portion is a long narrow slip consisting of pointed

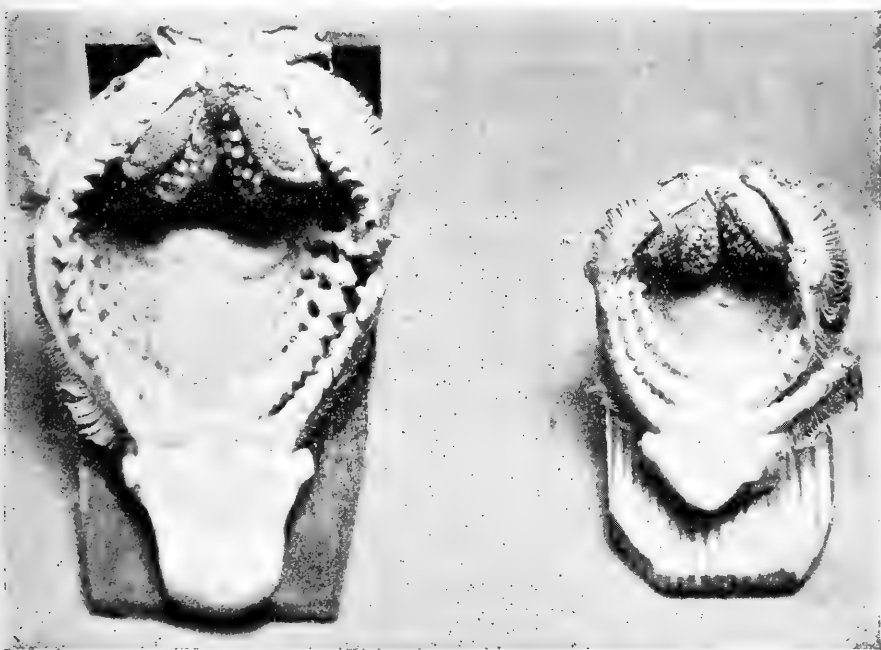


FIG. I.—CORVINA NIGRA.

FIG. II.—UMBRINA CIRRHOSA.

teeth along the inner upper edge, with less developed teeth of the same kind interspersed over the rest of the slip. The whole is surrounded with soft mucous membrane. Below the upper slip and on the inner side of it is a patch of granular teeth, not very close together but distinct and strong. Below these again are two patches with pointed teeth showing through, but which are very much embedded in the mucous membrane. The granular upper pharyngeal teeth show clearly in the illustration. The lower pharyngeal teeth are like the granular looking

teeth of the upper. This dentition could cope well with crustaceans and even some molluscs.

UMBRINA CIRRHOSA.\* Fig. II.

There are nine gill-rakers from the angle of the first branchial arch forward that bear teeth, and five on the epibranchial, but two of these gill-rakers in each set are rudimentary. The first arch on its inner side, and the second, third, and fourth arches on both sides have tubercle gill-rakers; all of them carry teeth. The tubercles between the first and second arches interlace closely between the others; they have larger openings. The upper extremity of the second epibranchial carries a long narrow set of villiform teeth, quite palpable to the touch; below these and on the inner side of the middle patch are some sharp conical teeth placed round the edges, with some prominent, almost granular, teeth in the centre of the patch. The lowest section of these upper pharyngeal teeth has sharp upstanding teeth. The lower pharyngeal teeth are granular-shaped ones, fairly thickly studded over the surface of the lower pharyngeal bones. The pharyngeal teeth show distinctly in the illustration.

ANCYLODON JACULIDENS.†

Has ten long, horny gill-rakers on the first cerato-hypobranchial; these all bear teeth, with two on the first epibranchial. The gill-raker at the angle is as long as the gill lamina below it. The other arches are but feebly provided with gill-rakers, having only a few tubercles on their upper margins. There is a small patch of upper pharyngeal teeth on the second epibranchial. On the third epibranchial there is a small patch of prominent teeth on the arm of this arch, and at the head of the arm a patch of strong cardiform teeth. At the head of the fourth epibranchial there is a patch of cardiform teeth, but smaller ones than those last mentioned as on the third epibranchial. The lower pharyngeal teeth are likewise cardiform, with a row of extra strong ones along the inner margin of the set.

\* From the Mediterranean.

† From British Guiana.



## NEBRIS MICROPS.\* The Butterfish.

Has fourteen long, horny gill-rakers, which are toothed; on the first cerato-hypobranchial the longest is a trifle longer than the gill lamina below it. There are eight gill-rakers on the first epibranchial. The other arches have short gill-rakers on each side, the whole forming a good filter apparatus. The upper pharyngeal teeth are in three sections of cardiform teeth; a small one on the head of the second epibranchial, one on the head of the third epibranchial of strong cardiform teeth, and one on the head of the fourth epibranchial of smaller cardiform teeth. The lower pharyngeals are in two long portions of cardiform teeth, with very strong ones along the inner margins.

## TRIGLIDÆ.

## TRIGLA GURNARDUS. The Gurnard.

Has nine upstanding, horny, thick gill-rakers that terminate in a knob studded with teeth. The longest is about the same length as the gill lamina below it; there are also two flat tubercles with teeth. All these are on the first cerato-hypobranchial. On its epibranchial there are two upstanding gill-rakers, knob terminated, and two flat tubercle gill-rakers. The inside of the first arch and both sides of the other arches have very prominent tubercle gill-rakers that fit in from alternate positions on opposite sides, making a close filter; they bear villiform teeth. The upper pharyngeal teeth are set on an elongated plate on the second epibranchial, a broad shield on the third epibranchial, and a smaller patch on the fourth epibranchial; these are thickly studded with minute cardiform teeth. The lower pharyngeal teeth are on two rhomboidal plates of comparatively large size covered with villiform teeth. This fish feeds on molluscs, crustaceans, and small fishes.

## TRIGLA LYRA. The Piper. Fig. III., a.

Has seven horny, upstanding gill-rakers along the first cerato-hypobranchial, with minute teeth on the inside; they then subside into tubercles, which are also toothed. The inner side of the first, both sides of the second and third, and the

\* From British Guiana.

outer side of the fourth arches all carry short fat tubercles, which have a rough surface. The upper pharyngeal teeth, which are villiform, show as a roughly circular patch in the lowest portion, with two concentric patches in the upper portion. The two plates bearing the lower pharyngeal teeth, also villiform, are so much rounded at the anterior end that they can hardly be called of a triangular shape. The tubercles of the branchial arches, whilst fitting alternately, yet have a small oblong opening for the passage of water to the gills; this shows clearly in the illustration. The food of this fish consists of crustaceans, molluscs, echinoderms, and seaworms.

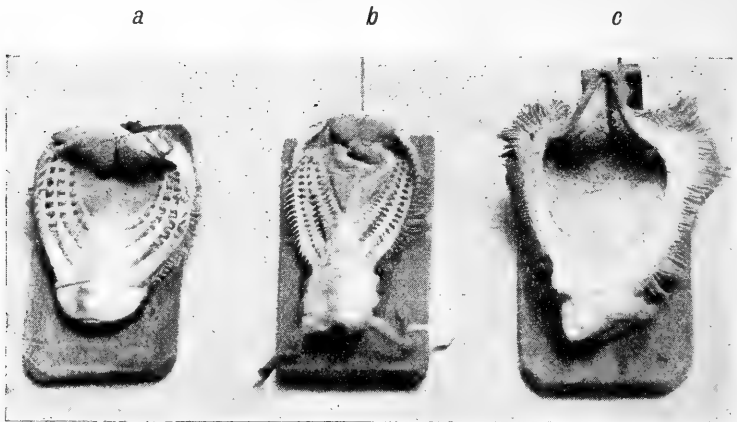


FIG. III.—*a.* TRIGLA LYRA.      *b.* PERISTEDION CATAPHRACTUM.  
*c.* DACTYLOPTERUS VOLITANS.

PERISTEDION CATAPHRACTUM. The Armed Gurnard (Couch).

Fig. III., *b.*

Has twenty horny, upstanding gill-rakers from the angle of the first branchial arch to the end of the hypobranchial, the third one being the longest. There are five on the epibranchial. The other arches carry long narrow tubercles, which fit into each other alternately, so that when the branchial arches are closed together a very perfect filter is formed. The upper pharyngeal teeth, which are villiform, show as a roughly circular patch on each side, with a narrow circular patch above. The lower pharyngeal teeth, also villiform, show as two elongated

triangles, with the narrow apex at the forward end and the base, which is nearly right angled, at the œsophagus end.

## DACTYLOPTERIDÆ.

DACTYLOPTERUS VOLITANS. The Flying Gurnard. Fig. III., c.

Has eight flat tubercles for gill-rakers along the cerato-hypobranchial of the first arch, with two on the epibranchial. These are all smooth to the touch. The other arches are furnished, as is the inner side of the first arch, with alternating tubercles, which yet leave a small opening between them for the passage of water. The upper pharyngeal teeth are in two rows of distinctly conical teeth in the upper patch, and also similar teeth at the lower portion of a circular pad of teeth; between these sets of conical teeth are villiform teeth. The lower pharyngeal teeth are villiform.

## SCOMBRIDÆ.

SCOMBER SCOMBRUS. The Mackerel.

This fish has twenty-eight very long, horny gill-rakers on the first cerato-hypobranchial arch; the longest one is at the angle of the arch, and is about one and a half times the depth of the gill lamina below it. The gill-rakers diminish in size as they approach the tongue, but keep fairly long all the way. There are thirteen on the first epibranchial. All these gill-rakers, although smooth to the touch, have a fringe of small hair-like bristles along the inner face, making each one look like a miniature spoke-cleaning brush. When looked at collectively with a magnifying-glass the whole gives the appearance of a closely-set hair-brush. The gill-rakers on the other arches are short, but covered with the hair-like bristles, the whole forming such a filtering apparatus as to entangle the smallest organisms. The upper pharyngeal teeth are on a thin elongated strip on the second epibranchial, and a long and fairly broad patch on the third and fourth epibranchials; both these are thickly furnished with setiform teeth. The lower pharyngeal teeth are set on two long narrow plates, and are setiform.

SARDA MEDITERRANEA. The Pelamid (Couch). Fig. IV.

The specimen examined had eleven long, horny gill-rakers on the left side of the gullet, and twelve on the right side on the first branchial arch. These gill-rakers had villiform teeth

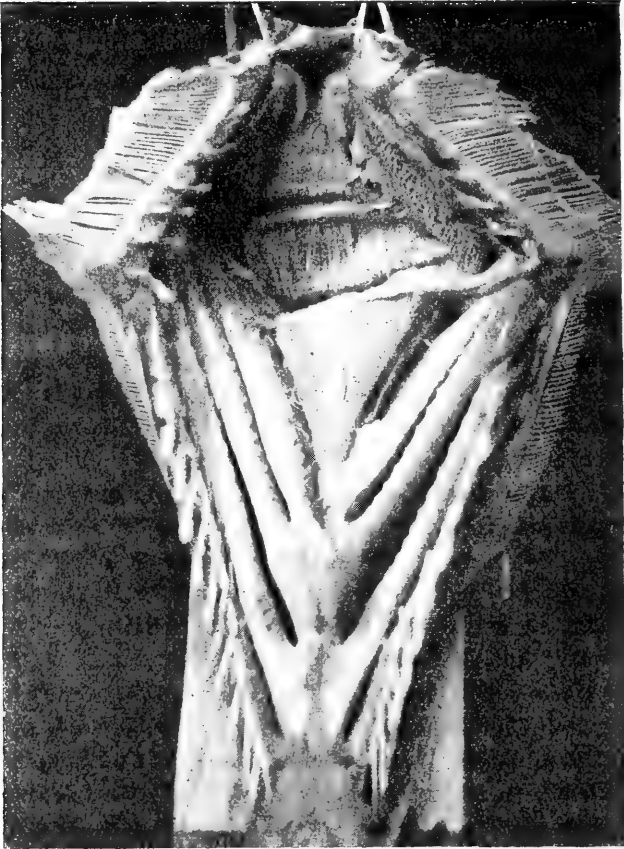


FIG. IV.—SARDA MEDITERRANEA.

on their inner faces. On the inner side of this arch are fourteen small processes like gill-rakers, also set with teeth. Along the top of the second, third, and fourth arches villiform teeth run all along, but arranged on tubercles which touch each other; on the inner side of these arches there are similar tubercles with villiform teeth, but they are spaced more distinctly apart. The

upper pharyngeal teeth show as a roughened surface of villiform teeth at the upper extremity of the second epibranchial. The third epibranchial carries a long triangular patch of cardiform teeth. The fourth epibranchial has a narrow oblong patch with a rounded base covered with cardiform teeth; the lower extremity of this does not fit close to the lining membrane of the mouth, but can stand out from it. The lower pharyngeal teeth are set in two long narrow plates. There are also in the buccal cavity two oval patches of villiform teeth where the first hypobranchial joins the base of the tongue, and two long patches of similar teeth where the second hypobranchial joins the basi-branchial bones.

## XIPHIIDÆ.

XIPHIAS GLADIUS. The Swordfish. Fig. V.

The illustration shows the gullet of a young specimen from the Mediterranean. There are no gill-rakers of any kind; the branchial arches are smooth. The upper pharyngeal teeth consist of a long narrow patch of villiform teeth on the upper part of the second epibranchial arch. The upper part of the third epibranchial has a long patch, broader at one end than at the other, of villiform teeth, with a smaller patch on the same epibranchial, but lower down. From the top of the fourth epibranchial, and hanging much below the end of the bone and standing with its lower end away from the surface of the mucous membrane of the gullet, is a long patch of villiform teeth. The illustration shows this fairly clearly. The lower pharyngeal teeth are in two long patches, which narrow slightly at their middle portion. This fish is occasionally caught off the coast of the British Isles.

## ZEIDÆ.

ZEUS FABER. The John Dory.

On the first cerato-hypobranchial arch this fish has ten short, broad, horny gill-rakers, mostly upstanding, covered at their tops with minute cardiform teeth; on the summit of the third gill-raker from the angle between twenty and thirty could be counted. The gill-raker at the angle is the largest; it is a trifle over one-half the depth of the gill lamina immediately below it. There is a very evident extra space between this gill-raker and

the one next to it; after that they are fairly evenly spaced, the spaces, however, decreasing as the size of the gill-rakers dwindle towards the end of the hypobranchial, the last two or three becoming small flat plates. The second and third branchial arches have tubercle gill-rakers on each side, those on the inner side being smaller than those on the outer; they are all covered with teeth. The inner side of the first and outer edge of the fourth arch also have toothed tubercles. The top of the second epibranchial has a small patch of cardiform teeth as part of the

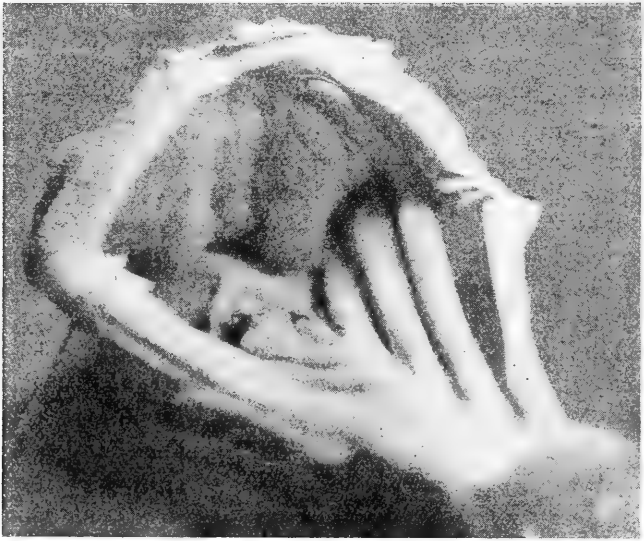


FIG. V.—XIPHIAS GLADIUS.

upper pharyngeal teeth system, and below this on the third and fourth epibranchials is a large protruding patch with strong teeth on it, forming the bulk of the upper pharyngeal teeth. There is one of these patches at each side, and the distance between the upper and lower patches is rather more than is usually found in other fishes. The lower pharyngeal teeth do not lie flat on the floor of the mouth, as in most fishes, but are tilted up, forming an angle roughly of about  $120^\circ$ , with the floor just opposite the swallow. This inclination of the lower pharyngeal teeth gives, with the upper teeth, a very powerful

disintegrating effect when at work—a kind of downward rasping action. The specimen examined had its gill-slits covered with a matted mass of foodstuff that had evidently been subjected to a triturating process, in which the pharyngeal teeth had probably borne their part.

CYTTUS AUSTRALIS. The Silver Dory (Stead).

This fish has fourteen horny gill-rakers of the first ceratohypobranchial arch, with three tubercles at the end nearest the tongue; the longest ones, the third to the ninth from the angle, are about one-half the depth of the gill lamina below them. These gill-rakers are spatulate at the top, and carry a number of small teeth, which also grow upon the three end tubercles. On the first epibranchial there are six small gill-rakers, also tooth-bearing. The other arches have short stumpy gill-rakers, each of which is toothed. At the extremity of the second arch is found a large prominent tubercle covered with teeth. A similar tubercle is found at the extremity of the third arch, but smaller. The upper pharyngeal teeth are in two sections each side, but fitting so close as to look like one prominent patch. The teeth on them are cardiform. The lower pharyngeal stand up high on the floor of the mouth, and consist of two solid patches of minute cardiform teeth.

(To be continued.)

## NOTES AND QUERIES.

## AVES.

**Supposed Occurrence of Scarlet Grosbeak (*Pyrrhula erythrina*) in Oxfordshire.**—On Jan. 31st, 1912, during a spell of hard weather, with north and east winds prevailing, Miss J. H. Blunt, of Adderbury Manor (and, from another window, three adult members of her household), watched, as it was feeding among some birds for whom food had been put out in a courtyard, a bird unknown at the time, but identified by a reference to Howard Saunders's 'Manual' as a Scarlet Grosbeak (*Pyrrhula erythrina*). A coloured sketch of the bird was prepared from memory of its appearance directly afterwards, and most kindly sent to me, and I do not think that anyone who saw this would have any doubt as to the correctness of the identification. The peculiar cap of burnished carmine is characteristic, and well represented in the sketch, and I think the bird must have been a quite adult male. Miss Blunt writes: "It looked like a jewel (ruby) in the sun, on the head and breast . . . a sort of rose-crimson—so different from the red on most other birds." It was not seen again after that day. I will only add that Mr. Harvie-Brown (who, of course, knows this bird well in life), to whom Miss Blunt wrote describing the bird seen at Adderbury, thought it was undoubtedly a Scarlet Grosbeak. This is a welcome addition to our Oxfordshire list of rare birds.—O. V. APLIN (Bloxham, Oxon).

**The Perching Habits of Starlings.**—For the main purpose of my paper in 'The Zoologist' (*ante*, p. 281), I made no distinction between sheep and cattle. Perhaps deer might be included also, for I have noticed Starlings on these animals; but I find now that I have no notes, nor any safe recollection, relating to horses. To the Jackdaw mentioned by Mr. Morris, I would add the Wagtails, which often perch on cattle. It has occurred to me that a map showing the distribution of the habit in our islands would be rather interesting, and might hold some surprises. For example, the information already available suggests that the whole of Cheshire, and perhaps the whole of Ireland, must be viewed as "non-perching" areas. I should be glad to receive notes relating to any locality, and if I get a sufficient



number I shall try to reproduce this material in the form of a map.—  
FREDK. J. STUBBS (77, High Street, London, E.).

**Starlings on Sheep's Back.**—In my note (*ante*, p. 393) there is the following misprint which is worth correcting, as it conveys a wrong impression: "They walked with *care* on the wool." For *care* read *ease*.—F. B. KIRKMAN (Letchworth).

**Starlings and Jackdaws on Sheeps' Backs.**—It is a common sight in Northumberland, and on the Borders, to see both of these birds perching upon the backs of Sheep, and less frequently on cattle, and the fact has been repeatedly remarked upon in print during the last thirty years. Occasionally, no doubt, the attraction may be parasites, but quite often it is only a conveniently raised resting place for observation, and shepherds would be glad if the birds could be induced to abandon the practice, for during hot weather the resultant droppings on the fleece attract flies, which often means sore backs—fly-blown spots—needing immediate attention, and which a careful man is constantly on the look-out for amongst his flocks.—GEORGE BOLAM.

**Spoonbills (*Platalea leucorodia*) in Suffolk.**—Possibly a few words with reference to the three Spoonbills referred to by Mr. Patterson (*ante*, p. 420) which I was fortunate enough to see in Suffolk may be of interest. It was in the evening of June 4th that I saw them; I was at the end of Easton Broad nearest the sea, when three very large white birds rose at the opposite end, and for a moment I could not think what they were. However, when I got my field-glass on them, there could be no doubt at all, and though they never came within two hundred yards, I had an excellent view. They circled about, and at last I lost sight of them. A Heron came into the range of the glasses at the same time, and the difference in flight was very conspicuous: the Heron with neck drawn back, and with a rather heavy, laboured flight, and the Spoonbills with their necks fully extended, and a flight which appeared to be as graceful and easy as a Gull's. I looked for them again, but never saw them; however, some boys who were bathing in the Broad told me they had seen them, and described them as "tall birds," one of them suggesting that they were Storks. To see a new bird for the first time is always a pleasure, and a sketch I made of one of the Spoonbills, which a friend has been good enough to reproduce as a lantern-slide for me, will be an interesting memento of the incident.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

**Migrations of Bernacle-Geese.**—From several accounts which have come to hand it is evident that there has been a movement of Bernacle Geese (*Bernicla leucopsis*) on the east coast this autumn.

*In Surrey.*—In the 'Shooting Times' of Oct. 12th, Mr. E. J. Heiden Cronan wrote that a gaggle of eight had been frequenting a flooded meadow near Dorking since Oct. 2nd. He approached within thirty yards of them on the 4th, but beyond paddling away from the edge of the water they showed no signs of alarm. Boisterous weather had been experienced there a few days previously.

*In Northumberland.*—On Oct. 15th my friend Mr. John Black wrote me from Scremerston, near Berwick-on-Tweed, that the station-master there had shot two Bernacles from a flock of eight on Oct. 14th. I received the head and wing of an immature bird. They were wonderfully tame, feeding in a stubble near the line. They had departed two days later. On Oct. 21st a notice appeared in the 'Newcastle Daily Journal' to the effect that on Oct. 17th a flock of about thirty "wild geese" flew over Canada Farm, Longframlington, near Morpeth. Five of the birds settled just in front of the farmstead, and remained there for about half an hour, allowing the farm-workers to approach within a very short distance of them. I immediately wrote to Mr. James Robson, The Manse, Longframlington, who had inserted the notice, and obtained the reply that the birds were Bernacle Geese. They had arrived from the south-east, and appeared to be making for the "Black Lough," which lies about three miles north-west of the farm. The following day (18th) about a dozen passed over in the same direction at 4 p.m. The five which had settled near the farm the previous day were so tame that Mrs. Renwick and the farm-workers got round them and drove them like domestic fowls close to the house before they took flight.

*In Scotland.*—In the 'Shooting Times,' Nov. 16th, a correspondent writes from the Forth that a fine mature Bernacle was handed to him for identification about Nov. 8th.

The Bernacle is a comparatively rare bird on the east coast, and especially so in Northumberland, so that these records, occurring as they did within a radius of about a month, points to the fact that a considerable movement was probably taking place. It would be interesting to know if others have heard of any Bernacles on the eastern seaboard this autumn. — JOHN M. CHARLTON (Cullercoats, Northumberland).

**Partridge breeding in October.**—About the middle of October, 1909, a friend of mine was walking through some swedes on his farm

at South Newington, near here, when a single Partridge rose in front of him, and he shot it. On going to pick up the bird he found that it had risen from a nest of eight eggs placed at the side of a swede. That laying was still going on was afterwards proved by finding a fully developed egg in the bird when it was dressed for the table. The summer of that year was very wet and cold (and October, too, was a wet month), and probably the later broods and nests all perished, though the early ones got off, and it is possible that these October eggs were laid by a bird which lost her nest in June, and did not make another attempt to rear a brood during the summer.—O. V. APLIN (Bloxham, Oxon).

**Little Terns on Ayrshire Coast.**—In August last, on the Ayrshire coast, seven miles south of Girvan, I saw four Little Terns (*Sterna minuta*), two parent birds and two young, the old birds feeding the young as they sat on the sand. They rose as I approached, and I shot one of the young, which I have had prepared as a museum specimen. As far as I can gather from local authorities, the bird has never been seen on this coast before.—MELVIN H. RATTRAY (Bootham School, York).

**The Fulmar.**—Mr. Harvie-Brown, in his interesting paper on this bird, quotes (p. 408) from my first Spitzbergen paper in 'The Zoologist' for 1882 (though under a designation almost amounting to an alias), but has perhaps overlooked the notes on my second expedition, published in 'The Zoologist' for 1883-4. In that paper (1883, p. 485) he will find nearly half a page additional devoted to this question of grey plumage. When writing the article on this species for the fourth edition of 'Yarrell,' Mr. Howard Saunders wrote to me concerning the dark form, which he considered as something rare, but I could only tell him that out of the thousands I had seen not one seemed to tally with the description of the light phase. Apparently he could not credit the statement, judging by what he published there, and subsequently in his 'Manual.' He did not give his authority for the statement in both works that round Spitzbergen both forms are numerous.—ALFRED H. COCKS (Poynetts, Skirmett, near Henley-on-Thames).

**Technical Terms for Assemblies of Birds.**—Referring to the notes on this subject (*ante*, p. 440), may I suggest a few terms for some of the commoner species:—A mock of Starlings, perched; a glint of Starlings, feeding; a wave of Starlings, flying; a school of Jackdaws; a nibble of Bullfinches, feeding; a squad of Rooks;

a tease of Sparrows; a band of Swifts; a glitter of Goldfinches; a cluster of Crows; a creep of Larks, feeding; a party of Tits; a glean of Pheasants.—STANLEY LEWIS (Wells, Somerset).

**Some Notes on the Carrion-Crow: Correction.**—Under the above heading (*ante*, p. 426), instead of reading: "She does not leave the nest in the same way as a Magpie does or a Ring-Plover," read: She does not leave the nest in the same way as a Magpie does or a Ring-Dove.—STANLEY LEWIS (Wells, Somerset).

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### OBITUARY.

RAMSAY HEATLEY TRAQUAIR, M.D., LL.D., F.R.S., V.-P.R.S.E.,  
F.G.S., &c.

IN the 'Geological Magazine' of June, 1909, an excellent account (with a striking photograph) of Dr. Traquair appeared, and at considerable length. Moreover, a shorter notice in the 'Scotsman' on Nov. 23rd, 1912, the day after his death, by a distinguished geologist, dealt also with his palæozoological labours; whilst a third appreciative notice by Dr. Smith Woodward in 'Nature,' Nov. 28th, still further covers this aspect of his career; so that these will be curtly alluded to now. Born on July 30th, 1840, at the Manse of Rhynd, Perthshire, where his father was minister of the parish, his early education, after his father's retirement, took place in Edinburgh. Even in his school days he preferred quiet walks in the neighbouring country—where he collected butterflies and moths, as well as hammered the shales at Wordie—to the athletic games of his compeers, for his naturally slight physique rendered him then and subsequently less fitted for such exercises. The study of medicine then was considered an admirable training in biological science, just as it is now, notwithstanding the narrow views of the late Scottish University Commissioners, and Traquair entered the University of Edinburgh in May, 1857, when its fame as a Medical School was at its zenith. Of quiet and studious habits, and imbued with a love of nature, he yet at once found kindred spirits in the old dissecting-room of Goodsir, and formed friendships lasting for more than half a century with those who appreciated the genius and kindness lurking under the reserved exterior. As a student he did not enter the class-competitions, and

thus was not conspicuous in the prize-lists, but he conscientiously worked up every subject, and at the same time made substantial progress with his studies in zoology—so much so as to attract the attention of men like John Goodsir, William Turner, John Cleland, and James Young Simpson. The recesses between the sessions he often spent with his sisters at St. Andrews, where his natural bent found full scope either amongst the shells of the beach, the ironstone nodules of the east rocks, or in other kindred pursuits—such as exploring the fauna of Tents Moor, or in hauling a Porpoise out of the harbour for study and subsequent maceration. He spent five years at the University, graduating in 1862, and at the same time receiving a gold medal for his thesis on the Asymmetry of the *Pleuronectidæ*, a subject which his remarkable skill in dissection, his patience and his accuracy and taste in drawing, fitted him in every way to excel. Goodsir appreciated the talent of his young student and made him his Prosector, and then Demonstrator from 1863 to 1866, when he received the appointment of Professor of Natural History in the Royal Agricultural College, Cirencester, and the gift of a silver dissecting-case from his Edinburgh students; but as the main duty was to teach botany to somewhat lively agricultural students, the study of the oolitic geology of the neighbourhood was a congenial recreation. In 1867 he was chosen as the first Professor of Zoology in the Royal College of Science, Dublin, and in the autumn of 1873 he secured the appointment of Keeper of the Natural History Collections in the Royal Scottish Museum, Edinburgh, a post in which his special talents, and more especially his unrivalled capacity for dealing with the anatomical structure of fossil fishes, found free play. Yet he was not unmindful of the purely zoological side of the Museum, and under his management, with the able assistance of Mr. Eagle Clarke, great strides were made with mammals, birds, and fishes, as well as with the Invertebrates. His kindly aid also was of great service in exchanging with other Museums, and both Perth and St. Andrews have good reason to remember his valued services in this respect. His official and other visits to the Continent gave him unique opportunities for extending his knowledge of fossil fishes, and, besides visiting Museums, he travelled much in Belgium and Germany, hammer in hand, entranced in forest and mountain scenery. Besides, he held the Swiney Lectureship in Geology at the British Museum for two periods of five years, and acted as external Examiner in Zoology in the University of Edinburgh. Many of his memoirs were communicated to the Royal Society of Edinburgh, in which he

took a deep interest, and was one of its Vice-Presidents. As a scientific worker he was not rapid, but careful and exact, and his conclusions were ever held in esteem, whilst his fine drawings and those of Mrs. Traquair were worthy of all praise. It is true he may have yearned for a Scotch Professorship, yet it is doubtful if in that capacity he would have had either the time or the opportunity for the splendid work he accomplished in the Palæichthyology, especially of the Devonian and Carboniferous Strata, of Scotland. In the Royal Scottish Museum he laboured for thirty-three years, producing no fewer than one hundred and thirty memoirs and papers, chiefly on fossil fishes, his researches being based on morphological structure, and not on the scales and teeth so much relied on by Agassiz and the older workers. After a year or two of failing health, he passed quietly away on the 22nd of November.

Dr. Traquair was elected a Fellow of the Royal Society of London in 1881, received the Degree of LL.D. of Edinburgh in 1893, was awarded the Neill Medal (1878) and the Macdougall-Brisbane Medal (1901) of the Royal Society of Edinburgh, the Lyell Medal of the Geological Society of London (1901), and a Royal Medal of the Royal Society of London in 1907. A true worker, he laboured until he fell, and our country is the poorer by the absence of one of the most distinguished authorities in Palæichthyology, of a genial, cultured, and kindly man of science, and of a lover of everything that was noble and good.

W. C. McINTOSH.

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#### WILLIAM FORSELL KIRBY.

W. F. KIRBY, who passed away on Nov. 20th, in his residence at Chiswick, was born in Leicester on Jan. 14th, 1844, and was therefore in his sixty-ninth year. He was the eldest son of Samuel Kirby, a banker, his mother's maiden name being Lydia Forsell, and it was her proposition that young William should make a collection of butterflies, thus probably starting a well-known entomological career. This had already been incited by the constant reading of 'Uncle Philip's Conversations with Children,' while an old friend of the family (Dr. Noble) had given him a copy of Duncan's 'British Butterflies.' His mother disapproved of schools, so he and his brothers were privately educated, a fact which he regretted, as he thought that the companionship of other boys might have firmed a too gentle disposition,

and in after life enabled him to combat or ignore many critical shafts which deeply wounded a most sensitive nature. His first tutor was Richard Waddington, a man of considerable literary attainments, who had translated Bodenstedt's 'Thousand and One Days in the East' from the German. Here the pupil probably imbibed his future love of the literature appertaining to the 'Arabian Nights.' From 1857 to 1860 he resided at Brighton, where his education was continued under Frederick William Stevens, and about this time he published



his first entomological writings in the 'Entomologist's Weekly Intelligencer.' In 1860 he left Brighton and came to London, and during 1864-65 studied Chemistry under Dr. L. W. Wood. In 1862 he published 'A Manual of European Butterflies.' In 1866 he married a young lady of considerable attainments (Johanna Maria Kappel), who was during her lifetime a great assistance to him in his literary and scientific work. The greater part of 1866 was passed in Germany, where he collected insects and plants, and studied German, Italian, and Persian. About this time he received an appointment in the

Museum of the Royal Dublin Society, afterwards the Museum of Science and Arts, his colleagues being Dr. Carte and Alexander Goodman More, and it was then the writer of this notice first made his acquaintance, while in 1871 he published his 'Synonymic Catalogue of Diurnal Lepidoptera,' a work which formed an epoch in the study of Rhopalocera. In 1879 he was transferred to the British Museum. He joined the Entomological Society of London so long ago as 1861, and acted as Secretary to that Society from 1881-85. He was known among entomologists as a bibliophile. He knew the literature of his subject as a whole better than any contemporary colleague, and his work principally lives in the different synonymic catalogues he has compiled on Lepidoptera, Odonata, Orthoptera, &c., for which his literary erudition particularly qualified him.

But Entomology failed to confine his literary versatility. He contributed some bibliographical and other notes to Burton's great edition of the 'Thousand and One Nights,' and his collection of European editions of this charming work is said to be probably the best in the world. He also translated the 'Kalevala' from the original Finnish, and this, in two volumes, was published in 1907. On the Councils of the Folklore, Goethe, and Anglo-Russian Literary Societies he had served, and last year was President of the Viking Club. He was a mystic, deeply interested in Occultism and Theosophy, and possessed a very fair knowledge of the old Hindu philosophy and early Egyptian doctrines. He from time to time contributed to the pages of 'The Zoologist,' and in 1908 we published a paper from his pen "On the Longevity of British Entomologists."

Mr. Kirby was of a retiring disposition, and required knowing, but when that was accomplished a sterling character was discovered. Like all of us, he had his limitations and compensations, and his sensitive nature was easily disturbed. His congenial work was in a museum or library, probably in the latter.

W. L. D.

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#### WILLIAM BERNHARD TEGETMEIER.

WE regret to record that this well-known naturalist, full of years—for he was in his ninety-seventh year—passed away at Golder's Green on Nov. 19th.

Mr. Tegetmeier was born at Colnbrook, Bucks, in 1816, and was the eldest son of a surgeon in the Royal Navy, who was a native of Hanover. George III. was then on the throne, and Mr. Tegetmeier



thus lived under the reigns of six sovereigns. In the days of his boyhood he kept wild birds, and afterwards was a well-known authority on Pigeons, and it was largely owing to this knowledge that through Yarrell he made the acquaintance of Darwin, who was then pursuing his epoch-making researches in the variation of plants and animals. Tegetmeier's name frequently appears in the writings of the great evolutionist. He was on the staff of the 'Field' for about fifty years, for over forty years wrote leading articles for the 'Queen,' and contributed the article on Poultry to the ninth edition of the 'Encyclopædia Britannica.' His separately published works are well known as relating to Pheasants, Poultry, and the House-Sparrow.

Other landmarks in his long life were his being the oldest holder of a reading ticket at the British Museum; he secured that privilege in 1833, at the age of seventeen. He was an original member of the Savage Club, and its first Joint Secretary with Andrew Halliday.

## NOTICES OF NEW BOOKS.

*The Mechanistic Conception of Life: Biological Essays.* By JACQUES LOEB, M.D., Ph.D., &c. Chicago: University of Chicago Press. London: The Cambridge University Press, Fetter Lane.

THIS volume consists of the reprint of a number of essays and addresses on a subject which has recently been much discussed in this country, and, to use words in the introductory essay, the question is: "whether our present knowledge gives us any hope that ultimately life, *i. e.* the sum of all life phenomena, can be unequivocally explained in physico-chemical terms." The verdict, however, so far as these essays are concerned, may be given as "non proven."

The problem is a complicated one, and of necessity enters the field of ethics, which we read "must be influenced to a large extent through the answer to this question." If, however, as Dr. Loeb says, it may be argued, "if our existence is based on the play of blind forces and only a matter of chance—if we ourselves are only chemical mechanisms—how can there be any ethics for us?" He answers his own inquiry by the opinion "that our instincts are the root of our ethics, and that the instincts are just as hereditary as the form of our body." We would here desiderate a definition of both the terms "instincts" and "ethics," as understood in this discussion. However, we are now travelling beyond the purview of 'The Zoologist.\*

We can, however, follow Dr. Loeb more easily in some of his biological conclusions. Such a paragraph as the following is

\* Dr. Loeb, at p. 70, writes:—"It is evident that there is no sharp line of demarkation between reflexes and instincts. We find that authors prefer to speak of reflexes in cases where the reaction of single parts or organs of an animal to external stimuli is concerned; while they speak of instincts where the reaction of the animal as a whole is involved (as is the case in tropisms)." But does this explain the statement on p. 81:—"We struggle for justice and truth since we are *instinctively* compelled to see our fellow beings happy"? The italics are our own.

worthy of all consideration by evolutionists:—"Under the influence of the theory of natural selection the view has been accepted by many zoologists and psychologists that everything which an animal does is for its best interest. The exact doctrine of heredity, founded by Mendel and advanced to the position of a systematic science in 1900, reduces this idea to its proper value. It is only true that species possessing tropisms which would make reproduction and preservation of the species impossible must die out."

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*The Home-life of the Terns or Sea Swallows.* Photographed and described by W. BICKERTON, F.Z.S., M.B.O.U. Witherby & Co.

IN this publication Mr. Bickerton has described, with a number of beautiful illustrations, the home-life of the five species of Terns which visit the British Isles every summer for their nesting season, and his work again accentuates that modern aspect of ornithological study based on patient and careful watching of the living birds with the use of the camera. In this way a new literature is accumulating which describes the domestic economy of birds, while photographs of the living creatures in the most interesting episodes of their existence supplement the knowledge derived from the drawers of skins or mounted specimens in cases. This practice also assists in the preservation of many of our rarest species; the gun is replaced by the camera, and in these islands at least the time is approaching when the special collector of killed birds will be regarded somewhat in the light of an ornithological vandal. We are not, of course, alluding to the necessary collection of skins in other areas, nor even to an unconditional rule in Britain, but the collector with the gun should be controlled, not only by legislation, but, what is more, by public opinion. We, however, write under a full conviction of our own personal sin in the matter. At p. 33 of this volume statistics show what Lord Muncaster has achieved in the preservation of Terns at the Ravensglass Gullery. The wholesale egg-collector is also found deservedly arraigned in these pages.

For those who require an intimate knowledge of the home-life of these birds this little book can be heartily recommended, especially as regards the Roseate Tern, of whose habits so little

is known—so far as this country is concerned—while the locality at which the observations have been made has been properly suppressed. The photographs of this bird and its eggs *in situ* are, as believed by Mr. Bickerton, “the first of this rare and interesting bird that have ever been taken or published in the British Isles.”

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*Report on the Immigrations of Summer Residents in the Spring of 1911; also Notes on the Migratory Movements and Records received from Lighthouses and Light-vessels during the Autumn of 1910.* By the Committee appointed by the British Ornithologists' Club. Witherby & Co.

THIS important publication forms vol. xxx. of the Bulletin of the British Ornithologists' Club, and is edited by W. R. Ogilvie-Grant. On the migration of birds it is an astounding collection and compilation of reports and observations made by trustworthy authorities, well arranged, properly condensed, and conveniently published in distinct sections. One sometimes wonders at the face value of many published observations; an answer is supplied by this Report, where each recorded item of avian appearance is, as it were, passed through a great ornithological clearing-house, and appears in its proper registry. It is often said that naturalists are not business men; it would be well if many yearly financial records were prepared with the discretion, method, and fulness of this Report. Mr. Ogilvie-Grant would have made a great accountant; it is a matter of satisfaction, however, that he presides over these annual avian migration reports, and remains an ornithologist.

The thanks of all who study this fascinating subject are also “due to the Master and Elder Brethren of the Trinity House for the continuance of their permission to enlist the services of the light-keepers,” and we would add the remark—entomologists, please copy.

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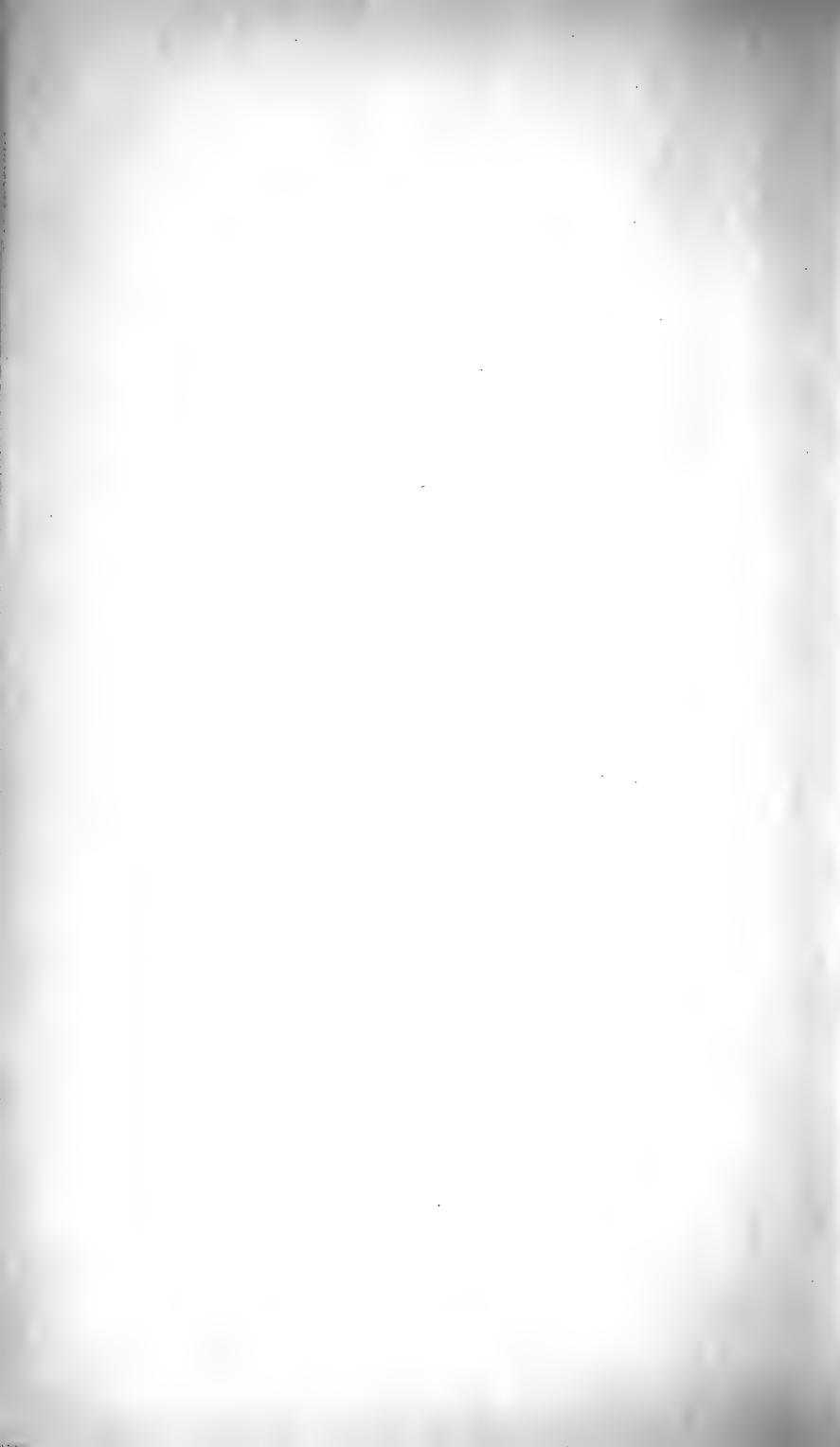
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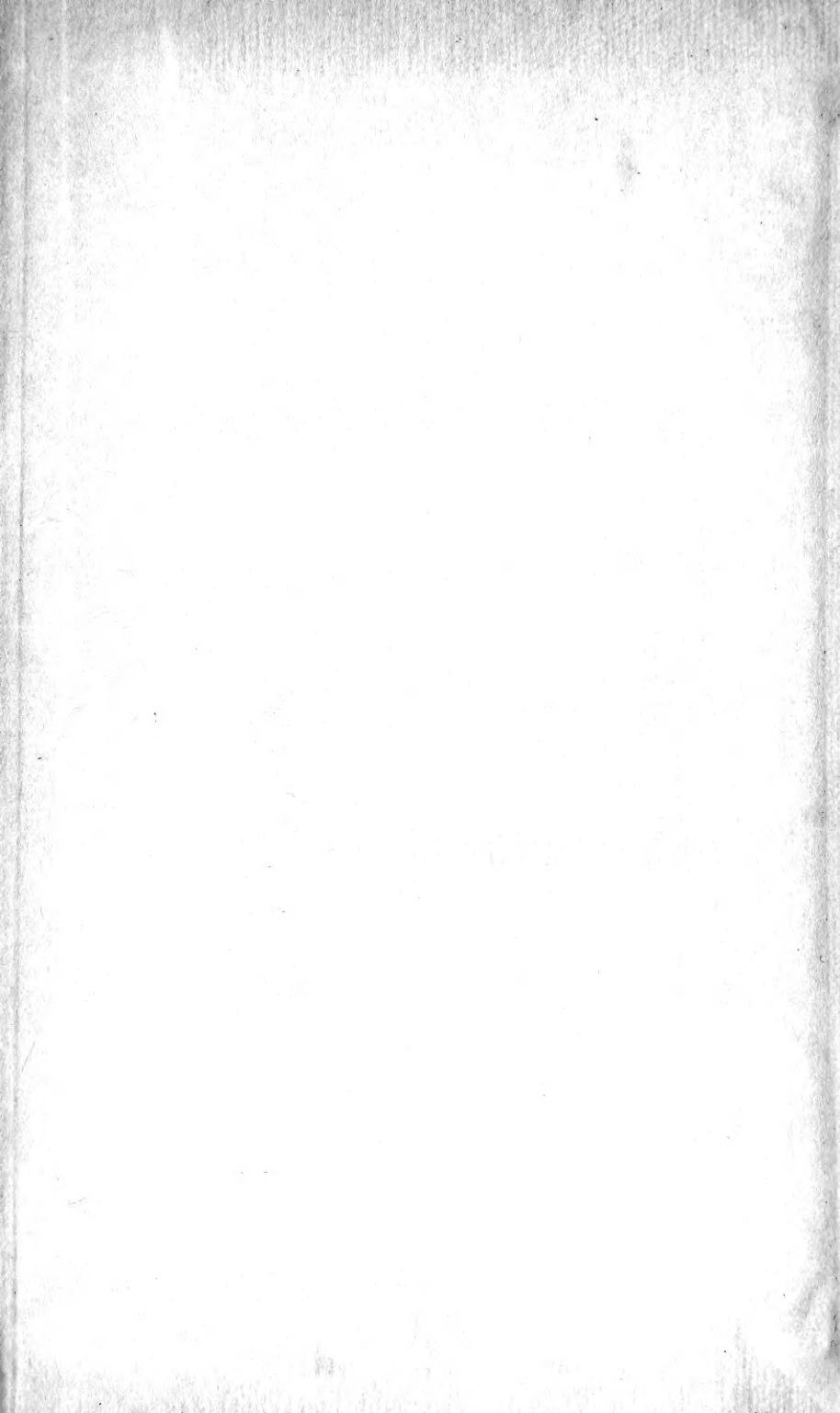








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