HISTORY

OF

BRITISH BIRDS,

INDIGENOUS AND MIGRATORY.

A

HISTORY

OF

BRITISH BIRDS,

INDIGENOUS AND MIGRATORY:

INCLUDING

THEIR ORGANIZATION, HABITS, AND RELATIONS;
REMARKS ON CLASSIFICATION AND NOMENCLATURE;
AN ACCOUNT OF THE PRINCIPAL ORGANS OF BIRDS, AND
OBSERVATIONS RELATIVE TO PRACTICAL
ORNITHOLOGY.

ILLUSTRATED BY

NUMEROUS ENGRAVINGS.

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VOL. I.

RASORES, SCRAPERS, OR GALLINACEOUS BIRDS;
GEMITORES, COOERS, OR PIGEONS;
DEGLUBITORES, HUSKERS, OR CONIROSTRAL BIRDS;
VAGATORES, WANDERERS, OR CROWS AND ALLIED GENERA.

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PREFACE.

The object which I had in view, when, many years ago, I commenced the observations recorded in this work, was at some convenient season to lay before the public Descriptions of the Birds of Great Britain, more extended, and, if possible, more correct, than any previously offered. To accomplish so ambitious a purpose, I judged it necessary to direct my attention to the living objects themselves, rather than to their skins in collections, or their portraits in books, to follow them in their haunts, observe their manners, procure unmutilated specimens, carefully examine all their parts, and thus be enabled to bring forward facts that had been entirely overlooked, and place others in a light in which they had not previously been viewed. Short specific characters, slight descriptions or notices, and measurements of parts, I could easily have obtained by visiting museums and consulting books; but the elaboration of a detailed account of the species, such as is to be found in the following pages, could obviously be accomplished only by much labour of a different kind.

They who have always contented themselves with the meagre and unsatisfactory notices given by systematic writers, or with the vague though often florid accounts of closet naturalists, may judge a great part of this labour uncalled for and unnecessary. The mere describers of skins on the one hand, and the mere observers of the manners of birds on the other, will no doubt find in protracted descriptions much that they

must deem superfluous. Yet the plan which I have followed is calculated in some measure to please all parties, for he who dislikes minute observations relative to form and structure, may confine his attention to the descriptions of habits and manners. To those really desirous of information respecting our native species, I would say, Let us betake ourselves to the fields and woods; let us traverse the hills and valleys together; let us there study our favourites, pursue them from brake to bush, procure as many as we need, and returning to our homes, inspect their exterior, look closely to their bills, feathers and feet, and not resting content with this, open them up, examine their internal organs, and record as much of our observations as we may judge useful to ourselves and others. A full description of any species would occupy considerable space; and were the anatomy of an eagle, a raven, a heron, or a gull, detailed with as much fidelity as that of our own species has been, it would form a work equal in size to one containing an entire system of ornithology, graduated and circled out according to the most approved principles, and with due regard to affinities and analogies, types and aberrations. But books of this kind could not, in the present state of zoology, obtain general approbation, and, moreover, could be introduced to the public only by men possessing the gifts of providence in a more than usual degree. I have therefore judged it meet to steer a middle course between the tediously expanded, and the frivolously contracted, feeling, assured that my observations, if accurate, will in due time attract attention, and promote the progress of science.

In this volume are contained descriptions of the Gallinaceous Birds, the Pigeons, the Huskers or Conirostral Granivorous Birds, and the Crows and Starlings, of which the ordinal, family, and generic characters are given at length. The specific forms are minutely described, reference being made in each case to the general appearance, the bill, the feet, the wings, the tail, the plumage, the organs of sense, the intestinal canal, the sexual distinctions, the variations, the modes of walking and flying, the ordinary habits, the nestling, the food, and the various uses and relations of the bird treated of. The changes that take place in the plumage, the distribution of the species, their mi-

grations, natural affinities, and other circumstances, are also described; and, when occasions are offered, critical and explanatory remarks respecting families, genera, and species, are introduced. Many of the details are illustrated by figures engraved on wood and steel, from drawings made by myself,—the former executed by Messrs. SCLATER and SON, the latter by Mr. GELLATLY.

Some anatomical details are introduced as absolutely necessary to be known before any real knowledge of the relations of the species can be obtained. The entire series of the digestive apparatus, comprehending the bill, the tongue, the throat, the gullet, the crop, the proventriculus, the stomach or gizzard, the intestine, and its cœcal appendages, has been described in all cases, excepting those in which it was found impossible to procure recent specimens. The physiology of these organs forms a most convenient centre of relations, affording, as it were, a key to the more intelligible functions, and determining the food, the haunts, the flight, the mode of walking, and other actions of the bird. It also throws much light upon the affinities of groups, and tends to prevent the frequently absurd associations imagined by persons who form systems by arranging birds' skins on their parlour floors. All the primary groups of birds may be readily determined by a little attention to the nature of the digestive organs, as may be seen on comparing the details given in the following pages with their illustrations.

As the actions and various relations of the species cannot be properly understood without reference to the nature of the districts which they inhabit, I have considered it useful occasionally to introduce descriptive sketches of scenery. Although in all cases I have been anxious to copy nature with scrupulous fidelity, I have not considered a mysterious gravity or an assumed dignity in any degree tending to benefit my readers. A pompous ornithologist is of all characters one of the most absurd; and the solemnity of scientific pride sits ill upon him who is alternately scaling precipices and wading bogs, chasing the ptarmigan on the weather-beaten summits of the Highland hills, and pursuing the flights of plovers along the sandy shores of our bays and estuaries. The man who

would effectually learn from nature, must approach with affection, and receive her instructions with a humility that would ill accord with any subsequent vain display of the knowledge acquired.

Although my qualifications for the task which I have thus undertaken will be best judged of by the manner in which it has been executed, yet I may be permitted to intimate that I have not spared time or labour to enable me to perform it with credit to myself and advantage to the public. About twenty years have elapsed since I commenced the study of ornithology, and, though a very large portion of that time has been devoted to other pursuits, I have always eagerly availed myself of the opportunities which occurred of accumulating facts relating to it. For the purpose of making myself acquainted with the natural productions of the country, I have undertaken many long journeys, performed numerous short excursions, traversed the cultivated districts, wandered among the wild moors of the interior, and visited the distant islands to which the sea-birds resort. I have endeavoured further to qualify myself for the task by attending to the observations and inferences of other students of nature, as recorded in their works, and by inspecting the objects contained in museums of Natural History. My education having had reference to the medical profession, I have been enabled to profit by the taste for anatomical pursuits which I had imbibed in the course of it. The importance of the digestive organs in particular has seemed to me so great that I have, as already mentioned, been induced to pay particular attention to them. Not content with accumulating notes and drawings as I had opportunity, I have finally formed an extensive collection of preserved skins, not of British birds only, but of species from all countries; that, while preparing my observations for the press, I might be enabled to compare my descriptions, so far as they have reference to the external parts, with the originals themselves, and thus correct errors and supply deficiencies. Anatomical preparations I have also procured for the same purpose. In short, according to my ability, I have done all that seemed necessary for the occasion; and may, without presumption, hope that I shall not be considered as

having rashly ventured upon an undertaking for which I am not qualified.

In an Introductory Discourse I have endeavoured briefly to explain my views as to classification and nomenclature. Some remarks are then made on the Structure of Birds; and, for the benefit chiefly of the student, but also for that of those ornithologists who openly profess to disregard internal structure, the osseous, muscular, digestive, and dermal systems are partially described. An outline is next given of two modern systems of classification, followed by an announcement of the manner which I intend to follow in this work. For the purpose of introducing the reader to the objects of our common study, I have further conceived it meet that he should accompany me in idea into the fields, the objects seen in which suggest observations relative to the details of what may be called Practical Ornithology. This expedient, which is resumed at intervals, affords an opportunity of conveying information on subjects that cannot with propriety be treated of in connection with the regular descriptions.

It is unnecessary to present a catalogue of books that have been consulted, as they are all repeatedly referred to in the course of the descriptions; but it may be proper here to mention the names of those individuals who have afforded me aid in my researches.

To Professor Jameson I am indebted for permission to examine the birds in the museum of the University of Edinburgh. Mr. Macduff Carfrae, preserver of animals to that institution, has most obligingly procured for me numerous recent birds, bodies, and skins; as have Messrs. Fenton and Edmondston, bird-stuffers, Edinburgh. Of the individuals who have sent me recent birds, those to whom I am more especially indebted are:—Sir Thomas G. Carmichael, Bart. of Skirling; Dr. Th. J. Aitkin, Edinburgh; the Rev. Mr. George Gordon, Morayshire; the Rev. Mr. Adam, Peebles; William Stables, Esq., Nairnshire; Mr. Falconar of Carlowrie, Linlithgowshire; Captain Graham, Stirlingshire; Dr. Macdonald of Ballysher, Argyleshire; William Craigie, Esq., Aberdeenshire; Andrew Murray, Esq., advocate, Aberdeen; and Mr. Alexander Campbell,

Edinburgh. Skins and eggs have been sent to me by G. H. Greenhow, Esq., Northumberland; Mr. Henderson, Gifford, East Lothian; Mr. Alexander Brand, Peterhead; and Mr. Roderick Bethune, Harris. Lastly, valuable observations relative to the habits of various species of birds have been communicated by Th. Durham Weir, Esq. of Boghead, Linlithgowshire; Mr. William Hogg, shepherd, Stobo Hope, Peeblesshire; W. Smellie Watson, Esq., Edinburgh; and, through Dr. Aitkin, by James Barclay, Esq., Shetland.

To the individuals who have thus generously lent me their aid, I beg leave to offer my most sincere thanks.

And now, having announced the purport, and given some intimation of the quality of the work, I may be permitted to express a hope that it will be found useful by those who may be disposed to take me as their guide in the pleasant pursuits from which I have derived much of the happiness that a beneficent Providence has been pleased to confer upon me. It would be folly of a kind not common in those who have taken some note of the fluctuations of public opinion, and have observed the diversity of taste with reference to objects of art or science, to expect that all who may read this volume should be pleased with it, or that its author should be so fortunate as to obtain the confidence and approbation of all who are qualified to judge of its merits and defects; but he yet trusts that it may prove useful, both as affording correct descriptions of a considerable number of our indigenous birds, and as tending to introduce a more rational method of study than that hitherto followed, by evincing the practicability of applying characters derived from their internal structure to the purpose of classification.

W. MACGILLIVRAY.

Edinburgh, 1*st May* 1837.

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WOOD CUTS.

These figures are generally one-half of the natural size; but those illustrative of the Deglubitores, from 55 to 81, excepting 71–76, are of the full size. Fig. 77 is misplaced.

ERRATA.

At p. 18, line 11, in "Nuthatchers" delete *r*.
At p. 26, 6th line from the bottom, for "These processes do," read This process does.
At p. 85, in 4th line of note, for . substitute ,
At p. 93, 3d line from the top, read The skeleton in Pl. I, is reduced to one fourth; the other objects are generally represented of half the natural size.
At p. 129, line 2, for "always," read generally.
At p. 130, line 16, for "Phasianinæ," read Gallinæ.
At p. 296, line 20, delete "other."
At p. 305, for "Crucirostra" read Loxia, and for "Loxia," read Coccothraustes.
At p. 310, for "more proportionally," read proportionally more.
At p. 332, line 4, for "Grosbeaks" read Linnets.
At p. 402, line 7, delete "in a field."
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INTRODUCTION.

Were the method which I have judged the most useful in describing birds in no essential respect different from that usually employed, I should not consider it necessary to offer any preliminary remarks, but should proceed directly to treat of the various species, supposing the readers of a work like the present to possess a sufficient knowledge of the terms in common use. The case, however, being very different, insomuch that with respect both to the arrangement of the species, and to the mode of description which I have chosen, some explanations are required to enable the reader to view the objects introduced in the same light as that in which they are considered by the writer, I need not apologize for offering here a few observations calculated to facilitate the progress of the former, and to induce him to tolerate what might otherwise seem the not altogether relevant discourse of the latter. The arbitrary, one might almost say mechanical, gradation of arrangement in general use, though presenting as many modifications as there are writers, appears not to be commonly understood to be of so empirical a character as that in which it presents itself to my view; I shall therefore, in the first place, offer some observations respecting it, accompanied by remarks on nomenclature. An attempt to communicate as much information regarding the structure of birds, as may render the subsequent descriptions perfectly intelligible even to the unscientific reader, will occupy the second place. Many persons are deterred from studying

the anatomy of birds by a vague apprehension of the extreme difficulty of making any proficiency in it. But the study of the organization of these animals is certainly a much easier task than that of their habits, manners, distribution, and migrations, seeing that any educated individual, having a moderate acuteness of observation, with some patience, may quietly, and with little labour, and less expense, inspect in his closet the entire anatomy of a variety of species readily procurable in the markets of any of our cities; whereas the observer of habits must perform laborious, expensive, and sometimes dangerous journeys, and after all his exertions, may count himself singularly fortunate if he has succeeded in discovering some interesting facts previously unnoticed, and still more so if, after communicating them to the public, he escape the abuse of the envious and prejudiced, who, with a little of the slight knowledge that the mere collector of specimens can ever possess, presume to pronounce judgment upon his performance. The study of the structure of birds is a delightful, as well as an easy occupation; for at every step it discloses the most beautiful illustrations of divine wisdom; but to what rational purpose it can be applied by an intellect which vainly strives to render itself independent upon its Creator, I am unable to apprehend. Even a very slight general knowledge of their organization will give an interest to the details of their habits and economy which can scarcely be felt, or at least adequately experienced, by him who merely knows that they are organized beings. Having given the necessary explanations on this subject, I shall finally offer some remarks on the habits of birds, and proceed to describe the species selected for the present occasion.

REMARKS ON CLASSIFICATION AND NOMENCLATURE.

The class of Birds is perhaps the most distinctly defined in the entire series of organized beings; but the general similarity of the different species upon which the obvious connexion of the whole depends, renders it extremely difficult to separate them into groups distinguishable from each other by well-marked characters. Hence the great diversity of opinion respecting the limits of the genera, families, and orders of this class; which, in fact, is such that no two original writers on the subject have adopted the same divisions, and that while in the system of one there are only four great sections, there are not fewer than thirty-eight in that of another. The modifications of form and structure, and the minute gradations by which the species are multifariously connected, while they seem to render it impossible to elicit a symmetrical and generally intelligible arrangement, render it easy to invent classifications, founded on partial views, so apparently simple and philosophical, that he only who is tolerably well acquainted with a considerable number of facts and phenomena, can be truly sensible of their numerous absurdities.

The apparent facilities afforded in studying birds by the diversified development and colouring of their plumage, the multiplied forms of their bills, feet, and wings, and their general distribution over the globe, have rendered them favourite objects of examination, and led some persons boldly to assume the character of legislating ornithologists, before making themselves acquainted with even the rudiments of the science; the foundation of which, as of every department of zoology, exists only in the anatomical structure of the objects to which it

refers. When we find the authors of the most imposing systems making the most absurd statements in almost every page, we ought to become diffident of our own powers, and reflect that the mysteries of creation are scarcely to be understood even by him who to great acuteness adds great perseverance and great humility.*

Much of the discrepancy of opinion respecting the limits of the genera and families of birds arises from forgetfulness of the fact that species alone exist in nature. Most persons acknowledge this truth when it is forced upon them; but few act under its impression. A species, composed of individuals of two sexes, capable of producing similar individuals, varying however within certain, but hitherto undefined limits, and capable of continuing the race, which remains the same for ages, and of which the varieties, when placed in ordinary circumstances, tend to return to the original type, is all that we can consider as having a positive existence. It is merely because species are so numerous, and our faculties so limited, that we throw them into ideal groups, for the purpose of facilitating our recollection of their forms and qualities. Species are more or less allied to each other; thus, a Raven is very similar to a Carrion Crow, less so to a Magpie, and in a much smaller degree to an Auk or a Penguin. The alliances exhibited between species give rise to the idea of connecting them in various degrees; but the limits of the groups thus formed being undefined, it is not in the nature of things that those arbitrarily fixed by one man should be acknowledged by all others. It is very evident that genera, families, orders, and all the mediate sections of a class, must ever remain fluctuating, and that dis-

* "The structure of birds," says the author of a recent work, "adapts them for inhabiting an element from which quadrupeds, and even man, is excluded." One naturally asks, What element can this be? man lives in air, walks on earth, and swims in water; so do quadrupeds and birds. Others inform us that the Raptores, or birds of prey, have the body very muscular; the upper mandible the longest; and that they nidificate in lofty situations: whereas the body of a Pheasant is greatly more muscular than that of a Sparrow-hawk; the upper mandible of a Parrot or an Albatross, in fact, of almost all birds, is the longest; and the Merlin nestles on the ground, as do the Moor Buzzard and the Henharrier.

cussions respecting them will continue to be keenly engaged in until men clearly perceive that instead of fighting in earnest, they are merely beating the air. What is a genus? "The first collocation of species in a system." An order? "The last or most general group in a class." What constitutes a genus? "Certain palpable resemblances." But what are they? "Come, let us go on, and you shall see." There is no need of quarrelling about genera. Let us be courteous: what you call a genus, allow me to consider as a family; let it be a tribe with another, and an order in the system of a fourth. No classification of birds has ever been generally adopted; and none has stood for twenty years. And why? Because no system-maker ever acquired a clear perception of all the phenomena of nature. Without the wisdom of a Solomon, and the longevity of a Methuselah, with many other advantages to boot, no ornithologist will ever arrange the ten thousand species which probably exist in the world, in an order conformable to the plan of their creation. Then let us just understand that all systems must be arbitrary; that a genus, if it be any thing at all, is something as shadowy as one of Ossian's ghosts; that a naturalist who has studied birds, and described their structure, form, and manners, adds to our knowledge, although he may not choose to impose upon species the newest and most fashionable names; and that the first principle in the classification of natural objects is, that species alone exist in nature.

It must be very obvious that to acquire a general knowledge of birds, a person must examine many species, and not only those that much resemble each other, but those that differ in the greatest degree. Whether at one time, or at different times, he must at some time look to the details of the internal structure, inspect the outer parts, attend to the actions and habits, and thus discover the faculties and relations of the objects. But many may be desirous of forming an acquaintance with birds, without the hope, or even the desire, of inventing a system, or of describing all the species of a country; and some may content themselves with studying a few, and with being able to refer a particular bird to its place in a system or catalogue, to discover its name, and thus by reading its history as

narrated by one or more authors, add to their store of knowledge, or find relaxation from more important occupations. In composing the present work I have kept in view the interest of the scientific as well as the general student; and while I have entered into the details of structure and form, I have paid equal attention to the manners and habits of the different species.

As to their arrangement, I have thought it prudent, in the present unsettled state of opinion on the subject, and under the conviction that all existing systems are defective, to adopt the opinions of no systematist, but to group the species according to their obvious relations. Although the number of species that occur in Britain is not sufficiently great to afford a connected view of the entire series of genera and families, yet it is sufficiently so to admit of observations respecting their connection and mutual affinity. The Rapacious Birds generally occupy the first rank in systems, and I am not aware of any good reason for depriving them of it; but as I have lately submitted to the public a description of them, and as it may be more advantageous to begin with a tribe of birds having a more remarkable construction of the digestive organs, which I conceive to have been too much neglected by ornithologists, I shall first treat of the Gallinaceous birds and Pigeons.

In all arrangements of birds hitherto published, whether professing to be derived from the consideration of the aggregate of the organization, or from particular organs, the modifications in the form of the bill have afforded the principal characters. After much consideration, however, and after examining the digestive organs in a great number of birds belonging to nearly all the families, I have resolved to adopt the intestinal canal as a central point of reference. Instead, then, of describing merely the bill, I attend to the mandibles, the mouth, the tongue, the throat, the œsophagus, the crop, the proventriculus, the stomach, the intestine, and the cœcal appendages; the modifications of which seem to me to throw more light upon the affinities of the larger groups than those of any other organ.

In some systems the modifications in the form of the feet

afford the most general distinctions; and attention is also paid to those of the wings; but in all, the internal organs have been too much neglected. An arrangement may be founded on the variations of any part:—the brain, the heart, the feet, the bill, or the sternum; but classifications resulting from such partial considerations must be extremely imperfect. As the various organs do not undergo similar or analogous changes in the different species, linear series are not capable of connecting them by general affinity. The idea that in a given group, each of its divisions is represented analogically by a corresponding division in another group, is certainly, to some extent, countenanced by appearances; but when it is attempted to be carried through the entire series, it gives rise to the most fanciful and forced substitutions; such, for example, as that of conceiving a cock to be analagous to a horse, because, as it is alleged, both kick, or to a bull, because its spurs are somewhat similar to horns. In one point of its structure, a species may be allied to another, while in a second point it may resemble a third species. Thus, a Pterocles, or Sand Grouse, resembles the Pigeons in its general form, and in that of its wings, while its feet are similar to those of a Grouse, and its tail not unlike that of some Parrots, as well as of many other birds. In some respects a bird may be very similar to another, while in one or more particulars it may manifest some relation to a species extremely different in everything else. In a linear series, therefore, it is impossible to place species in the order of their affinities; nor can those of species or genera be exhibited by disposing them in circles, parallel series, quincuncial rows, or any other figures, on a flat surface, that is, in diagrams on paper. To present affinities, species would require to be fixed in empty space, and represented by forms bearing no resemblance to birds, but having parts more and less elongated, to meet parts of other near and distant species; so that such an arrangement, were it made by a being who understood all the relations of the species, would, by exhibiting such a multitude of reticulations, be just as unintelligible to us as is the order of things studied in the economy of nature such as we see it. When objects, then, are placed in linear series, whether di-

rectly extended, circularly bent, or otherwise disposed, they cannot manifest any other relations than those that refer to the structure of a single organ; and thus, all arrangements must be merely artificial, as we have no means of disposing our descriptions of species otherwise than in elongated series. The only remedy is to indicate in words all the relations that have been observed, while some principal organ is chosen as a general medium of connection.

It is only, however, in a systematic arrangement embracing all the known species that a nice attention to their location, and to the subordination of characters is of importance. In the Fauna of a district or country, the gaps would be so numerous as to break off the affinities at every step. My ideas of a general arrangement of birds being as yet very imperfect, I will not obtrude them at present upon the public; but dispose the species with which we are more immediately concerned, in such an order as may preserve some of their principal points of connection.

As the limits of the genera are continually fluctuating, the names imposed upon them are liable to frequent change, in so much that in twenty years an ornithologist may have seen a given species referred to three or four genera. These changes cannot be avoided, and therefore it is useless to cry out against them. But as the species have a real existence, and being once correctly described can always be recognised, the names imposed upon them by their discoverers ought never to be altered. If the specific name be fixed, it is not of much importance that it be coupled with this or that generic name. Those imposed by Linnæus, the first great reformer of natural history, ought to be held inviolable, as well as all that have been applied by the principal systematic writers. There are cases, however, in which, owing to a faultiness in its construction, its inapplicability to the species, its leading to misconception, or its manifest absurdity in some respect or other, a specific name ought to be rejected. When a group is broken up, a specific name ought never to be converted into a generic one, although this has been a prevailing practice in Botany as well as in Zoology; for the alteration thus made is productive

of much confusion in the minds of those who have been accustomed to associate a particular form with a particular name; and it is always easy to find a new generic name. Very many specific names converted into generic ones are most obviously quite inapplicable; for example, those referring to colour, as Rubecula, Ruticilla, Phœnicurus. Among the most absurd names are those of gods, goddesses, kings, queens, men and women of various ranks, trades, professions, and such like, applied without change to genera: Of this kind are Zeus, Venus, Orpheus, Tyrannus, Pastor, &c. In short, the general principles of nomenclature as laid down by Linnæus, Willdenow, and other botanists, although not always acted upon by them, ought to be adopted. Generic names in particular ought to be of Greek or Latin origin, always with a Latin termination; and persons defective in taste and classical knowledge ought to be interdicted the use of dictionaries, because in framing names from Greek or Latin words, they are ever prone to produce the most absurd compounds. They should always refer to the schoolmaster.

As to English names, very little needs be said, further than that, were the genera positively fixed, which they cannot be for many years, if ever, it might be well to give them vernacular names, in which case each species ought in like manner to have a distinctive epithet or substantive name. Thus, we shall suppose a genus named Corvus, to consist of five species named Corax, Corone, Cornix, Frugilegus, Monedula. The English generic name being Crow, we might name the species Raven Crow, Carrion Crow, Hooded Crow, Rook Crow, Daw Crow. But in all cases single substantive specific names would be the best: for example, the Raven, the Corby, the Hoody, the Rook, the Daw. Some person proposes a general meeting of British Ornithologists at London, York, or Edinburgh, for the purpose of determining the English nomenclature of our native birds; but such a meeting, were it to take place, would disperse without accomplishing the object in view, unless indeed its members were placed on the Bass Rock, and interdicted fire and food until they had settled all their differences, and sworn perpetual friendship. Even then, some

malicious Celt, capable of subsisting a month on dulse and tangles, with an occasional raw limpet or mussel, might hold out until, rather than be starved, the philosophers should leave the birds to him to do with them as he pleased. In sober earnest, it is impossible to remedy the acknowledged defects in nomenclature, so as to render it universally acceptable. Some persons who do their best to render the subject still more intricate, are extremely sensitive on the point of uniformity; but, in my opinion, however much they who are ambitious of being legislators in this matter may desire conformity to their views, there will always be more to spurn the yoke than to yield to authority, which is gradually falling to its proper standard. In fact, no two ornithologists have ever used the same names for five hundred birds; nor could two be found who should employ the same nomenclature in describing even the birds of Britain. There is really no cause of regret in all this: were there no differences in politics, religion, and science, the world would probably be much worse than it is. I am therefore under the necessity of using my own discretion in bestowing English, Gaelic, and Latin names on the birds which I propose to describe; and I request that my readers scruple not to reject whatever they find indicative of bad taste or bad feeling.

Of the numerous systems, or modes of arranging birds, that have been proposed by authors, two of the most celebrated may be here given in outline, that the student may be enabled to judge whether it be probable that any method so constructed can be in harmony with nature.

The System of Linnæus, which for a considerable number of years was extensively adopted, is founded chiefly upon the form of the bill and feet. The six orders of which it is composed are named and characterized as follows:—

I. Accipitres. Bill more or less curved; upper mandible dilated on either side behind the point, or armed with a tooth; nostrils open. Feet formed for clutching, short, robust; toes tuberculate beneath the joints; claws arcuate, very acute. Head and neck muscular; skin tough; flesh unfit for being

eaten. Food the flesh of animals. Nest in high places; eggs about four; the female larger; monogamous. Analogous to the Feræ, or predaceous quadrupeds.

Ex. Vultures, Falcons, Owls, Shrikes.

II. Picæ. Bill cultrate, with its back convex. Feet formed for walking, short, stoutish. Body toughish, unfit for being eaten. Food of all sorts of substances. Nest in trees; the male feeds the female while incubating; monogamous. Analogous to the Primates,—to Man, Monkeys, and Bats.

Ex. Parrots, Hornbills, Crows, Humming-Birds.

III. Anseres. Bill smooth, covered with cuticle, enlarged at the point. Feet formed for swimming, the toes being connected by a membrane; the tibiæ compressed and short. Body fat, the skin tough, the feathers more perfect. Food in the water, of plants, fish, &c. Nest more frequently on the land; the mother more rarely feeds her young; more commonly polygamous. Analogous to the Belluæ,—the Horse, Hippopotamus, Hog, and Rhinoceros.

Ex. Ducks, Auks, Pelicans, Gulls, and Divers.

IV. Grallæ. Bill somewhat cylindrical. Feet formed for wading, the thighs being half bare. Body compressed, the skin very thin; tail short; flesh savoury. Food in marshes, of animalcula. Nest more frequently on land; nuptials various. Analogous to the Bruta,—the Elephant, Walrus, Sloth, and Ant-eater.

Ex. Ibises, Snipes, Rails, Plovers, Bustards, and Ostriches.

V. Gallinæ. Bill convex; upper mandible arched over the lower; nostrils arched with a cartilaginous membrane. Feet formed for running, the toes being rough beneath. Body sebaceous, muscular, fit for being eaten. Food on the ground, of seeds, which are macerated in the crop. Dusters. Nest on the ground, artlessly constructed; eggs numerous. The food is pointed out to the young. Polygamous. Analogous to the Pecora,—Camels, Deer, Sheep, Bulls.

Ex. Peafowls, Turkeys, Pheasants, Grouse.

VI. Passeres. Bill conico-acuminate. Feet formed for leaping, tender, slit. Body delicate, fit for being eaten in the granivorous species, but not in the insectivorous. Food in trees, of seeds or insects. Nest artfully constructed. Food put into the mouth of the young. Monogamous. They have the faculty of singing. Analogous to the Glires,—Hares and Mice.

Ex. Finches, Buntings, Swallows, Thrushes, Larks, and Pigeons.

Any criticism applied to such a system would be useless, for, notwithstanding the merits and celebrity of its author, there is scarcely an unexceptionable character in the whole series. "If," says M. Vieillot, "we direct our attention to the characters which they (Linnæus and Latham) have indicated as referring to the bill in the Picæ, Grallæ, and Anseres, do we not discover that they are not applicable to very many of the genera of these orders? Have all the Picæ a cultrate bill with a convex back? Is this the case with the Todies, Creepers, Humming-Birds, Hornbills, &c.? Have all the Grallæ a subcylindrical bill:—the Flamingoes, Avocettes, Spoonbills, &c.? May not the same question be asked respecting the Anseres or Palmipedes, to which these systematists have given as a general character a bill covered with cuticle and enlarged at the end, which in fact is the case only with the Geese, Swans, and Ducks? For it cannot be said with truth that such is the bill of the Auks, Guillemots, Petrels, Darters, Frigate-Birds, Cormorants, Boobies, Divers, Gulls, and others."

M. Vieillot, therefore, finding the bill inefficient, employs the feet for his primary characters. His system is composed of five orders, with fifty-eight families.

I. Accipitres. Feet robust, short or moderate; legs entirely covered with feathers; tarsi naked or clothed in whole or in part; toes tuberculate beneath, three before, one behind; pollex on the same level as the rest; claws very strong, mobile, retractile, arched, pointed, or a little blunted. Bill stout, covered with a cere at the base, hooked towards the end.

Tribe 1. Diurnal. Eyes lateral.

Fam. 1. *Vulturini.* Vultures.
2. *Gypaeti.* Lammer-geyer.
3. *Accipitrini.* Eagles and Hawks.
Tribe 2. Nocturnal. Eyes in front.
4. *Ægolii.* Owls.

II. Sylvicolæ. Feet short or moderate; legs entirely feathered; toes a little flattened beneath, two before and two behind, or three before and one behind, very rarely two before and one behind; the pollex on the same plane as the rest; claws slender, mobile, slightly retractile, curved, pointed, seldom blunt. Bill of various forms.

Tribe 1. Zygodactyli. Two toes before, two behind.
1. *Psittacini.* Parrots.
2. *Macroglossi.* Woodpeckers.
3. *Aureoli.* Jacamars.
4. *Pteroglossi.* Toucans.
5. *Barbati.* Trogons.
6. *Imberbi.* Cuckoos.
7. *Frugivori.* Plantain-eaters.
Tribe 2. Anisodactyli. Three toes before; the outer directed forwards; the pollex sometimes versatile.
8. *Granivori.* Grosbeaks, Finches, Buntings.
9. *Ægithali.* Tits, Manakins.
10. *Pericalles.* Tanagers.
11. *Textores.* Orioles.
12. *Leimonites.* Starlings.
13. *Carunculati.* Grakles.
14. *Paradisei.* Birds of Paradise.
15. *Coraces.* Crows.
16. *Baccivori.* Chatterers.
17. *Chelidones.* Swallows.
18. *Myiotheres.* Flycatchers.
19. *Colluriones.* Shrikes.
20. *Canori.* Thrushes, Wagtails, Wrens.
21. *Anerpontes.* Nuthatchers, Creepers.
22. *Anthomysi.* Humming-birds.
23. *Epopsides.* Hoopoes.

24. *Pelmatodes.* Bee-eaters, Kingsfishers.
25. *Antriades.* Rock-birds.
26. *Prioniti.* Hornbills.
27. *Lyriferi.* Menuras.
28. *Ophiophagæ.* Snake-eaters.
29. *Columbini.* Pigeons.
30. *Alectrides.* Penelopes.

III. Gallinacei. Feet short, or moderate, somewhat robust; legs entirely covered with feathers; tarsi naked, or feathered; toes callous beneath, three before and one behind, or none behind; pollex when present higher than the rest, resting on the ground by its tip, or not reaching it; claws short, not retractile, generally somewhat blunt, rarely compressed, arched, and acute. Beak vaulted; upper mandible covering the edges of the lower.

1. *Nudipedes.* Turkeys, Peafowls, Pheasants, Partridges.
2. *Plumipedes.* Grouse, Ptarmigans.

IV. Grallatores. Feet moderate, or long, robust, or slender. Legs half-bare; toes slit or webbed, sometimes margined; two before only, three before only, or three before and one behind; pollex raised from the ground, or resting upon it only by the tip, or reposing upon it in its whole length; claws of varied form, not retractile. Bill of various shapes.

Tribe 1. Two or three toes before, none behind.

1. *Megistanes.* Ostriches, Cassowaries.
2. *Pedionomi.* Bustards.
3. *Ægialites.* Long-shanks, Oyster-catchers, Plovers.

Tribe 2. Three toes before, one behind.

4. *Elonorni.* Lapwings, Turnstones, Snipes, Curlews.
5. *Falcirostres.* Ibises.
6. *Latirostres.* Spoonbills.
7. *Herodiones.* Herons.
8. *Ærophoni.* Cranes.
9. *Colloramphi.* Sheath-bills.
10. *Uncirostres.* Screamers, Serpent-eaters.
11. *Hilebatæ.* Trumpeters.

12. *Macronyches.* Jacanas.
13. *Macrodactyli.* Rails, Gallinules.
14. *Pinnatipedes.* Coots, Phalaropes.
15. *Palmipedes.* Avocettes, Flamingoes.

V. NATATORES. Feet short, placed in the centre of gravity, or at the hind part of the body; legs denuded on their lower part; toes webbed, sometimes lobed, three before and one behind, three before and none behind, or four before and none behind; claws short, rarely moderate, compressed, or flattened. Bill of various forms.

Tribe 1. Tellopodes. Four toes; pollex directed forwards and connected by a membrane with the next, or turned back and free.

1. *Syndactyli.* Cormorants, Pelicans, Tropic-birds.
2. *Urinatores.* Grebes, Divers.
3. *Dermorhynci.* Geese, Swans, Ducks.
4. *Pelagii.* Gulls, Terns.

Tribe 2. Atellopodes. Three webbed toes before, none behind.

5. *Siphorini.* Petrels, Albatrosses.
6. *Brachypteri.* Guillemots, Auks.

Tribe 3. Ptilopteri. Four toes, three palmate, pollex directed forwards and free.

7. *Sphenisci.* Penguins.

These are samples of systems, of which however there are multitudes of all shapes and sizes, formed on various principles, some apparently on no principles at all, but all doubtless excellent and admirable in the eyes of their inventors. Yet I presume any person must be sensible of the absurdity of characters like those given to the fourth order, Grallatores, of the above arrangement. I cannot venture upon the magnificent systems of the present day, in which, if we believe their authors, the order and harmony of nature are demonstrated with absolute certainty; although to me they seem like fragments of old chaos, or dreams of monomania. For my part, I confess my inability to discover the principles according to which

the All-wise and All-powerful has created and disposed the various objects that form the garniture of our globe; yet, as some method must be followed in describing the birds of which I have undertaken to give the history, it is necessary that I should here say a few words on the subject.

In the first place, or preliminarily, I must endeavour to conciliate the grammarians, by humbly intimating my intention of considering *avis* as of the feminine gender, although for many reasons it might be preferable to employ masculine terminations. Many systematists in fact have used this privilege; but I am not disposed to take shelter under authority, seeing that some employ two genders indiscriminately. The orders, however, may be denoted by masculine substantives indicative of their nature, and similar in termination; the families by adjectives derived from one of the genera contained in them; and the genera by substantives of regular construction, but of any gender.

Without professing to propose a general arrangement of birds, I may state that those of Europe may be primarily divided into four groups, sections, or subclasses, determined by their mode of life.

1. Some species, as Falcons and Swallows, seek their prey by open flight, and either seize it in the air, or pounce upon it on the ground, but are incapable of searching for it by walking, leaping, or climbing. Indeed, although they all perch with facility and security, and therefore have a peculiar claim to the denomination of Perchers, which, however, has been applied by authors to another group, they are for the most part incapacitated from walking effectively. Some of them take their stand on a twig or stone, and launch into the air after insects, or into the water after fishes, returning immediately to their post. The former of these form the transition to the second section, the latter to the fourth. Although all birds respire air exclusively, and are therefore *aërial*, yet these being especially addicted to the use of that element in moving from place to place, may in a comparative sense be named *Aërial Birds*, *Aves Aëriæ*, or *Volatoriæ*.

2. Other species, as Grouse, Pigeons, Finches, Crows, and Warblers, obtain their food by searching for it on the ground or on plants, employing their wings to carry them to the places in which it is likely to be found. The birds of this section, then, are peculiarly *Terrestrial*, *Aves Terrestres*, or *Ambulatoriæ*.

3. Many, as Gallinules, Plovers, Snipes, and Herons, are adapted by their long slender legs, bared above the heel, for searching the shores or marshy grounds, although some, uniting this group with the preceding, run on dry land, and others, not expert at running, take their stand in the water or by its margin, and seize their prey when it comes within reach. The birds of this group may be termed *Amphibious* or *Wading*, *Aves Litorales*, or *Grallatoriæ*.

4. Lastly, there are species, as Ducks, Divers, and Gulls, which are formed for swimming, and of which many dive, while others plunge into the water, and some reach at substances beneath its surface. They are all capable of walking in some degree. These are the *Aquatic Birds*, *Aves Aquaticæ*, or *Natatoriæ*.

All these primary groups, which I consider merely as sectional, and as coming in the place of those, familiar to every person, of *Land Birds* and *Water Birds*, are composed of orders equivalent to each other, and characterized by peculiarities of form and structure. Thus,

CLASS II. AVES. BIRDS.

SECTION I. AVES VOLATORIÆ. AERIAL BIRDS.

Order.

1. *Raptores*, Plunderers or Birds of Prey: Vultures, Eagles and Hawks, Owls.
2. *Excursores*, Snatchers: Shrikes and Flycatchers.
3. *Volitatores*, Skimmers: Swallows, Bee-eaters, and Goatsuckers.
4. *Immersores*, Dippers: Kingsfishers.

SECTION II. AVES AMBULATORIÆ. LAND BIRDS.

5. *Rasores*, Scrapers or Gallinaceous Birds: Pheasants, Grouse, Partridges.

Order.

6. *Gemitores*, Cooers: Pigeons.
7. *Deglubitores*, Huskers, or thick-billed granivorous birds, as Finches, Buntings, Larks.
8. *Vagatores*, Wanderers, as Crows and Starlings.
9. *Cantatores*, Songsters, as Thrushes, Warblers, Wrens.
10. *Scansores*, Climbers, as Woodpeckers.
11. *Reptatores*, Creepers, as Creepers and Nuthatchers.

SECTION III. AVES GRALLATORIÆ. WADING BIRDS.

12. *Palpatores*, Gropers, as Rails, Gallinules, Coots.
13. *Cursitores*, Runners, as Plovers.
14. *Exploratores*, Probers, as Snipes and Curlews.
15. *Expectatores*, Watchers, as Herons.

SECTION IV. AVES NATATORIÆ. SWIMMING BIRDS.

16. *Cribratores*, Sifters, as Geese and Ducks.
17. *Urinatores*, Divers, as Grebes, Divers, Auks, and Guillemots.
18. *Mersatores*, or Plungers, as Gannets, Gulls, Terns.
19. *Spoliatores*, or Robbers, as the Jagers.

Each of these orders contains several families, under which the genera are arranged.

The species of each family may be disposed in a circular manner, or parallel to each other, or in various ways; and many of the families may be viewed as representing each other in their several stations. Thus, the Rasores or Scrapers are analogous to the Cribratores or Sifters, as well as to the Palpatores or Gropers; and the Raptores of the first section are represented by the Vagatores of the second, the Serpent-eaters of the third, and the Spoliatores of the fourth. All the genera, in fact, may easily be arranged in a circle, and that so as to preserve several of their affinities. It is not, therefore, of much importance whether we commence our descriptions with one class or another; and, for various reasons, I prefer beginning with the Rasores, the first order of the Terrestrial Birds.

In describing the birds of a very small portion of the globe,

it is impossible to exhibit the relations of the different species and genera, without entering upon considerations the development of which would occupy more space than could with propriety be devoted to it. I do not, therefore, profess to add a new system to the many already in partial use, or that have passed away like their authors. Those of Linnæus, Latham, Blumenbach, Illiger, Vieillot, Temminck, and Cuvier, may all be said to be extinct, for none of these worthies can muster half a dozen followers at the present day. Indeed their systems were never generally adopted even in a single country of Europe. Methods spring up and die like mushrooms, and for the same reason:—they are composed of flimsy and unsubstantial materials, easily elaborated; and having no solid frame to give them stability, they fall suddenly into decay, withered by the breath of criticism, which but serves to invigorate that which is possessed of real stamina. My object, therefore, in offering the above sketch, is merely to disclose the order which I conceive to be best adapted for the present work.

The first section, or the Aërial Birds, I reserve for a separate volume, both because I have recently published a short account of the Rapacious species, which is not yet out of print, and because I am desirous of obtaining additional information respecting them before giving their extended history to the public. The second section, or that of the Terrestrial Birds, affords the materials for the present volume, in which are described the orders Rasores, Gemitores, Deglubitores, and Vagatores; the Scrapers, Cooers, Huskers, and Wanderers; or the Gallinaceous Birds, Pigeons, Conirostral or Granivorous Birds, and Omnivorous Birds, of authors.

The nomenclature and sectioning are matters on which I cannot expect that my readers should all agree with me. I have endeavoured to render them as consistent with nature as I could; but, after all, they must ever be in some measure arbitrarily dealt with.

REMARKS ON THE STRUCTURE OF BIRDS.

Birds constitute the second class of Vertebrate Animals, and are characterized by having an internal skeleton; a twofold, that is, a general, and a pulmonic, circulation; as well as a double respiration, the air passing beyond their lungs into cells distributed through various parts of the body, and even into some of the bones; by being warm-blooded, oviparous, furnished with four extremities or limbs, of which the two anterior are converted into wings; and by having their skin covered with feathers. The last circumstance is peculiarly distinctive of the class. They never approach in magnitude to many species of Mammalia, Reptiles, and Fishes; and, being organized for flying, are proportionally lighter than animals of equal dimensions belonging to those classes. Their specific gravity, in fact, is less than that of water, so that they all float on the surface of that element, and many of them are adapted for swimming upon it, or for plunging or diving into it. By far the greater number, however, are confined to the air, most of them obtaining their food by walking on the ground or on trees, while a few procure their prey on wing, and are incapable of walking without difficulty.

Although it is unnecessary to enter here into a minute explanation of all the organs of birds, I consider it expedient to describe as much of their structure as may enable the reader not previously acquainted with their anatomy to follow me through the various details which I shall have to present. I will therefore give an outline of the osseous, digestive, and dermal systems, accompanied by illustrative figures.

The Skeleton of birds is composed nearly of the same parts as that of the Mammalia, but with modifications suited to the peculiarities of their kind of life. As in man, it is divided into the head, the neck, the trunk, the anterior, and the posterior extremities.

The Head, which is generally small, is at an early age com-

posed of several distinct bones, which, however, soon unite, so that all traces of their sutures become obliterated. In the skull properly so called, or cranium, there are two frontal, two parietal, two temporal bones, with an occipital, a sphenoid, and an ethmoid. The cavity formed by these bones is in some measure divided into two portions, of which the anterior contains the cerebrum, while in the posterior are lodged the cerebellum, the optic lobes, and the medulla oblongata. The face is composed of the nasal, intermaxillary, malar, lachrymal, superior maxillary, and palatal bones, with the vomer, and the lower maxillary bone. The upper jaw, composed of all the bones mentioned except the last, is united at its base with the frontal, the ethmoid, and the temporal bones, but in such a manner as generally to allow a considerable degree of motion, which is not however effected by joints properly so called, but by the elasticity of the parts. Viewed from beneath, it presents two outer or anterior, and two posterior, slender branches, which are articulated behind to a bone of irregular, somewhat square form, named the tympanic bone, or os quadratum, which is itself articulated to the temporal bone, and forms the anterior edge of the cavity of the ear, having the membrane of the tympanum attached to its posterior margin. This arrangement, owing to the motion given to the tympanic bone, and the elasticity of the parts at the junction of the frontal and nasal bones, allows the upper mandible a degree of motion varying in the different families. The lower jaw of an adult bird is formed of a single bone, having the sides generally thin and nearly vertical, and articulated to the tympanic bone.

FIG. 1. *Skull of Raven.*

Fig. 1 represents the skull of the Raven, *Corvus Corax*, viewed laterally. The occipital bone, *a*, originally composed of four pieces, the anterior or basilar; the posterior, spinous, or superior; and the two lateral or condyloid. The temporal bone is composed of the petrous portion, *b*, containing the ear; the

squamous portion, *c*; to which is articulated the tympanic portion, or os quadratum, *d*. The parietal bone, *e*, intervenes between the occipital and the frontal. The latter, *f*, besides forming the anterior part of the covering of the brain, also constitutes the upper edge of the orbit or cavity in which the eye is lodged, its posterior process, *g*, bounding it behind, while its antorbital process, *h*, margins it before, and is connected with the lachrymal bones. The lower part of the orbit is thus left incomplete, as it is in various degrees in all birds, excepting some of the parrots. The sphenoid bone is originally composed of several distinct parts: a basilar portion, united to that of the occipital bone; two orbital plates, *i*, constituting part of the orbits and of their septum; two cranial plates, *j*, corresponding to the wings, and forming the posterior part of the orbits; and two pterygoid or interarticular portions, *k*, which are articulated posteriorly to the tympanic bones. The ethmoid bone forms the anterior portion of the septum of the orbits, *l*, and separates them from the cavity of the nose. Excepting the os quadratum, *d*, and the pterygoid process of the sphenoid bone, *k*, these bones are all anchylosed or united in the Raven and other Crows, as is indeed the case with most adult birds.

The Face is primarily divided into the upper jaw, *m*, formed of a number of bones, and the lower jaw, *n*, formed of a single bone. The nasal bones, *o*, occupy the basal part of the upper jaw, and bend obliquely downwards behind the nasal cavity. The lachrymal bones, *p*, are articulated with the antorbital process of the frontal bone, *h*, the nasal, *o*, and the malar bones. The latter, *q*, are here articulated posteriorly with the lachrymal bones, anteriorly and above with the nasal, and below with the long slender process of the upper maxillary. The intermaxillary bones, *r*, form the greater part of the upper mandible, extending from its extremity along the ridge and sides, and are united with the superior maxillary bones. The latter, *s*, are generally small. They send a long slender process, *t*, backwards, along the edge of the upper mandible, to be articulated to the tympanic bone, *d*. This process is by some considered as analogous to the zygomatic arch, and

by others held to be the malar bone. The palatal bones, forming the roof of the mouth, are scarcely visible in this view. The vomer separates the cavity of the nostrils, *u*, when complete.

FIG. 2. *Cranium and Upper Jaw of Raven.*

Fig. 2 represents the cranium and upper jaw of the Raven, viewed from below. The occipital bone, *a*, *b*, *b*, *c*, of which *a* is the basilar or anterior portion; *b*, *b*, the two lateral portions; *c*, the posterior. The occipital foramen for the passage of the spinal cord is seen, of a somewhat triangular form, having on its anterior margin a small hemispherical prominence for the articulation of the first cervical vertebra. The temporal bones, *d*, *d*. The tympanic bone, or os quadratum, *e*, *e*. The basilar portion of the sphenoid bone, *f*; its pterygoid bones or ossa quadrato-palatina, *g*, *g*; and its large orbital plates, *h*, *h*. The palate bones, *i*, *i*. The malar bones, *j*, *j*. The os quadrato-maxillare, *k*, *k*, or slender process of the upper maxillary bones, *l*, *l*. Lastly, the intermaxillary bones, *m*, *m*, of which the superior part is seen behind the aperture of the nares, *n*.

The lower jaw, Fig. 1, *x*, *n*, originally composed of twelve pieces, which remain more or less disunited in many of the waders and aquatic birds for a considerable time, is here completely ossified. Its two thin, broad, erect sides, are named the rami or branches, *v*; the union of which anteriorly, from *w* to the point, is named the symphysis, and determines the outline of the lower horny mandible. Behind the middle of the ramus, there is in many cases a vacuity, *y*, in others two, and sometimes none. The part by which the articulation is effected with the os quadratum, *z*, is the condyle, and is of various forms, with several processes in its vicinity.

The upper jaw preserves a degree of mobility in its union with the cranium, which is effected by the medium of the slender quadrato-maxillary bone, Fig. 1, *t*, Fig. 2, *k*, by which the motion of the os quadratum, Fig. 1, *d*, is communicated to

the maxillary bone, *s*. The lower jaw admits only of a direct hinge-like motion. Both together constitute the general organ of prehension in birds, and undergo great modifications of form, according to the nature of the food.

It is only necessary further to observe here that the skull contains the cerebrum, cerebellum, and optic lobes, constituting the central organ of the nervous system; that in the temporal bone, Fig. 1, *b*, is contained the organ of hearing; while in the large cavities formed between the cranium and face, at *g*, *h*, *p*, named the orbits, are placed the organs of vision; those of smell being situated in the cavity at the base of the upper jaw, *o*, *s*; and that the organs of taste and deglutition, with the entrance of the respiratory apparatus, are placed in the mouth and throat.

Plate I. represents the skeleton of the Golden Eagle, *Aquila Chrysaëtus*, reduced to one fourth of its natural size. The parts already spoken of may, for the most part, be readily traced in the head, which has an additional small bone, appended to the lachrymal, and named the superciliary. It is the basis of the thin-edged projection which gives a peculiar character to the eyes of the birds of prey. The cranium is marked *a*, the upper jaw *b*, the lower *c*.

The vertebral column, or spine, along the centre of which runs the spinal cord, is divided into three regions: the cervical, from *d* to *e*; the dorsal, from *e* to *f*; the sacral, or united lumbar and sacral, from *f* backwards; and lastly, the caudal or coccygeal, *g*. The number of vertebræ, or pieces of which it is composed, varies much in this class of animals.

The cervical vertebræ, *d*, *e*, are here thirteen. The articulation of the skull with the first takes place by a single condyle, or hemispherical knob, seen in Fig. 2, and a corresponding depression in the first cervical vertebra, which is of an annular form. This sort of joint allows a much freer motion than in the mammalia. The other vertebræ are articulated by alternate concave and convex surfaces, but so as to permit extended motion, the upper vertebræ moving more easily forwards, those in the middle backwards, and the lower forwards or downwards; in consequence of which the ordinary flexure of the

neck resembles the letter *f*. The spinous processes, *h*, *h*, are generally very small, unless in the lower vertebræ. The transverse are large, directed forwards, and have a pointed process, *i*, *i*, analogous to a rib, and affording attachment to the muscles of the neck.

The length of the neck varies exceedingly, being dependent upon the nature of the food. It therefore in land birds, and the waders, bears a proportion to that of the feet; but in those swimming birds which reach at their food under the water, as the swan, it is greatly elongated, while the feet are short. The number of vertebræ varies from nine in the sparrow to twenty-three in the swan; but in general it is from twelve to fifteen.

The dorsal vertebræ, from *e* to a little beyond *f*, are those forming the region of the back properly so called, and to which the ribs are attached. They vary in number from six to eleven, being generally seven or eight, which is also the number of the ribs. Here it is observed that six of them, from *e* to *f*, are free, with thin projecting spinous processes, while the two posterior are united with the large bone extending backwards beyond *f*. They are generally shorter than the cervical, are not articulated by intervening cartilages; and in many birds, some of them, generally those nearest the sacrum, are anchylosed. Their bodies are usually much compressed, and the anterior have inferior spinous processes, to which some of the muscles of the neck are attached. The transverse processes are articulated with the ribs, which are also joined to their bodies.

The vertebræ of the back having to sustain the other parts, and withstand the shock of the muscles, in flying, the reason of their partial anchylosis is easily understood. But such an union is still more requisite in the posterior vertebræ, which have to support the generally more or less horizontal body, in standing and walking, and transfer its weight to the legs, which are articulated far behind the centre of gravity. The lumbar and sacral vertebræ are therefore anchylosed, and moreover united with the pelvis, to form the great mass of bone extending from *f* to *g*. These vertebræ, commonly named

sacral, of which the number can be determined only by counting the foramina by which the spinal nerves issue, vary from seven to twenty, and in the Golden Eagle are eleven.

The caudal or coccygeal vertebræ, *g*, vary from six to nine, and in the present bird are eight. They are narrow, generally mobile, with superior and inferior spinous, and frequently with transverse processes. The last bone is much larger, of an irregular oblong form, without processes, much compressed; and affords a basis to the tail-feathers.

The Body, properly so called, is composed of the dorsal, sacral, and coccygeal parts of the vertebral column above, laterally of the ribs and pelvis, and beneath, of the sternum, together with the soft parts contained in it, and those without. Its anterior part is named the thorax, the posterior the pelvis.

The Thorax is composed of the dorsal vertebræ, the ribs, and the sternum. It contains the heart, the lungs, the liver, the lower part of the œsophagus, and a portion of the intestine, besides vessels and nerves. The ribs, *k*, *k*, *n*, *n*, vary in number from six to eleven, and in the Golden Eagle are eight. That part of them which is nearest the sternum, *m*, is not cartilaginous, as in the Mammalia, but bony, whence two sets of ribs are described by authors, the dorsal and the sternal. In plain language, each rib is divided into two parts, one, *l*, attached to the dorsal vertebræ, the other, *m*, to the sternum, both meeting with a moveable articulation, *k*. The ribs have two attachments to the vertebræ, one by their head to the body, the other by the angle to the transverse process. From about the middle of their dorsal or upper portion, a thin slender process, *n*, *n*, passes obliquely upwards and backwards, over the next rib behind, by which the strength of the thorax is obviously augmented. These processes do not exist on the first rib, which is generally incomplete below, nor on the last, where it would be useless.

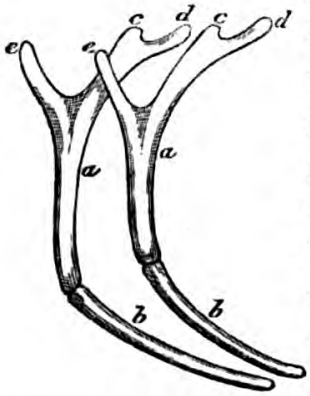


FIG. 3. *Ribs of Golden Eagle.*

Fig. 3 represents two ribs of the Golden Eagle:—*a*, *a*, the vertebral portion; *b*, *b*, the sternal portion; *c*, *c*, the angle or

process by which the ribs are articulated to the transverse processes of the dorsal vertebræ; *d*, *d*, the heads of the ribs articulated to the bodies of the vertebræ; *e*, *e*, the thin laminar processes.

The thorax is completed anteriorly by the sternum, which is marked in Plate I. by the letters *o*, *p*, *q*; but which, form-

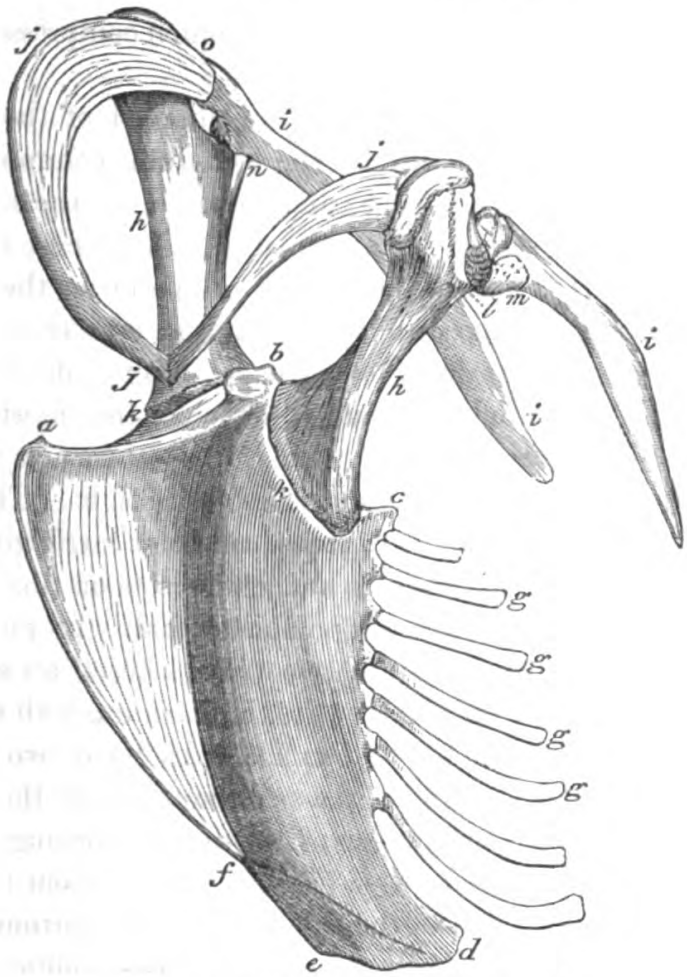


FIG. 4. *Sternal Apparatus of Golden Eagle.*

ing with the clavicles and scapulæ, perhaps the most curiously modified part of the skeleton of birds, requires a separate illustration.

Fig. 4 then represents the Sternal Apparatus. In it are seen the sternum, *a*, *b*, *c*, *d*, *e*, *f*; the seven sternal ribs, *g*, *g*, *g*, *g*; the coracoid bones, *h*, *h*; the scapulæ, *i*, *i*; and the furculæ, *j*, *j*, *j*. As is seen in Plate I, the sternum is a large expanded

plate, extended over the whole anterior part of the thorax, and even covering more or less of what may be considered the abdomen. In the Golden Eagle, Fig. 4, it is of an elongated quadrilateral form, deeply concave internally, and having a prominent ridge or keel along the middle externally, so that, especially with the costal ribs appended, it forcibly reminds one of the form of a ship. It varies greatly in the different tribes of birds, insomuch that it has been proposed as a basis for a methodical arrangement of the class, but in all is more or less four-sided, and externally convex. In the present case, its anterior margin has a medial prominence, *b*, named the manubrial process, to which is attached a ligament from the furcula, *j*; and two oblique lateral grooves, *k*, *k*, in which are fitted the lower ends of the coracoid bones, *h*, *h*. The lateral edges, *c*, *d*, are nearly straight, and afford attachment to the ribs, *g*, *g*. The posterior margin, *d*, *e*, is nearly straight and transverse. In other species, however, it is variously cut into by sinuses or notches, and consequently exhibits a great diversity of appearance. One object of the large sternum of birds being to afford a basis to the powerful muscles by which the wings are moved, its surface is expanded, and in the median line elevated into a projecting lamina, *a*, *f*, named the crest or ridge, by which the muscular masses are kept from blending together. This part, by its greater or less size, indicates a corresponding degree of power in the pectoral muscles, and consequently the strength of flight, although by no means the actual velocity, which depends upon the form of the wing as much as upon the vigour of its muscular apparatus. In the ostrich and other birds of its family, of which the diminutive wings are not used for flying, the crest of the sternum is wanting. This bone has received so extended a development partly to afford a support to the wings, the rapid and powerful motions of which rendered such an arrangement necessary. These organs come next to be spoken of.

The Anterior Extremities of birds are modified so as to render them subservient to the aërial progression which these animals have in common with Insects. They are converted into wings by having appended to them series of long stiff

feathers, variously proportioned, according to the kind of flight required by the species; and as they are not used for supporting it on the ground, as in quadrupeds, or for enabling it to cling to an inclined surface, the claws are obliterated, and even the fingers so modified as to be scarcely distinguishable. The coracoid bone, *h*, resembling the clavicle in man and quadrupeds so much as generally to have been mistaken for it, is on the contrary considered analogous to the coracoid process of the scapula in the mammalia, while the furcular bone, *j*, is taken for the acromial process. These parts, however, being very remarkably modified in birds, I shall speak of them as the coracoid bones, *h*, *h*; the scapulæ, *i*, *i*; and the furculæ, *j*, *j*.

From the anterior margin of the sternum, in an elongated fossa of which they are articulated, proceed obliquely outwards the two coracoid bones, or posterior clavicles, *h*, *h*, which are the strongest of those forming the shoulder, and afford the chief support to the wing. Near its anterior extremity, on the outer side, is a small hollow, *l*, which, with a corresponding one on the scapula, *m*, forms the glenoid cavity, for the reception of the head of the humerus.

The scapula, *i*, *i*, is a narrow elongated bone, flattened towards its posterior extremity, generally curved, and lying over the ribs. At its anterior end it is articulated to the coracoid bone behind the glenoid cavity, *n*, and by a process to the furcula, *o*.

The furcula, or anterior clavicle, *j*, *j*, *j*, varies extremely in the different families of birds. It commonly presents the appearance of a single bone, bent so as to resemble a V or U; but in some few cases its two sides are not united below. Sometimes its angle is anchylosed to the sternum, but more commonly connected by a membrane with it. The use of this bone being to prevent the humeri from being driven inwards by the action of the pectoral muscles in flying, it is stronger, and has a wider arch, in those species which have the most powerful flight.

Turning again to Plate I, where the coracoid bone is marked *r*; the furcula, *s*, *s*; and the scapula, *t*; we can trace the other bones of the wing, which resemble those of the human arm.

The os humeri, or arm-bone, *u*, *u*, is of a cylindrical form,

greatly enlarged and flattened at its anterior end, at the extremity of which is the articular surface corresponding to the glenoid cavity, *l*, *m*, in Fig. 4. The upper edge or crest of this enlarged part is curved a little forwards, and affords insertion to the pectoral muscle, which pulls the wing downwards; while its lower edge is rounded and curved backwards. Behind this part is an orifice by which the air gains access to its cavity. The outer extremity of the bone is also flattened, curved a little outwards, and presents two rounded surfaces, the lower, larger for the ulna, the other for the radius. This bone varies extremely in length, being very short in the Swallows, of moderate length in the Gallinaceous birds, longer in the Crows, very long in the Gannets, and excessively elongated in the Albatross. In the Golden Eagle, it is also seen to be of great length. As the power of the wing depends partly upon the size of the quills, the elongation of the humeral bone does not correspond with the velocity of the bird; but in those species which have a buoyant flight, produced by a slow motion of the wings, it is always long.

The cubitus, or fore-arm, is composed of two bones, the ulna, *v*, *v*, and the radius, *w*, *w*. The former is a cylindrical bone, enlarged at both extremities, and generally marked by the attachment of the cubital quills, or those usually termed secondaries. The radius is nearly of the same form, but more slender.

The carpus, between *v*, *w*, and *x*, is formed of two small bones, intervening betwixt the anterior extremity of the radius and ulna, and the metacarpus, so as to confine the motion to flexion and extension. The metacarpus, *x*, is usually formed of two bones, united at both extremities. At its base externally is a single small bone, *y*, free or anchylosed, which is analogous to the thumb, and to which are attached the feathers of the pinion, alula, or bastard wing. Appended to the outer metacarpal bone are usually two digital bones, *z*; and generally to the inner a smaller bone of the same nature. The quills named primaries, usually ten in number, correspond to the metacarpus and digits.

The inferior extremity is attached to the pelvis, which in

birds is united to the sacrum, forming a large mass of bone indicated in the plate by the letters *f*, *j*.

The pelvis, which is always open in front, excepting in the Ostrich and American Rhea, is composed, as in the Mammalia, of the ilium, ischium, and pubes, denoted by the Greek letters, α, β, γ. The ilium is anchylosed with the sacrum, and generally with the two posterior dorsal vertebræ, as well as with the ischium, and frequently the pubes, which latter is a long narrow bone curving backwards, and not meeting its fellow on the opposite side, as in the mammalia. The ischiadic notch, δ, is closed behind by the union of the ilium and ischium; and the obturator foramen, ϵ, is generally completed by the pubes, but sometimes merely forms a notch. The great size and solidity of the pelvis were rendered necessary for the support of the bird, which, when not flying, is essentially bipedal; and its separation in front, for facilitating the passage of the eggs.

The os-femoris or thigh-bone, ζ, is cylindrical, slightly curved, with a single large trochanter, and a small hemispherical head, standing off at right angles to the body of the bone, without a neck. Its lower extremity has two condyles, η, η, to which the tibia, θ, is articulated, but to the outer of which the fibula, ι, is also joined. Anterior to the joint is seen the small patella connected as usual with the tibia by a ligament. The thigh-bone is generally very short, and being concealed in the body, leads superficial observers to consider the leg as the thigh.

The leg, composed of the tibia θ, and the fibula, ι, is always much longer than the femur. The fibula is merely a slender, gradually attenuated bone, generally adherent to the tibia, which is straight, of a triangular form above, and flattened below, where it is articulated by two condyles.

The tarsus and metatarsus are united so as to form a single bone, generally named the tarsus, λ, λ, which varies greatly in length and size, as well as in form, being roundish, square, flattened transversely or compressed. At its upper extremity it has two cavities corresponding to the pulley of the tibia, generally with an intervening prominence or tubercle in front, which being received into a depression of the tibia, tends to strengthen the joint when the bird is standing. At its lower

extremity are three prominences for the articulation of the toes. In most birds there is at the inner and back part a small bone, μ, sometimes anchylosed, to which the hind toe is attached.

The toes, 1, 2, 3, 4, are never fewer than three, or more than four, unless the spur of the Gallinaceous birds might be considered as the first toe, in the same manner as that on the first digit of the wing has been by some. In very many birds the first or hind toe is wanting, and in others reduced to a rudimentary state. The toes vary extremely in their length and direction. In all birds the outer or fifth toe has five bones, the fourth or middle toe four, the third or inner three, the second or hind toe two, and the first or the spur one. Some birds however have naturally two spurs or even more on the tarsus. The spur, being merely a rudimentary toe, cannot be in the least degree indicative of an analogy between the Gallinaceous Birds and Ruminating Quadrupeds, as Mr. Swainson appears to consider it. The horns of a bull might as well be viewed as hoofs placed on his head for special purposes, and the horny mandibles of birds as claws appended to the jaws as a substitution for the fingers.

This superficial inspection of the osseous system of Birds will suffice to render the relations of the external parts intelligible, and prevent the student of ornithology from falling into those strange mistakes to which persons are liable whose knowledge is not more than skin deep. I may be allowed to adduce a few examples from "the Natural History and Classification of Birds, by William Swainson, Esq." "The leg," he says, "is obviously divided into three parts: 1. the thigh; 2. the shank or tarsus; and 3. the foot itself, composed of the toes. The thigh is subject to very few variations beyond relative length, and in being more or less clothed with feathers. In aquatic birds it is generally naked before it reaches the knee joint." Never, in any aquatic bird, is the thigh naked; but it is obvious that Mr. Swainson is not aware that birds have a thigh, or that part of which the bone is marked ζ in Plate I. The knee joint, which he considers to be at η, is at $\varkappa$, as a little reflection might shew any person, and what he calls the thigh is the leg or tibia. Again, "the *humerus*" (referring to

the extremity of the cubitus) " is generally termed the shoulder; the *flexum*" (pointing to the wrist) " is the shoulder joint; and the *axilla*" (reference to the pollex), " which corresponds to the *cubitus*, is commonly called the shoulder margin." Errors like these are deplorable, more especially as their author is in many respects an estimable writer. To mistake the wrist joint for the shoulder joint is a blunder which might have been avoided by inspecting a skeleton, or even feeling for the bones in the wing of any common bird.

The Muscles of birds are generally of a deep red colour, their fasciculi remarkably distinct, their tendons glistening and peculiarly liable to become ossified, especially those of the inferior extremities. In the Gallinaceous species, however, and some others, the muscles are often very white. It is not necessary here to enter into a particular description of these organs of motion; but as the mechanism of the wings is of especial interest, and as I shall often have occasion to speak of the flight of birds, it may be well to endeavour to afford some general description of it.

The bones of the wing have already been pointed out in the skeleton of the Golden Eagle, and are again represented in Plate III, Fig. 1. It may here be further stated with respect to them that the frame-work of the wing is composed of a series of bones fixed by a joint to the solid apparatus of the scapula and clavicles, and folding up by hinges into three pieces, the humerus, the cubitus, and the hand, so as, when not in use, to be conveniently disposed of by the side of the body. The first bone, the os humeri, or bone of the arm, or brachial bone, *b*, *c*, is articulated by a small rounded surface to a corresponding cavity formed between the coracoid bone, *b*, and the scapula, *a*, in such a manner as to allow great freedom of motion. When at rest this bone is directed backwards, more or less parallel to the spine. Its distal extremity forms, with the proximal extremity of the cubital bones, the ulna and radius, *c*, *d*, an oblique hinge-like joint, *c*, which allows the cubitus to be folded up parallel to the brachium, and nearly in the same plane. The third portion, the hand, *d*, *e*, *f*, on the contrary, is jointed so as to fold under the cubitus in a perpendicular

plane. These solid parts are moved upon each other, and upon the scapula, by a complicated muscular apparatus; and the arm, thus constructed, is converted into an instrument of flight by having appended to its posterior edge a large lamina or plate, composed of a series of strong, elastic feathers, named quills, and varying in firmness, form, length, and relative proportion, according to the kind of flight necessary for the species. When about to be employed, the parts, which in a state of rest were folded up, are stretched out so as to unfold the feathers somewhat in the manner of a fan, and form a horizontally expanded lamina, which being alternately raised and forcibly pulled down, furnishes a lever by which the body is elevated into the air; when, by repeated strokes, by which the wing is alternately drawn upwards, forwards, and inwards, and then more forcibly outwards, downwards, and backwards, the bird advances, directing its course by the tail, but more especially by a difference in the action of the two wings.

In Plate II. is represented the wing of a domestic Pigeon, *Columba Livia*, deprived of all its feathers excepting the quills, and viewed, first from above, Fig. 1; then from beneath, Fig. 2. In these figures, *a*, is a portion of the body; *b*, *c*, the humerus; *c*, *d*, the cubitus; *d*, *e*, the carpus and metacarpus; *e*, *f*, the digital bones; *g*, the pollex. The ten quills attached to the hand, from *d* to *f*, are the primary quills; those attached to the cubitus, from *c* to *d*, are the secondary quills. They are arranged, as is observed, in two distinct sets. Those on the first finger, *g*, are named the alula, or spurious wing: they are few, and of small size. Besides these, there are large feathers, not however so strong, attached to the skin along the edge of the humerus, *b*, *c*; but these, which are named tertiary quills, have been removed. Now the order of nomenclature, if numerical, ought to have commenced at the part nearest the body; those on the first joint or brachium, ought obviously to have been named primary; those on the second, secondary; those on the third, tertiary. A decidedly preferable mode, however, is to name the quills according to their relations: those on the arm, brachial; on the fore-arm, cubital; on the hand, digital; on the outer finger, alular.

Plate III. represents the muscular apparatus of the wings, seen after the feathers and skin have been removed. Fig. 1. shews the bones, which have already been explained. In Fig. 2, which represents the wing seen from above; and in Fig. 3, representing it seen from beneath, the regions are marked as in the figures of Plate II.; *a*, being a portion of the body; *b*, *c*, the brachium or arm; *c*, *d*, the cubitus or fore-arm; *d*, *e*, the carpus and metacarpus; *e*, *f*, the digital bones; *g*, the pollex. The muscles to be described are: 1*st*, those inserted into the scapula; 2*dly*, those inserted into the brachial bone; 3*dly*, those inserted into the hand. In the figures the same muscles bear the same numbers.

I. Muscles inserted into the scapula.

1. The first muscle is the *trapezius*, which, arising from the spines of the last cervical and all the dorsal vertebræ, excepting the last two, is inserted into the dorsal edge of the scapula and the extremity of the furcula. Its action is to draw the scapula towards the spine, and to fix it during flight.

Under this are the *rhomboideus*, which passes from the spines of some of the anterior dorsal vertebræ, to the dorsal edge of the scapula; and the *levator scapulæ*, which, arising from the transverse process of the last cervical vertebra and a few of the anterior ribs, is inserted into the dorsal edge of the scapula, which it pulls upwards and forwards.

2. The *serratus magnus anticus* arises by digitations from the last four ribs excepting two, and is inserted into the extremity of the scapula. A slender slip, 2 *a*, separates from it, to be inserted into the skin of the posterior edge of the brachium.

There is also a *serratus parvus anticus*, or *costo-scapularis*, which arises in like manner from the first two ribs, and is inserted into the anterior part of the lower edge of the scapula.

II. Muscles inserted into the humeral or brachial bone.

3. The two superficial slips seen on the back are analogous to the *latissimus dorsi* in man. They arise from the spinous processes of the last cervical and some of the anterior dorsal

vertebræ. The first, 3 *a*, is inserted into the coracoid bone, the other, 3 *b*, into the middle of the linea aspera, or dorsal ridge of the humerus, which it draws toward the back.

The other muscles which arise from the trunk, to be inserted into the humerus, are situated in front.

4. *Pectoralis major*, Fig. 2, arises from the whole length of the crest of the sternum, from its posterior and lateral margins, and from the outer edge of the furcula, forming a triangular mass of vast size, sometimes exceeding in bulk all the other muscles of the body together. Its fibres run obliquely forwards and outwards, pass over the shoulder joint, and are inserted fleshy into the anterior or upper crest of the head of the humerus, and by a flat tendon where they cross the insertion of the next muscle. Its action has not been correctly described. Its anterior part raises the humerus, and brings it forward; its middle part brings the wing downward; and its posterior part brings the humerus backward, close to the body. Its combined action is powerfully to depress the wing, and bring its anterior edge downward, by which the quills are obliquely raised.

5. Under the great pectoral muscle is seen, in Fig. 4, the *pectoralis medius*. It arises, properly speaking, over the other, from the whole length of the under surface of the sternum, and the upper half of its crest, and from the fore edge of the coracoid bone and the membrane between it and the furcula. The fibres converge into a central tendon, extending its whole length, which passes forwards between the coracoid bone and furcula, curves round the joint, and is inserted upon the upper tubercle or crest of the humerus, close to the insertion of the pectoralis major, and anterior to it. Although this muscle is similar in its origin to the pectoralis major, its action, owing to the direction of its tendon, is the reverse of that muscle, as it elevates the humerus and brings it forward.

6. The *pectoralis minor* is a small muscle which arises from the lower two-thirds of the outer edge of the coracoid bone and the anterior margin of the sternum, under the articulation of the ribs, forms a small round tendon, which passes outwards and forwards, and is inserted into a prominent internal tubercle of the humerus, which it pulls downwards and backwards.

7. Above and before the pectoralis minor is a small muscle, which arises from the upper part of the coracoid bone, and a strong fascia extended from its base to its extremity above, passes obliquely upwards, and is inserted anteriorly to the pectoralis minor. Its action is to draw the humerus directly downwards.

The muscles which arise from the scapula to be inserted into the humerus, are the following:

8. The *supra-spinatus*, Fig. 1, arises from the fore part of the scapula, and is inserted into the posterior or inner crest of the humerus externally of the tendon of the pectoralis minor.

9. The *infra-spinatus* arises from the outer surface of the scapula as far as its extremity, and is inserted into the same prominence as the last. These two muscles draw the humerus backward.

The *subscapularis* arises from the fore part of the inner or under surface of the scapula, and is inserted into the same protuberance.

10. The *deltoides* arises from the fore part of the scapula, and from the top of the coracoid bone, its anterior fibres being in contact with those of the pectoralis major. Its anterior portion is inserted into the outer and back part of the edge of the anterior crest of the humerus, its posterior into that bone as far as the origin of the supinator radii longus, that is, for four-fifths of its length. A thin flap is attached to the skin in the bend of the wing. The deltoid muscle raises the humerus.

Under the deltoid is the *coraco-brachialis*, which arises from the tip of the coracoid bone and adjoining part of the scapula, and is inserted into the proximal part of the crest of the humerus. Its action is to pull the humerus forward and upward.

The muscles inserted into the cubitus or fore-arm come next in order; but it may be proper here to describe a very curious apparatus existing in the bend of the wing, anteriorly, between the shoulder and wrist joints, *b* and *d*. At that part the edge of the wing is formed by a fold of the skin enclosing an elastic substance, and edged with an elastic tendon or fibre, which has at its commencement at the shoulder joint a small muscle detached from the pectoralis major.

11. This muscle, named the *tensor plicæ alæ*, or stretcher of

the fold of the wing, has its terminal insertion in the prominence at the base of the metacarpal bone, at *d*. Another smaller slip comes off behind from the anterior ridge of the humerus, and immediately forms a very slender tendon, which passes along the humerus to the radius.

About the middle of the fold, at *h*, is a dense mass of cellular and elastic tissue, to which is attached a thin flap from the deltoid muscle, seen in Figs. 2 and 3 of Plate III, at *h*.

12. Besides which, there is a thin muscle arising from an aponeurotic base, from the lower part of the deltoid near its insertion, attached to the cellular mass, and sending off from its lower edge a very slender tendon, inserted along with that of the tensor plicæ. This muscle, which does not appear to have been previously observed, may be named the *retractor plicæ*. I have not met with it in any other birds than Pigeons. In the Thrushes its place seems to be supplied by an enlargement of the slender muscle of which the tendon is seen between 11 and 13, in Fig. 3, and which in them is inserted into the ulna.

III. Muscles inserted into the cubitus.

The muscles which move the fore-arm on the arm are two, a flexor and an extensor.

13. *Flexor cubiti*, or *biceps flexor*, arises tendinous from the upper extremity of the coracoid bone, passing, flat, under the insertion of the pectoralis major, and also from the flat surface and edge of the inferior crest of the humerus, runs along the anterior and inferior face of that bone, and is inserted by a short tendon into the radius, and by a more slender slip into the ulna, between the supinator radii longus, and pronator radii teres. Its action is to bend the cubitus on the humerus.

14. *Extensor cubiti* arises from the anterior extremity of the scapula, from the head of the humerus, by another distinct origin from the lower ridge of that bone, and from the greater part of its posterior edge or linea aspera, and is inserted by two tendons into the olecranon or upper extremity of the ulna. Its action is to extend the cubitus, and raise it a little.

IV. Muscles inserted into the hand.

As these muscles are numerous, it is expedient to describe them in the order in which they are seen in the two views.

Fig. 2, Plate III, represents the lower face of the wing. In it are observed the following muscles.

15. *Extensor metacarpi radialis longior*, or *supinator radii longus*. It is the muscle seen on the fore edge of the cubitus. It arises from the outer condyle of the humerus, fleshy and penniform, runs along the anterior edge of the fore-arm, and terminates in a tendon, which is inserted into the protuberance on the head of the radial metacarpal bone, anterior to the first digit. Its action is to bend the arm and extend the hand, or bring it into a straight line with the cubitus. The insertion of the biceps cubiti is between the head of this muscle and that of the pronator radii teres.

16. Of the muscles that arise from the inner condyle, the first or most external is the *flexor carpi ulnaris*, which comes off by a tendon from the lowest part of the condyle, passes along the inner and posterior side of the ulna, in contact with the bases of the cubital quills, and on the anterior side with the palmaris longus, and is inserted by a short tendon into the projecting point of the ulnar carpal bone, analogous to the os pisiforme. Its action is to bend the hand, or bring it back towards the fore-arm.

17. The *palmaris longus* arises from the inner condyle of the humerus, immediately above the flexor carpi ulnaris, and, covering the flexor carpi radialis, runs superficially over the flexor digitorum, and is inserted partly into the base of the posterior carpal bone, partly into the fascia which covers the lower surface of the metacarpus, partly into the ulnar carpal bone, and sends an extremely slender tendon along the radial metacarpal bone and the first phalanx, to be inserted into the base of the second phalanx. Its action is to bend or adduct the hand, and at the same time extend the digit.

18. The *flexor digitorum* is a small muscle arising under the palmaris longus from the inferior and posterior surface of the ulna, along four-fifths of its length, the upper fifth excepted. Its fibres pass obliquely forwards, and it sends off a very long tendon, which runs anterior and parallel to that of the palmaris

longus, and has a similar insertion. Another tendon also passes to be inserted into the base of the radial metacarpal bone, under that of the supinator radii longus.

19. The *flexor carpi radialis* arises from the inner condyle immediately below the origin of the pronator radii teres, and concealed by the palmaris longus. Its fibres pass obliquely forwards along the lower and posterior edge of the radius, in contact anteriorly with the pronator radii teres, and posteriorly with the flexor digitorum. It is inserted fleshy along the posterior edge of the radius. Its action is to draw the arm obliquely downwards and forwards.

20. Under these muscles is a shorter one which arises from the posterior edge and lower surface of the ulna for two-thirds of its length, and forms a short strong tendon, which passes over the wrist joint, to be inserted into the base of the radial metacarpal bone. Its action is to assist in extending the hand and bringing it into a line with the cubitus.

A thin fleshy muscle extends obliquely forwards from the outer edge of the ulna, in nearly its whole length, to be inserted along two-thirds of the lower surface of the radius. It is a pronator of the radius, which, although fixed when the wing is extended, has considerable motion when bent, in which case it tends to elevate the hand. This muscle is analogous to the *pronator radii quadratus.*

21. The most anterior muscle of those that come from the inner or posterior part of the lower extremity of the humerus is the *pronator radii teres.* It arises from the upper part of the inner condyle of the humerus, at a considerable distance up the arm, by a tendinous origin, passes obliquely outwards, in contact first with the insertion of the biceps flexor cubiti, then on the same or anterior side of the fore-arm with the extensor carpi radialis longior, and on the other side with the flexor carpi radialis; and is inserted into two-thirds of the length of the radius. Its action is to bend the fore-arm obliquely downwards and inwards.

The small muscles on the hand may be described afterwards. Let us now turn to the upper surface of the cubitus, seen in Fig. 2, Plate III.

The most external muscle, of which a portion is seen along and behind the ulna, is the *flexor carpi ulnaris*, 16, which has already been described.

22. The next muscle is the *extensor carpi ulnaris*, which arises from the lower extremity of the outer condyle of the humerus, runs along the middle of the fore-arm, with the ulna immediately behind, and terminates in a long slender tendon, which passes over a pulley at the extremity of the ulna, and is inserted into the posterior edge of the radial metacarpal bone. Its action is to extend the hand, and when extended, to bring it upwards. It is not by any means an adductor of the hand, as stated in several books.

23. *Extensor primi digiti* arises from the outer condyle of the humerus, runs along the fore-arm parallel and anterior to the last, and forms a very slender tendon, which, passing over that of the next muscle, goes to be inserted into the base of the bone of the first finger, which it draws upward and backward.

24. *Extensor digitorum* arises from the outer condyle of the humerus, and from the anterior edge of the ulna and the posterior edge of the radius; its tendon passes over the wrist joint, and runs along the radial metacarpal bone to be inserted into the last phalanx. Sometimes several slips are given off by this tendon. Its action is to pull the hand or pinion upwards and outwards.

25. *Extensor carpi radialis brevis* arises also from the inner condyle, and from nearly the whole length of the inner edge of the radius, and is inserted by a slender tendon into the prominence at the base of the metacarpal bone near that of the extensor carpi radialis longior, 15, already described, and which is the muscle on the anterior edge of the fore-arm.

There now remain the small muscles on the hand.

The first finger, *g*, has three muscles.

26. *Flexor primi digiti* arises from the base of the radial metacarpal bone, and is inserted into that of the first finger, which it draws downwards.

27. *Adductor primi digiti* arises from the metacarpal bone, and is inserted along the inner or posterior edge of that of the first finger, which it draws toward the next.

28. *Abductor primi digiti* arises from the insertion of the tendon of the supinator radii longus, 15, and draws the first finger outwards from the second.

29. *Abductor digiti* arises from the whole length of the outer edge of the radial metacarpal bone, and is inserted into the base of the first phalanx, which it draws forward.

30. *Adductor digiti* arises from the ulnar carpal bone, and the whole length of the ulnar metacarpal, and is inserted into the edge of the third or little finger, which is so firmly attached to the second as to have no motion of its own. The action of this muscle therefore is to draw the fingers outwards.

31. *Supinator* or *extensor digiti* fills up the space between the two metacarpal bones, and is inserted fleshy into the base of the first phalanx, and by a tendon into that of the second. It pulls the second finger upwards and backwards.

By this complex apparatus, then, the wings are made to perform all those powerful, delicate, and varied motions necessary for ordinary flight, for escape, pursuit, and the numberless inflexions used every day by birds in their usual avocations. These motions will be better understood by inspecting the figure than by following a laboured description, and still better by dissecting the wing of a Pigeon, or any other bird of moderate or large size.

The adaptation of the form and structure of birds to flying or progression in the air, is obvious and intelligible. Their body is oval, with the larger end forwards, and the more powerful muscles placed on the breast, so that when the horizontal direction is assumed, the centre of gravity comes between the wings, and is kept near the lower part by the weight of the pectoral muscles. The length and flexibility of the neck enable the bird to make the necessary changes in the centre of gravity, while the solidity of the dorsal spine gives advantage to the action of the muscles; the head is terminated by a pointed bill, which aids in cleaving the air; the feet, when short, are drawn up and concealed under the feathers; when long, stretched out beneath or beyond the tail, which is more or less expanded, and helps to support the body in the air, as well as, by acting in the manner of a rudder, to change its

direction, or by being stretched out to break its descent. In proportion to their bulk birds are also much lighter than any vertebrate animals, and their lightness is produced by the introduction of air into their tissue, and even into the bones, as well as by the great bulk of the feathers, which in those having a very buoyant flight, as Owls and Gulls, is much greater than that of the body.

When a bird intends to fly, it loosens its wings from their ordinary position, throws its body forward, and gives it a sudden impulse by means of the legs, which would merely produce a leap, but the wings being in the meantime spread out and elevated, they are again brought down with force, so that their points generally strike against the ground. Whether or not, they act as levers, and by repeated strokes, carry the bird upwards. Were its ascent vertical, the rapid action of the wings in the same plane would suffice to raise it, provided the downward stroke were much more powerful than the upward, the wing, moreover, being drawn in during the latter, and stretched out during the former. But, for progression in a horizontal direction, it is necessary that the downward stroke should be modified by the elevation in a certain degree of the free extremities of the quills, and that the pinion should be pulled backwards. The best subject in which to study the motions of the wings during flight, is one of the larger gulls, in which the wings being very long and the flight remarkably buoyant, and performed by slow beats, one may trace their alternations with ease, provided he be near enough. In these birds, the wings are never extended to their full length, the elbow-joint being always more or less bent, and the hand or pinion always inclined backwards. During the elevation of the wing, it is drawn in a little, the humerus is directly raised, but the cubitus inclines downwards to some extent, and the fore-edge of the hand is depressed, so that the primary quills are elevated, by which arrangement little resistance is offered to the air. Then the wing is stretched out, brought strongly down, first with its whole concave surface direct, but presently with the quills raised a little behind, so as to procure an oblique stroke on the air. The Gannet, when viewed at hand, shews these alternate motions still more decided-

ly. A person vaguely observing the flight of a bird might suppose that the wing is stretched out stiff, but on the contrary, it undergoes an undulatory motion during its descent. Many birds, however, as the Golden Eagle and the Raven, having given themselves a sufficient impetus by repeated vigorous exertions, can glide with extended wings over a considerable space. This mode of flying has by some been called sailing, but the nomenclature of flight is at present in a most barbarous condition, being confined to the general terms, flying, gliding, sailing, hovering, skimming, and a few others. Birds in flying always beat their wings synchronously, never alternately, even in executing rapid turns, which are effected by the contraction of one wing and the extension of the other, aided by the tail.

The modifications of flight are numerous, different families of birds, and sometimes even different species of a genus, exhibiting marked peculiarities with respect to it. Thus Grouse and Partridges, which have short, rounded, concave wings, fly by quickly repeated strokes; while Gulls and Terns, which have long, pointed, straight wings, fly by slowly repeated strokes, in a light and buoyant manner. The modifications in the form of the wing are not less numerous than those in the mode of flying; but as both will be amply illustrated in the following pages, it is unnecessary to treat of them here.

As connected with flight, however, it may be proper to say a few words respecting the tail, and the muscular apparatus by which it is moved.

Fig. 5. represents, as seen from above, the tail of a Thrush, *Turdus musicus*, from which have been removed all the smaller feathers and the skin. A portion of the sacrum and pelvis, *a*; the large tail-feathers or quills, *b*, *b*. These feathers have their basis supported by the last coccygeal bone, and firmly bound together by a strong ligamentous band, composed of interlaced fibres. On its upper surface rests the uropygial gland, celebrated by the field and closet naturalists, being one of the few points of the structure of a bird accessible to them, and containing a quantity of oily matter mixed with an aqueous fluid; while on its lower surface is a layer of cellular tissue containing a similar substance. Both are apparently destined for nourishing the

feathers, or, at least, are connected with their growth. I have observed that at the period of moulting, and especially when the tail-quills are growing, that they are very highly developed, and, as is well known, sometimes inflame and suppurate in domestic birds, whereas in birds of which the moult has been completed, I have generally found them greatly diminished, and frequently entirely shrunk. This fact, analogous to that of the periodical enlargement of the testes in birds, affords a key to the knowledge of the nature and use of the uropygial gland, which has hitherto eluded the sagacity of physiologists; for the application of the oil contained in it by the bill is certainly fanciful.

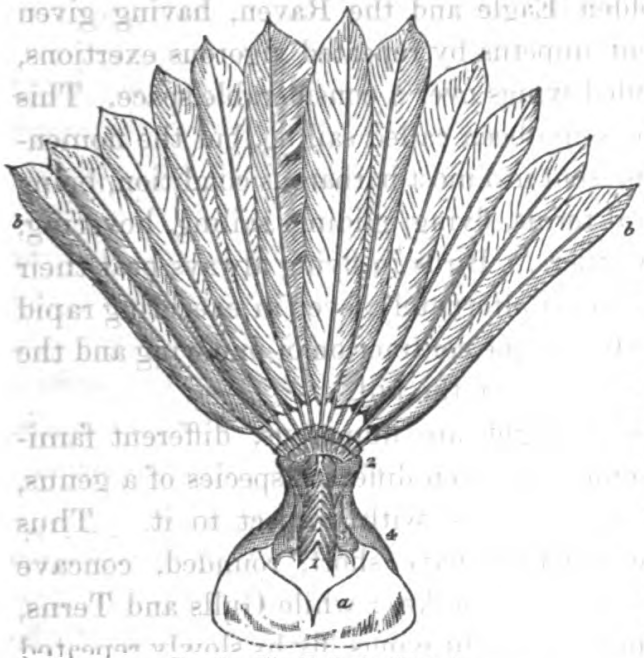


FIG. 5. *The Tail of a Thrush.*

The muscles seen in this view are:

1. The *levator coccygis*, which arises from the lower extremity of the sacrum, and from the sides of the coccygeal vertebræ, to be inserted into the tips of their spinous processes, and into the base of the last vertebra. This muscle is, in fact, rather a series of small muscles of which there is one for each vertebra. Its use is to elevate the tail in various degrees; and, when acting singly, to draw it obliquely to a side. It is opposed by the depressor coccygis.

2. The *quadratus coccygis* arises from the sides and transverse processes of the coccygeal vertebræ, and is inserted into the base of the ligamentous fascia investing the base of the quills, its fibres curving also round the edge of the tail, and being partly inserted beneath. Its action is to spread out the tail-feathers.

3. The *ischio-coccygeus* arises from the posterior edge of the ischium, passes laterally along the coccyx, and is inserted beneath into the edge of the last vertebra, and the adjoining part of the ligamentous fascia. It draws the tail laterally, and tends to depress it.

4. The *pubi-coccygeus* arises from the pubes and adjoining part of the ischium, and is inserted into the base of the fascia of the quills. Its action is to bend the tail to a side, and to spread the quills.

FIG. 6. *Lower Surface of Tail.*

Fig. 6. represents the lower surface of the tail; the feathers, *b*, *b*, being cut short, and the skin removed. The pubi-coccygeus, 4, is seen in its whole length; the ischio-coccygeus, 3, is also seen passing over the latter, and inserted into the last vertebra; as is part of the quadratus, 2.

5. The remaining muscle is the *depressor coccygis*, which is much more powerful than the levator. It arises from the posterior edge of the pelvis beneath, and from the sides of the vertebræ, to be inserted into the inferior spinous processes, and into the sides of the last vertebra. The action of the two muscles is to depress the tail; but when acting singly it draws it outwards and downwards.

The feet of birds afford a subject of observation as varied and interesting as the wings; but as numerous opportunities of describing them will occur in the course of the work, it is unnecessary to treat of them here. They vary in the proportional development of their parts, and even in the number of the toes, as well as in their position and degree of connection or separation, according to the different modes of progression used by the different species. Some birds walk by bringing their feet alternately forward, others by a simultaneous motion of these organs; some run with great velocity, while others are scarcely able to walk; some can hardly even stand; most birds walk only on a flat surface, but some are enabled to ascend a vertical plane; and many, by having their toes joined by membranes, have their feet converted into paddles, and are thus fitted for advancing on the water.

In flight the centre of gravity is brought forward beneath the origin of the wings; but in standing it is carried in various degrees backwards. As the legs are always articulated very far behind, it becomes necessary that they should be much bent, and that the toes should project anteriorly beyond the vertical line drawn through the centre of gravity, in order to give stability. When the feet are very short and placed far behind, whether the neck be long or not, the bird is obliged to stand and walk with the body nearly in an erect position; but when the bones of the leg are moderate or large, and especially when the neck is long and flexile, the feet are brought forward and the head backward, so that the body remains nearly in a horizontal position. Birds generally rest upon one leg, the other being drawn up towards the side; and many species are enabled to employ this attitude without fatigue by a peculiar arrangement of the tarsal joint, there being a process from the anterior part of the head of the metatarsal bone, which fits into a corresponding cavity at the lower end of the tibia, from which it is not again withdrawn without an effort on the part of the bird. Other birds are rendered secure during repose by the weight of the body, which, bending the joints of the legs, brings into a state of tension the long flexor tendons that go to the extremities of the toes, which they thus cause to grasp their perch. Some birds in reposing lie flat upon the ground, and this posture is that adopted by most species during incubation.

In walking, a bird throws its centre of gravity to one side, raises and brings forward the leg of the other side, impels the body forward by the foot that rests on the ground, shifts its centre of gravity to the other side, and thus continues, the neck all the while undulating from side to side. These motions are easily observed in heavy birds, as Geese and Ducks. In birds of a lighter form, as Pigeons and Crows, the alternate forward and backward motion of the neck during walking is very conspicuous and often graceful, and is of course employed for balancing the body. Those birds which move by hopping or leaping, throw the body forwards by bending all the joints of the legs, and then by suddenly extending them give it the necessary impulse, which causes it to perform a curve in the air. Some birds, as eagles, in thus leaping, use their wings also;

and others, as the ostrich and cassowary, which run with great velocity, employ their short wings to balance their bodies; but the more ordinary swift-footed birds, as the Plovers and Curlews, do not avail themselves of their wings in running.

On the water, birds are propelled like a boat, by means of their webbed feet, which act alternately in the manner of paddles. Those species which dive in pursuit of their prey, propel themselves under water by alternate motions of their feet, but also, and that more especially, by the synchronous action of the wings, which are used precisely in the same manner as in aërial flight, as I have frequently observed. A flock of Red-breasted Mergansers, in pursuit of sand-eels, in one of the shallow sandy bays of the Outer Hebrides, has frequently afforded me, from a concealed station on some prominence, a most interesting sight. These birds seemed to move under the surface with almost as much velocity as in the air, and often rose to breathe at the distance of 200 yards from the spot at which they had dived.

The Nervous System of birds, which, although less developed than that of some of the mammifera, is greatly superior to that of the other oviparous vertebrate animals, exhibits a remarkable uniformity in the structure and form of the brain and spinal marrow in the different tribes. Figs. 7, 8, and 9, represent the brain of a sparrow, *Passer domesticus*, as seen from above, Fig. 7; from behind, Fig. 8; from beneath, Fig. 9.

The Brain of a Sparrow.

FIG. 7.

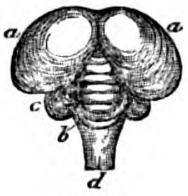


FIG. 8.

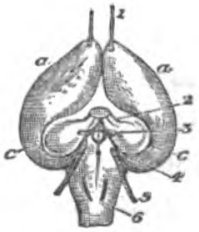


FIG. 9.

In Fig. 7. are seen, besides the bill and part of the skull, *x*, and the eyes, *z*, the *cerebrum*, composed of two lobes or hemispheres, *a*, *a*, which are destitute of convolutions, as well as of the corpus callosum or great commissure; and the *cerebellum*, *b*,

transversely grooved, and formed almost entirely of the middle lobe, which in the mammifera is comparatively small. In the posterior view, Fig. 8, are seen, besides the cerebral lobes *a*, *a*, and the cerebellum, *b*, the oval bodies, *c*, *c*, named *optic lobes*, analogous to the corpora quadrigemina in man, and situated between the cerebrum and cerebellum beneath; together with the *medulla oblongata*, *d*, a large uniform mass placed beneath the cerebellum and behind the optic lobes. In Fig. 9, representing the base of the brain, the same parts are seen, namely, the cerebrum, *a*, *a*, the cerebellum, *b*, the optic lobes, *c*, *c*, and the medulla oblongata, *d*, which is observed to be destitute of the prominences seen upon it in the mammifera. The numerals refer to the cerebral nerves. The first pair, or *olfactory*, 1, come off from near the anterior extremity of the cerebral lobes, pass along the septum of the orbits, and are distributed upon the pituitary membrane of the upper spongy bone. The second pair, or *optic nerves*, 2, are remarkably large, and unite so as apparently to be perfectly incorporated. Of the rest it is unnecessary to speak. The spinal marrow is generally of great length, and has two dilatations or enlargements, corresponding to the origin of the nerves of the wings and legs. The posterior enlargement is generally greater than the anterior, more decidedly so in those birds which do not fly. The spinal nerves correspond in number to the vertebræ, and therefore vary exceedingly. The brachial plexus is formed by the last two cervical and first two dorsal nerves; and the nerves of the posterior extremities are furnished by the posterior lumbar and the sacral nerves.

An intelligible description of the organs of sensation would occupy more space than can be devoted to the subject here; and as my object is to bring into notice certain parts which have been too little regarded by ornithologists, not to present an elementary treatise, I shall merely offer a few remarks on them, reserving the exposition of the eye and the ear especially for the convenient opportunities which will be presented when I come to treat of the Hawks and Owls.

The *eyes* of birds are remarkable for their great size, for the convexity of the cornea, for having the sclerotic coat formed anteriorly by a circle of bony plates, and for the existence of a

plaited membrane, named the pecten, projecting from the retina in the direction of the chrystalline lens. The pupil is, I believe, always round, although it has been alleged to be transversely or longitudinally elliptical in certain species, the Owls and Pigeons for example; the iris extremely contractile, and frequently of the most vivid colours, although for the most part of different shades of brown. The eyeball is moved by six muscles, four of which are straight and two oblique; but in many birds it possesses very little motion, and in some of the Owls is so closely fitted into the orbit as to be absolutely immoveable. There are two eyelids, of which the lower is generally largest, and a nictitant membrane moved by two muscles so as to sweep over the surface of the cornea.

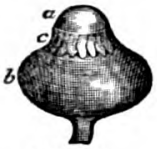


Fig. 10.


Fig. 11.

Fig. 10. represents the eyeball of an Owl viewed laterally:—*a*, the cornea, which is very convex; *b*, the sclerotica, depressed, and at its anterior part, *c*, contracted and surrounded by bony plates. Fig. 11. is an anterior view of the same, in which the central dark part represents the pupil dilated, the zone surrounding it the iris, then the circle of bony plates; and externally the sclerotic coat.

Fig. 12. represents the head of a Thrush, Turdus musicus: *a*, the upper mandible; *b*, the lower mandible; *c*, the tongue; *e*, the nostril; *d*, the feathers covering the ear. Fig. 13. is the external ear of the same bird, margined with feathers, of some of which only the shafts are represented. Fig. 14. is the roof of the mouth. Fig. 15. the tongue, *a*; and the glottis or top of the windpipe, *b*.

Fig. 12. *Head of a Thrush.*


Fig. 13.


Fig. 14.

Fig. 15.

The *organ of hearing* has a somewhat less complex structure than in the mammifera. There is no conch or external auricle

properly so called, unless in the Owls, in which the external ear is excessively large, and generally furnished with lateral flaps or opercula, by which it may be closed. The want of this part however is compensated by a circle of feathers, which are capable of being erected or depressed, Fig. 13. The meatus externus is a very short membranous canal, in many cases scarcely appreciable; the membrana tympani is generally of an elliptical form, somewhat convex externally, and having attached to its inner surface a single ossiculum; the cavity of the tympanum is of moderate size, and communicates with numerous cells, analogous to the mastoid cells in the mammifera, but which extend over the greater part of the skull. The eustachian tubes, which communicate with this cavity, are large, entirely osseous, and open, either separately or united, into the aperture of the posterior nares or back part of the mouth. The vestibule and cochlea are small; and there are three semicircular canals, of which the bony walls are easily separated from the surrounding cellules.

The nostrils, Fig. 12, *e*, are generally small and placed apart, being separated by the intermaxillary bones. They are of various forms, sometimes open, sometimes covered by feathers, and in other cases having an arched horny or membranous operculum. The nasal cavities are situated at the base of the upper mandible. Their septum is generally complete, but sometimes perforated. They have three turbinated laminæ on their outer side, and are covered by a pituitary membrane of delicate texture, bedewed with a lubricating fluid. The posterior nares, Fig. 14, open in the form of a longitudinal slit margined with papillæ upon the roof of the mouth. It is very doubtful whether the sense of smell be acute in any order of birds, for it has been most satisfactorily proved by Mr. Audubon, that in the Vultures, at least in those of the genus Cathartes that occur in North America, which were supposed to possess it in the greatest perfection, it is so inefficient as not to indicate to them the existence of putrid flesh in their immediate vicinity.

As birds generally swallow their food without mastication, and as their tongue is small and sheathed with a horny case, Fig. 15, *a*, it is not probable that they possess the sense of

taste in any considerable degree. The bill, Fig. 12, *a*, *b*, and the tongue, Fig. 12, *c*, are in fact more properly organs of prehension than of gustation.

The skin, being covered with feathers or hard scales, is supposed to be very imperfectly adapted for communicating a knowledge of the presence and nature of external objects; and it is very doubtful if those soft parts about the head, which are destitute of feathers, such as combs, wattles, and ceres, are ever employed for such a purpose. The bill however in many species, especially Ducks and some of the Grallatores, being abundantly supplied with nerves, and covered by a comparatively soft membrane, is undoubtedly an efficient organ of touch.

We come now to the consideration of the digestive organs, which merit especial attention, on account, not so much of their great importance in the economy of birds, as the nervous, vascular, and other systems are not behind them in this respect; but because, exhibiting great diversity of form and structure, in accordance with the nature of the food, they are more obviously qualified to afford a basis for the classification of the numerous species of birds. The parts of which the intestinal canal are composed are the bill, the tongue, the cavity of the mouth, the pharynx, the œsophagus, the crop, the proventriculus, the stomach, the small intestine, the cœca, the large intestine, and the cloaca; to which may be added as accessory organs, the salivary glands, the liver and the pancreas. Now, as the object of these introductory observations is, not to give a comparative view of the organization of birds, either with reference to other animals, or as modified in the different orders or families, but to disclose so much of it as may suffice to enable the reader to follow me in the generic and specific descriptions, I shall take a bird of the Falconine family, as presenting a form and structure of the digestive organs well adapted for exhibiting all their parts, and for affording an object of comparison with other tribes.

In Plate IV. are represented the digestive organs of the Peregrine Falcon, *Falco peregrinus*. Fig. 1, the bill; 2, the roof of the mouth; 3, the tongue; 4, the intestinal canal, concealed in part by the trachea, the heart, and the liver; 5, the

portion hidden in Fig. 4; 6, the rectum, cloaca, and cœca; 7, the internal surface of the proventriculus; 8, part of a section of that organ; 9, four of its glandules; 10, a portion of the inner surface of the stomach; 11, the pylorus, or commencement of the intestine.

The bill of the Peregrine Falcon, Plate IV, Fig. 1, is shorter than the head; the upper mandible, *a*, has at the base a cere, *b*, or bare coloured skin, of a peculiar dense texture, closely resembling that of the scales on the feet; its dorsal outline, *c*, is slightly convex, as far as the edge of the cere, then curved so as to form about the third of a circle; the ridge on the cere is broad and convex, on the horny part narrower but convex; the sides at the base are nearly flat and sloping, towards the end more erect and convex; the edges towards the base, *d*, are soft, being covered with skin, continuous with the membrane of the mouth, beyond the nostrils sharp, hard, and projecting towards the end, so as to form a thin rectangular process, which is characteristic of the genus Falco; the tip decurved, subtrigonal, acute. The mouth being wide, the lower jaw, *e*, has its rami widely separated at the base, so that the angle formed at the base of the horny mandible, *f*, is broad and rounded; its dorsal outline, *g*, is convex, the back broad, towards the end narrowed; the sides rounded; the edges at the base covered with skin, towards the end horny, inflected and sharp, with a deep sinus or notch near the tip, which, viewed vertically, is truncate. The process of the upper mandible is represented by many ornithologists as entering the sinus of the lower, which, however, is not the case, as it merely overlaps that part of the lower mandible on which it is situated.

The palate, Fig. 2, is flat, at the sides smooth, and sloping a little upwards, in the middle bearing a longitudinal depression, *a*, *a*, into which the tongue fits. This depression is bounded by two nearly parallel ridges of skin. In it, behind the base of the tongue, is the narrow, posteriorly sub-elliptical aperture of the nares, *b*, of which the anterior slit, *c*, extends forwards nearly to its termination. At the commencement of the slit behind is on each side a curved papillate line or edge, *d*; and behind the aperture is another, *e*, having several rows of

pointed papillæ; at its anterior extremity is a soft prominence, from which proceeds forwards a soft ridge, *f*. The tip or horny part is slightly, the lower mandible deeply, concave. The small conical papillæ are not glandular, but prominences sheathed with a substance of a horny or cuticular nature, although generally soft.

The tongue, Fig. 3, is short, fleshy at the base, rather narrow, concave above; its sides nearly parallel; the tip, *a*, rounded, its free part beneath, Fig. 4, *a*, sheathed with a horny substance; the lower surface of the sides toward the base furnished with large crypts, secreting a fluid analogous to saliva, but viscid; the base, *b*, concave in its outline, and fringed with pointed papillæ directed backwards. The space between the base of the tongue, *b*, and the aperture of the windpipe, *c*, is covered with mucous crypts, of which there are also lateral series, *d*, *d*; and the posterior part of the pharynx, *e*, is supplied with similar bodies irregularly disposed. The aperture of the glottis, *c*, is defended by the papillar base of the tongue; and behind it are two flaps, *f*, *f*, covered with papillæ, directed backwards.

Fig. 4. represents, besides the alimentary canal, *a*, the tongue; *b*, *b*, the hyoid bones; *c*, *d*, the trachea or windpipe, composed of numerous narrow rings, and dividing at the lower part of the neck into two bronchi, *e*, which open into the lungs; *f*, the heart, of which the right side, *g*, has been laid bare, while the left, *h*, is covered with the pericardium; *i*, *j*, the right and left lobes of the liver. The heart and liver cover the lower part of the œsophagus, a portion of the stomach, and the lungs. The œsophagus, *b*, *d*, measured from the base of the tongue to the stomach is six and a half inches long. At the very commencement, where its diameter is nearly an inch, it begins to enlarge, and continues rapidly widening, so as about the middle of the neck to form a crop, *k*, capable of being distended to a diameter of nearly two inches, and lying towards the right side, the trachea, *c*, *d*, passing along the left, or rather running straight down the neck.

Fig. 5. represents the continuation of the œsophagus, and the rest of the alimentary canal. On entering the thorax at *l*, the

œsophagus contracts to about three-fourths of an inch in diameter, and at its termination, *m*, enlarges to ten-twelfths, forming the proventriculus, *m*, which is about an inch long.

At its upper part, the œsophagus has a slight outer layer of inconspicuous longitudinal muscular fibres. In its whole length, it is encircled by transverse fibres, forming a distinct muscular coat. The inner or mucous coat is thrown into longitudinal rugæ, when the organ is contracted; otherwise it is smooth and even.

At this stage of the description, it must be mentioned that the tube extending from the mouth, *a*, *b*, to the stomach, *n*, *o*, is by some considered as properly speaking the œsophagus, of which the dilatation, or crop, *k*, and the thickened part or proventriculus, *m*, are only parts; while others maintain that the crop, *k*, is in reality the first stomach, and the proventriculus, *m*, the second; *n*, *o*, being the third. The œsophagus, then, according to these observers, is that part which extends from the mouth to the commencement of the crop; and the tubular part between the crop and the proventriculus John Hunter named the second or lower œsophagus. Were these views correct, the Peregrine Falcon has no proper œsophagus, for its dilatation begins at the mouth. As in many other questions of this nature, "much may be said on both sides;" for which reason it may be judiciously referred to the debating societies. In the meantime, the entire tube, whether dilated or not, from the mouth, *a*, to the stomach, *n*, I shall consider as the œsophagus.

At the lower part of the œsophagus, just before it joins the stomach, it presents a second enlargement, *m*, named the proventriculus. The calibre of this portion, or organ, is generally less than that of the adjoining portion of the œsophagus, so that the greater diameter of the proventriculus is made up by a thickening of its walls, there being interposed between its muscular and mucous coats numerous glandules or sacs, placed laterally in apposition, nearly at right angles to the surfaces of these coats. Fig. 8. represents a longitudinal section of the thickest part of the walls of the proventriculus, of the natural size: *a*, the outer or muscular coat; *b*, the inner or mucous coat; the glan-

dules which are longer in the middle, and shorter towards the two extremities of the organ, being interposed between them. These glandules, of which four are represented of the natural size by Fig. 9, are of a cylindrical form, and have a central cavity, with thick walls, and a spongy or villous inner surface. Their inner extremity is narrower, and they open on the mucous membrane, *b*, by an inconspicuous aperture, placed in the centre of a small rounded eminence. The intervals between these orifices on the mucous surface are minutely granulate. Fig. 7. represents the proventriculus in its whole length, laid open. There is an entire belt, an inch in length, composed of the glandules, which are placed close together, and open by minute orifices, for the most part irregularly disposed, but in many places arranged in lines. This belt becomes thinner toward the two extremities, *a*, *b*, and is longitudinally furrowed by four broad grooves, but not separated, the glandules being merely shortened. The fluid secreted by these glandules, and copiously poured out so as to cover the entire surface of the proventriculus, as well as part of that of the stomach, is of a greyish-white colour, clammy, and when cold having the consistence of slightly coagulated albumen.

The stomach, *n*, *o*, Figs. 4. and 5, which may be considered as commencing at the lower edge of the proventriculus, is of a roundish or broadly elliptical form, two inches in length, an inch and three-fourths in breadth, and an inch and a quarter in depth. Under its peritoneal covering, which has been removed, is a large quantity of fat. Its muscular coat is thin, compared with that of birds of other families, but yet of considerable thickness, and is composed of fibres arranged in fasciculi, which are broader in their middle, or along the edges of the organ, and are inserted into two thin tendinous spaces, *o*, one on each side. At the upper or anterior part, these fibres diverging, leave an angular space on each side, in and above which the fibres are circular. Within the muscular coat is the second, or cellular, thin and composed of a whitish interlaced fibrous tissue. The inner coat, Fig. 10, is of a softish homogeneous texture, elevated into strong rugæ running in various directions. That part of it nearest the proventriculus is generally in birds of prey found dissolved

by the proventricular fluid; and sometimes the whole is reduced to a pulpy substance; so that for a long time I considered the internal surface of the stomach of rapacious birds to be entirely destitute of epithelium or cuticle; but have lived long enough to see my error. In the Peregrine Falcon, this epithelium varies in thickness from half a twelfth to a twelfth and a half of an inch, and is of a reddish-white colour.

At its commencement the œsophagus is placed directly in front when not distended, but when filled inclines immediately to the right side, on which the crop lies. At the lower part of the neck it inclines to the left side, passes into the thorax in the centre, when the trachea or windpipe, *c*, *d*, which passes along the left side, comes in front of the œsophagus, and bifurcates immediately behind the base of the heart. The œsophagus continues inclining to the left side behind the left lobe of the liver, and joins the stomach opposite the last ribs. The stomach occupies the middle and left side of the abdomen, and when distended fills a very large proportion of its cavity. Between it and the sacrum are interposed a portion of the intestines and the kidneys; the duodenal part of the intestine lies between it and the walls of the abdomen on the right side; a portion of the liver lies over it in front; the greater part of its anterior surface is in contact with the abdominal parietes, as is also its left edge.

The intestine comes off from the stomach at *p*, close to its upper or cardiac orifice. The entrance to it is named the pylorus, and frequently has a valvular structure, which in the Peregrine Falcon presents the appearance of a rim with three knobs, Fig. 11. The length of the intestine is four feet three inches. It first inclines to the left, *p*, *q*, along or anterior to the edge of the stomach, until it nearly reaches the back, and is then bent back in a parallel direction, *q*, *r*, and curves forwards to pass under the right lobe of the liver at *r*. This fold, which is named the duodenum, or duodenal curve, is connected by a reflection of the peritoneum, on which lies the pancreas, *s*, which is a long narrow gland similarly folded upon itself, and of which the ducts enter the intestine near *r*. After receiving them and the biliary ducts, *t*, *r*, it becomes at-

tached to the mesentery, turns back, and forms a small fold; then forms a number of convolutions, *u*, *v*, occupying the space behind or above the stomach; runs up behind that organ, then forms a small fold, and passing backwards along the sacrum, forms the rectum, *w*, which terminates at the anus, *x*.

The duodenal portion of the intestine has a diameter of about five-twelfths of an inch; the remaining part gradually diminishes to three-twelfths, until about nine inches from the extremity, when it slightly enlarges. The terminal part is named the rectum or large intestine; and being only partially seen in Fig. 5, at *w*, *x*, is figured apart.

The rectum, Fig. 6, *a*, *b*, is that part of the intestine commencing at the cœca, *a*, and terminating at the anus, *b*. It generally enlarges at once in the rapacious birds, and continues to widen, but in the Peregrine Falcon is not much wider than the duodenum. It is seen to dilate at the end, so as to form an elliptical cavity, *c*, *b*. This part, which has a rim or valve internally at *c*, is an imperfect kind of bladder, into which open the two ureters, *d*, *d*, upon a prominent flap or rim at *e*. Immediately below them is seen the larger aperture of the Bursa Fabricii, an oblong sac lying behind the extremity of the rectum, and secreting a mucous fluid. The space between the edge on which the ureters enter and the extremity of the gut at *b*, is usually called the cloaca; and into it also the oviduct enters.

Besides the peritoneal covering, the intestine has a muscular and an inner or mucous coat. The former is thickest in the duodenal portion, the inner surface of which is delicately villous. On the rest of the small intestine internally are long, extremely slender villi, which, towards its lower part, become more sparse. The inner surface of the cœca has a cellular appearance; that of the rectum is furnished at its anterior part with numerous mucous crypts. The cloaca is smooth within.

This description and the figures are taken from a male bird shot in December 1836, on the Pentland Hills, near Edinburgh. Some persons being fond of knowing the numerical proportions of the organs of birds, I subjoin the measurements.

Length from the point of the bill to the end of the tail, $19\frac{1}{4}$ in.
Length from the point of the bill to the end of the rump, $11\frac{1}{2}$ "

Tongue about	$\frac{3}{4}$	
Œsophagus, ...	$6\frac{1}{2}$	
Intestine, ...	51	
— Intestinal canal,.....		$58\frac{1}{4}$ "

If the whole length of the bird be taken, its intestinal canal is in proportional length as 3.025 to 1; but if only the body excluding the feathers, as 5.064 to 1.

The uses and relations of the parts described may now be briefly stated. The bill, it is observed, is a very powerful instrument of prehension and offence; its short, bulging, convex form, with its sharp edges, prominent tooth-like process, and strong curved acute point, rendering it well adapted for tearing up the skin, flesh, and entrails of birds and other animals on which the Falcon feeds. The long pointed wings of this bird furnished with dense and large muscles, enable it to cleave the air with great rapidity; while being in all respects organized for a life of rapine, its whole frame is firm and compact, even the feathers having a close texture; and its long, flexile toes are furnished with curved claws, tapering to a fine point, and capable of being thrust in opposition to each other into the vitals of its victims. It preys entirely on living animals, which, after capturing, it deprives in a rude manner of part of their hair or feathers; when, keeping its prey firm with its foot, it tears up and swallows fragments of the flesh. If the subject be large, it fills the stomach, and then the crop and œsophagus, up to the very jaws, these parts being capable of containing five or six ounces of flesh. Notwithstanding its great agility and vigour, the capture of a suitable prize is not always of easy accomplishment, and therefore it is that the crop is added to the œsophagus, that enough of nutritious matter may be stowed away to last for a considerable time. That part is merely a recipient for the food, which is found in it quite unaltered. In the individual above described the mass of flesh, bones, and feathers contained in the œsophagus, was perfectly fresh ten days after it was killed, the juices seeming to have a

conservative in place of a solvent power; and I have observed the like in the Buzzard, Sparrow-Hawk, and other species. When the crop, stomach, and intermediate space are found filled, the solvent action is first perceived in the proventricular space; and it is probable that the secretion from its glandules effects the solution of the food in all species, for in those of which the epithelium or inner coat is horny and thick, there can be no effusion from the stomach itself. The mass of flesh, mixed with feathers, hair, and bones, being in the stomach reduced to a kind of pulp, the nutritious parts pass into the intestine through the pylorus, which rejects the indigestible substances. These, including the inner coats of gizzards, seeds, and other vegetable substances, are, by the contraction of the muscular fibres, thrust into the œsophagus, and voided in rounded dense pellets, which falconers term castings. In the duodenum the pulpy mass is further diluted by the pancreatic fluid, assumes a homogeneous appearance, and is of a light red colour. On being mixed with the bile it acquires a greenish tint, and deposits the chyle on the surface of the intestine, whence it is absorbed. The matter adheres tenaciously to the villosities, so as to be with difficulty washed off, and is found along the whole length of the small intestine. The refuse enters the rectum, where it is farther diluted by the urine, and is finally ejected in a semifluid state, of a dull green colour, mixed with flakes of white, being projected to a considerable distance.

The modifications which the several parts of the digestive organs undergo in the different families of birds are very numerous. Thus, the œsophagus is extremely wide in some, and very narrow in others; the crop is sometimes altogether wanting, sometimes small, or large, or extremely developed, membranous, or muscular, forming merely a dilatation of the œsophagus, or assuming the form of a large bag having a small orifice; the stomach is very thin, or has extremely thick, firm, and powerful muscles, very small, or very large; the intestine is long or short, wide or narrow; the cœca rudimentary, moderate, long, or so highly developed as to have a greater capacity than the whole intestine besides. I shall have occasion to describe

several of these differences in treating of the birds whose history I propose to sketch. It will in the meantime be useful to give a short account of the form of intestinal canal presented by a family very closely allied to that of which the Preregrine Falcon is a member.

Plate V. represents the digestive organs of a Male Snowy Owl, *Syrnia Nyctea*. Fig. 1. is a front view of the œsophagus, trachea, heart, liver, and part of the body. Fig. 2. shews the lower part of the œsophagus, the stomach and the intestines, which were concealed by the parts shewn in Fig. 1. Fig. 3, the tongue and glottis; 4, part of the inner surface of the proventriculus; 5, a transverse section of the proventriculus; 6, four of its glandules enlarged; 7, the inner surface of the stomach; 8, the rectum, cloaca, and cœca.

The bill of the Snowy Owl is formed on the same plan as that of the Peregrine Falcon, although differing considerably in its details, and in particular wanting the tooth-like process of the upper mandible; and the feet are similarly organized, although covered with feathers. The tongue, Fig. 3, *a*, is short, broad, and flattened above, the tip notched, the base, *b*, deeply emarginate and papillate. The aperture of the glottis, *c*, is destitute of papillæ on the edges, but has two central conical papillæ behind, together with two papillate flaps.

Fig. 1. represents, besides the œsophagus, *a*, the tongue; *b*, *b*, the hyoid bones; *c*, *d*, the trachea, flattened, five and a half inches long, composed of numerous narrow rings, with wide intervals, and at the lower part of the neck dividing into two bronchi, *e*, *e*; *f*, the heart, with the pericardium removed; *g*, *h*, the right and left lobes of the liver. The stomach and intestines are covered by the abdominal parietes, *i*; but at *j* are seen three of the large air-cells which are distributed through the body. The œsophagus, *b*, *k*, *l*, is nine inches long. At the commencement its diameter is an inch and a half, and it gradually contracts to less than an inch, but enlarges to an inch or a little more before entering the thorax, when it again contracts. It differs therefore from that of the Peregrine Falcon in having no crop; but in other respects is similar, its coats being of the same nature.

Fig. 2. shews the continuation of the digestive organs. The œsophagus, *l*, *m*, *n*, enlarges at *n*, to form the proventriculus, of which the walls, seen in Fig. 5, are thin, the glandules being very short, only about a twelfth of an inch in length, and a twenty-fourth in diameter. The glandules open on small rounded papillæ, which are seen enlarged in Fig. 4, while Fig. 6. represents sections of three of them enlarged.

The stomach, Fig. 2, *n*, *o*, is two inches long, an inch and three-fourths in breadth; its muscular coat composed of distinct fasciculi, its tendons, *o*, upwards of half an inch in diameter; its cuticular lining thick, soft, of a whitish colour, and with numerous tortuous rugæ, as represented by Fig. 7.

The intestine, from the pylorus, *p*, to the extremity, *x*, measures only thirty-eight inches. The general diameter of the duodenal portion, *p*, *q*, *r*, is half an inch; and the remaining part of the small intestine gradually diminishes to four and a half twelfths. The pancreas, *s*, which is seen occupying its usual position in the duodenal fold, is double, and has several ducts, which enter the intestine towards *r*, where it receives the biliary ducts. The general course of the intestine is similar to that of the Peregrine Falcon. It comes off from the stomach at *p*, close to its cardiac orifice, inclines to the left, running along the edge of the stomach, until it nearly reaches the back at *q*, when it returns in a contrary direction to *r*, where it curves under the liver, passes upwards and backwards, is convoluted above or behind the stomach, and at length terminates in the rectum.

Fig. 8. represents the latter portion of the intestine, together with the cœca. These organs, *a*, *f*, present a different appearance from those of the Falcon, being the one five, the other five and a half inches long, for two inches and a half, only about two and a half twelfths in diameter, but afterwards enlarged to a diameter of ten-twelfths, and finally tapering away to a blunt point. The rectum, which commences at *a*, is four inches long, including the cloaca; for two and a half inches it has a diameter of about five-twelfths of an inch, and is then dilated into an oblong sac, *c*, *b*, an inch and a half in its greatest diameter. At the commencement of this sac, *c*, is internally a

kind of valve or thickened rim. The ureters, *d*, *d*, are seen opening upon a prominence at *e*, below which is the larger orifice of the Fabrician bursa.

The functions are as described with reference to the Peregrine Falcon. The Snowy Owl is essentially a rapacious bird, and is organized for seizing live animals of various kinds, which it kills by thrusting into them its long, curved, tapering, extremely acute claws. After tearing off the feathers and hair in a partial manner, it tears up the flesh with its hooked and sharp-edged bill, and swallows it in fragments, until it has filled not only the stomach, but also the œsophagus, which, although not dilated into a crop, is yet wide throughout, and capable of containing a large quantity. The food is gradually dissolved in the stomach by the action of the proventricular fluid, and the feathers, hair, bones, scales of fishes, and other indigestible substances, ejected in pellets. The changes already described take place as the chyme descends; but, as the intestine is, for some unknown reason, comparatively short, the alimentary mass passes into the cœca, where it undergoes a further elaboration and absorption. The refuse at length enters the rectum, and accumulates in the cloaca, where it is farther diluted by the urine, and whence it is finally ejected at once, and cast to a considerable distance.

The length of a male Snowy Owl, from the point of the bill to the end of the tail, is.....23 inches.
Length from the point of the bill to the end of the rump, ...14 "

Tongue, ... $\frac{10}{12}$
Œsophagus, 9
Intestine, ... 38
— Intestinal canal,.....48 "

The intestinal canal is therefore to the whole length as 2.086 to 1; and to the length of the body, without the feathers, as 3.428 to 1. But if the two cœca are added, the proportional length of the canal is considerably greater.

Now, the points in which the digestive organs of the Pere-

grine Falcon and the Snowy Owl agree and differ are the following. In both the œsophagus is wide, the proventricular glands very numerous and small, the stomach roundish or elliptical, with thin walls, and having a rugous inner membrane, the rectum short, with an oval enlargement. They also agree in the general structure of these parts, and in various circumstances which it is not necessary here to point out. They differ principally in the form of the œsophagus and cœca; for while the former is uniformly wide in the Owl it has a great enlargement or crop in the Falcon; and while the cœca are rudimentary and merely secrete a mucous fluid in the Falcon, they are large and perform the assimilatory function in the Owl. These birds may be taken as types of their respective families, for all the other species which I have examined, about twenty in number, agree in the principal details. One may therefore in general easily recognise the digestive organs of a Falconine or a Strigine bird; and we shall see in the sequel that the different families are similarly distinguishable.

The thin stomach of these birds is of that kind usually termed membranous, although they are by no means of a membranous structure, but are so named in contradistinction to those which have very muscular parietes, and which are commonly denominated gizzards. These and other modifications of the digestive organs will be described in course. In the meantime we proceed to present a brief account of such of the other organs as it may be useful to notice, taking first those immediately connected with the digestive canal.

Of these the first are the salivary glands, which are generally simple follicles, similar to those already described in the proventriculus, and are situated under the tongue, along its sides, and in the space behind it. In the Gallinaceous birds, they form an aggregated mass in the angle of the lower jaw, opening by several pores; and in a few species they assume the conglomerated form, and open into the mouth by a single duct.

The pancreas, Plate IV, Fig, 4, 5, *s*, *s*, is usually a long narrow gland, always situated in the duodenal fold of the intestine, into which its secretion is poured by two or more ducts.

The liver, Plate IV, Fig 4, *i*, *j*, and Plate V, Fig. 1,

g, *h*, is of very large size, situated between the heart and the intestines, generally formed of two lobes, of which the left is the largest, and filling a great portion of the thoracic and abdominal cavities. The bile is carried directly into the intestine by the hepatic duct, and by the hepatico-cystic into the gall-bladder, whence it issues by the cystic duct.

Fig. 16.

Fig. 16. represents the heart, *a*, *b*; the liver, *c*, *d*; the gall-bladder, *e*; the hepatic duct, *f*; the hepatico-cystic duct, *g*; the cystic duct, *h*; and a portion of the intestine, *i*, *i*, of the Snowy Owl. The gall-bladder is wanting in the Pigeons, in which, as in many other respects, they differ from the Gallinaceous birds.

The heart, Plate IV, Fig. 4, *g*, *h*, and Plate V, Fig. 1, *f*, occupies the anterior part of the thorax, and is of a conical form, its apex passing between the two lobes of the liver, these organs not being separated by a diaphragm, as in the Mammifera. It is invested with a strong pericardium, Plate IV, Fig. 4, *h*, which is prolonged between the lobes of the liver. There is little perceptible distinction between the auricles and ventricles; the auriculo-ventricular apertures are secured by an oblique fleshy band; the left ventricle has its parietes of from three to five times the thickness of the left, which is much larger, and is curved round it, and there are scarcely any indications of columnæ carneæ. The aorta divides at its very base into three principal branches, Plate V, Fig. 1, α, β, γ; of which one on each side is for the anterior extremity or wing, and the head, while the branch forming the aorta proper, γ, curves backward to the right, over the bronchus of that side. The consideration of the distribution of the arteries, veins, and lymphatics, must be deferred to another opportunity, as it would occupy much space, and is not essential to my descriptions, which cannot comprehend the entire anatomy of the species.

The Respiratory Apparatus differs in many respects from that of the Mammalia. The trachea, or windpipe, Fig. 4, Plate IV, *c*, *d*, is composed of bony rings, which are in almost all cases complete, although they vary greatly in breadth and form in different species, being sometimes contracted in the middle anteriorly, sometimes alternately larger at the sides. The upper larynx, Fig. 3, is composed of several pieces, and has an aperture in the form of a slit, *c*, destitute of an epiglottis, but capable of being firmly closed by muscles, and defended by the base of the tongue. In the Falcon the trachea is a little flattened, and gradually tapers in a slight degree; but in many birds it presents dilatations and contractions, and in others is variously curved. Two slender muscles, the sterno-tracheales, which run along its sides, and serve to contract it, are observed in Fig. 4. coming off to be inserted into the sternum. Excepting these, and the muscles of the upper larynx, there are none attached to the trachea in many birds, while others, and especially the species noted for their musical powers, have several pairs at the lower larynx, which is the part where it bifurcates. The structure of this part I shall endeavour to explain in treating of the Blackbird. It is that which is considered as the principal organ of voice in birds. The bronchi, Plate IV, Fig. 4, *e*, and Plate V, Fig. 2, *z*, *z*, or divisions of the trachea, are short, membranous, and have their narrow rings incomplete behind.

In birds the respiratory function is more energetic than in the mammifera; they consume a larger quantity of oxygen, and produce a greater degree of heat. Yet their lungs are small, placed in the upper part of the thorax only, where they are confined on each side to a cavity bounded above by the ribs, and below by the imperfect diaphragm. But they are perforated by tubes which communicate with membranous cells, distributed over the thoracic and abdominal cavities, between the muscles, and beneath the skin, often in all parts of the body. The air even penetrates many of the bones, although the number thus supplied varies in the different tribes, an arrangement which contributes to render them lighter, in proportion to their aërial habits, for in some aquatic birds the bones are filled with

marrow, and in those which run rather than fly, some of them are impervious to air.

I have now only some observations to offer respecting the dermal system, or skin and feathers, after which it may be useful to consider the exterior of the bird, and mention the principal terms applied in describing it.

The Dermal or Tegumentary System is composed of the dermis, the rete mucosum, and the epidermis or cuticle. The skin, thus constituted, is connected with the subjacent parts by loose cellular tissue, which often contains a great quantity of fat, and is moved by the cutaneous muscles, by which the feathers are elevated and depressed. The dermis is generally very thin; and the rete mucosum, although usually colourless in the parts that are covered with feathers, often exhibits on those that are exposed the most beautiful and varied tints. The epidermis is generally scaly or scurfy on the feathered parts of the body; but on the tarsi and toes assumes a smooth and polished appearance, and to form the claws and mandibles becomes thickened, and acquires a horny texture.

Birds, like quadrupeds, are invested with a covering, which is connected with the skin, and lies immediately upon it. This covering is chemically of the same nature as the hair of mammifera, and the scales of reptiles and fishes, but it differs essentially in respect to its mechanical structure, being much more complex in its constituent parts than the envelope of these classes of animals. To this general envelope the name of *plumage* is given. In ordinary language it is more frequently called *the feathers*.

It may be presumed that the plumage of birds serves to protect them from the injurious agency of external powers, such as cold, heat, rain, and hail, and that it operates in retaining the heat generated in the body, and in developing or fostering electricity. The varieties of structure, magnitude, and proportion, and the degrees of connection, which its parts present, together with the diversified hues, and the varied capabilities of absorbing or reflecting light which it possesses, must, in a system where everything is the result of design, originate from peculiar specific necessities, and be subservient to the welfare,

or even the existence, of the individuals composing this beautiful, and, in many respects, highly interesting class of beings. Upon considerations like these it is not my design to enter. Their development would constitute a task more than sufficient to confound the pretensions of the wisest; and I should more admire the mind that had discovered the causes, relations, connections, ends, and objects of a feather, than that which had measured the magnitudes and distances of the planets, traced their orbits, and calculated the velocities of their revolutions. The plumage also answers another very important end in the economy of birds, being the medium of their locomotion in the air,—a faculty which gives them so many advantages over quadrupeds, and which is not possessed, in an equal degree, by any other class of animals.

The plumage, then, is the general covering of a bird, which usually invests all its parts, excepting the bill, eyes, tarsi, and toes. It consists of a great number of individual parts, which are denominated *feathers*. Besides these parts, however, so denominated, there are in most birds others, which, lying concealed among the former, and not making their appearance at the surface, are apt to be overlooked by superficial observers. These are the down-feathers, and hairs, or piliform feathers, which will be described in course, but which, for the sake of simplification, may be for the present overlooked. These individual parts or feathers are disposed upon the skin in what is called quincuncial order; that is, in lines intersecting each other at acute angles, and in such a manner as to lie over each other, like the tiles on the roof of a house; a circumstance denoted in zoology, as well as in botany, by the term imbrication, their general direction being backwards, or from the head of the bird to the tail and extremities.

The plumage, as has just been observed, does not cover the whole surface of a bird; but, besides the parts mentioned, as being altogether bare, there are others, which, although covered over by the feathers, yet do not give origin to them, and are thus, in a particular sense, bare. These parts are: a line from the base of the upper mandible to the eye, called the lore or bridle; a line from the ear to the shoulder, on either side of

the neck; a broader line from the fore part of the sternum to the vent; a space upon the sides under the wings; and in female birds, and frequently in males also, during incubation, two circular spaces, or one transversely oblong space, of greater or less size, upon the abdomen. Other parts also occur in particular species or genera, which will become the subject of distinct consideration in their own place.

FIG. 17.

A feather, Figs. 17, 20, may be defined an individual constituent of the plumage, having a distinct existence of its own, and by its association with others contributing to form the general envelope; or, in another sense, it may be defined, a mass of indurated albuminous matter, inserted by one extremity into the skin, connected by apposition in the greater part of its extent with others, and in a portion of one of its terminal surfaces touching the air, having a root or proximal part, of a tubular form, continued into an elongated and attenuated stem, laterally giving insertion to a series of connected filaments. A feather of the ordinary kind, or what may be assumed as a perfect feather, consists of the following parts:

1. The *tube* or *barrel*, Fig. 17, *a*, is the tubular part, by which it is fixed into the skin. It consists of a thinnish transparent tube or hollow cylinder, having the colour and texture of a thin plate of clear horn, and being chemically of the same nature. This tube, which is more or less protracted, being in some feathers scarcely a fortieth part of their length, as in the hypochondrial feathers of Paradisea apoda, while in others it exceeds a third, as in the quill-covers of the Flamingo, is abruptly narrowed at the lower, or, with reference to the connection of the feather with the skin, the proximal end, where it is closed up by a dry membrane, forming part of an apparatus that has been subservient to the growth of the other parts of the feather, and which now, in a dry and shrivelled state, extends along the whole length of the tube, in its interior. This part, when taken out of the tube of the feather, presents

the appearance of a very thin transparent membranous tube, divided internally by transverse dissepiments. At each of these dissepiments the tube separates on pulling it gently, and each portion so obtained presents the appearance of an inverted funnel, the prolonged extremity of which, being continued into that of the next above it, an internal tube is produced, which occupies the centre of the membrane. This membrane is, in ordinary language, termed the *pith*, from its resemblance, if not in nature, at least in position, to the pith of a plant. It might, with more propriety, be named the internal membrane of the tube. The tube is invested externally with a sort of close sheath, consisting of several layers of condensed cellular membrane. With regard to the texture of the tube itself, it would seem to be composed internally, and in its greatest thickness, of a uniform horny substance, which, in many species, however, shews longitudinal fibres, while the outer part, though not to a great depth from the surface, is composed of transverse or annular fibres. Hence the reason why, in making a pen, the slit is always cleanest when the outer layer has been scraped off. The longitudinal fibres are distinctly seen in the quills of the domestic cock, and of Gallinaceous birds in general. The tube terminates above, that is, distally with respect to the body of the bird in the shaft.

2. The *shaft* or *stem*, Fig. 17, *b*, is a continuation of the tube, but considerably altered in form. It is generally as follows: From being of equal diameter with the tube, it gradually diminishes, so as to terminate in a point. Considered in respect to its length, it is more or less curved, the outer, upper, or anterior part, or back, as it may be called, being convex, the inner, under, or posterior part, or face, concave. The back is more or less convex, but generally in a small degree, considered in its transverse section. The face is formed of two convex surfaces, separated by a groove which runs along its whole length, or of two inclined planes meeting at an obtuse angle. The two sides are more or less plane, and gradually approximating, as is equally the case with the back and face, from the base toward the tip, where all four meet, and so terminate in a point. Internally the shaft consists of a soft, compact, elas-

tic substance, of a white colour, having much of the mechanical nature of cork, and which may be named the internal suberose substance of the shaft. It is separated longitudinally by a line proceeding from the groove of the face of the shaft, and this division can be traced along its whole extent, even to the back, on the external surface of which there is sometimes a corresponding sunk line; but the two pieces of the corky matter are in close contact along this dividing line, and do not even separate distinctly by tearing them asunder. The external part, or horny envelope or case of the shaft, is much thinner than the tube, the latter of which is prolonged farther along the back of the shaft than along its face, although there is no line of distinction between them. Some further explanations, however, are necessary here, before the structure of the shaft can be rightly understood. Where the tube terminates on the face of the feather, and where the groove of the shaft commences, the line of union of the dorsal and lateral surface of the shaft meets its fellow of the other side, having gradually left the posterior margin of the shaft, crossed its side obliquely, and become anterior at this point; so that, at the commencement of the shaft, what is naturally considered as the back of the shaft forms the whole circumference of it, and does not become the real or geometrical back, until it has reached a certain height. It is this back only which is the true continuation of the shaft. We may suppose the corky matter imposed upon its anterior surface, and covered over by a prolongation of it, forming the coating of the sides and face of the shaft. The posterior wall of the shaft is much thicker than the others, and marked with a number of longitudinal grooves internally, or where it meets the pith. The anterior walls are considerably thinner, and the lateral comparatively very thin. About the point of union of the two lines mentioned, on the face of the feather, the corky matter commences, and is in contact with the anterior coat of the shaft, but posteriorly it leaves a vacuity, which extends some way up the shaft. The internal membrane of the tube having reached this point, divides, a portion passing upwards into the posterior vacuity, another passing to the surface of the feather, by a small aperture at the commencement of

the median groove of the shaft, over which lies a small laminar prolongation of the tube. This arrangement is what is observed in quill-feathers in general; but in most ordinary feathers there is no vacuity behind, and the internal membrane makes its exit undivided at the commencement of the groove. The shaft is distinguished from the tube by its being opaque, which is caused by the internal corky substance, the external horny coat being of the same nature as the tube, only attenuated, and more so, as has been said, on the back, than on the face or sides of the shaft.

3. The *webs*, of which there are two, Fig. 17, *c*, *d*, one on either side of the shaft. The web is a lateral prolongation of the external layer of the coat of the shaft, into a series of filamentous substances, ordinarily placed in apposition, and by their association in this manner forming a stiffish elastic expansion. The filaments of which the web consists are named barbs.

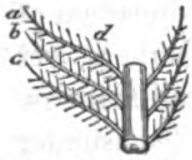


FIG. 18. *Barbs.*


FIG. 19. *Barbule.*

The *barb*, Fig. 18, *a*, *b*, *c*, is a very thin linear membrane, being an attenuated continuation of the outer pellicle of the shaft, and arising from it at the angle formed by the meeting of the dorsal and lateral surfaces, along the edge of the latter. The direction of the barbs is obliquely outwards with respect to the shaft, that is, inclining more or less at an acute angle toward the tip of the shaft. Each barb is flattened or compressed vertically with reference to the shaft, considering it horizontal with its face downwards, concave on the side next the tip, convex on the other, so as to fit to its neighbour on either side. It terminates at its lower part, or that on the concave surface of the feather, in a sharp edge, generally diaphanous, which is reflected in the direction of the tip of the feather. The body or substance of the barb is pretty uniform in thickness, and it is only when viewed in connection with the barbules that it could with any propriety be said to be triangular.

From the upper part or edge of each barb there proceed two sets, one on either side, of minute filaments, having a direction,

with respect to the barb, similar to that of the barbs with respect to the shaft. These smaller filaments are named *barbules*, Fig. 18, *d*. It is by means of them that the barbs are firmly kept in apposition. The manner in which this is done, is not by the barbules of one barb interlocking with those of another, in the manner of dove-tailing, or as the teeth of two combs might be made to alternate by mutual insertion, as has generally been supposed. The position and direction of the barbules do not admit of such union, seeing they meet each other at an angle, and therefore cannot interlock, which could only happen were they to meet vertically. The barbules of the side next the tube are shorter and more adpressed; those of the side next the tip of the feather are longer and more patulous. The latter are curved downwards at the extremity, while the former are curved upwards, and being placed in apposition, they form two distinct and continuous edges, the incurvate or anterior series of one barb overlapping and hooking into the recurvate posterior series of the barb next to it. Although the connection of the barbs may not be easily seen in the ordinary feathers, yet it may in general be discovered in the quills and tail-feathers, without the aid of a glass. When the barbs are pulled asunder in the plane of the web, their cohesion is found to be very considerable in most feathers. When the posterior barb is pulled downwards out of the plane of the web, the cohesion is found still greater; but when the anterior barb is pulled downwards, or the posterior barb upwards, there is found to be no cohesion at all. The curved form of the barbules is distinctly seen by the naked eye in the tail-feathers of Buceros galeatus.

The barbules themselves frequently present an appearance similar to that of barbs, giving off laterally two series of filaments which may be termed barbicels, Fig. 19. These filaments are much more sparse than those of the barbs, but their object appears to be the same, namely, that of connecting the barbules, and retaining them in apposition. They are very distinctly seen, with the aid of a small magnifying power in the quills of Aquila Chrysaëtus, Diomedea exulans, and Buceros galeatus.

It may here be remarked, that while what has been assumed,

for the purpose of general description, as a perfect feather, is, what is termed in botany, supra-decompound, there is yet in feathers the following gradation in respect to division:

1*st*. A feather may only have a tube and a shaft, without any other part; for example, the quill of the Cassowary.

2*dly*. There are feathers which have a tube, a shaft, and barbs destitute of barbules, as in the crest feathers of the Golden Pheasant.

3*dly*. Feathers consisting of tube, shaft, barbs, and barbules; as in most birds.

4*thly*. Feathers composed of tube, shaft, barbs, barbules, and barbicels, as in the examples mentioned above.

A barb also may have barbules in one part, and be simple toward its extremity, which is a case of very frequent occurrence.

Feathers, then, in general, consist of three parts,—the tube, the shaft, and the webs; or they may be primarily divided into two parts, the tube and the vane, the latter of which consists of the shaft and webs. The webs consist of barbs furnished with barbules.

With respect to the immediate consequences of their mechanism, it may be remarked of feathers in general, that, from being convex above, they resist flexion or fracture more from beneath upwards than in any other direction; pulled to either side also, they feel stronger than when bent downward in the direction of their concavity. They are elastic, and this property, together with their curvature, tends to keep them close together, and enables the bird to present, when occasion requires, a more or less compact surface to the air. When the barbules are disjoined, they readily unite again, on being placed in apposition. The weaker the feather is, provided it be complete in all its parts, the greater is the cohesion between its barbs. Compare, for example, the quills of the Golden Eagle and Barn Owl.

The webs ordinarily consist of united barbs, more or less stiff, although elastic, and compact in their whole length, excepting toward the junction of the shaft with the tube, where they are of a looser texture, often entirely disunited and float-

ing. The lateral lines, from which the barbs arise, incline toward the median line of the shaft at this place, as has already been explained, aud meet at its commencement.


Fig. 20.

At this point there is, in the feathers of a large portion of birds, a plumiform process, or small feather, Fig. 20, *b*, which is of the following description: From the fore part of the tube, at the commencement of the shaft, and lying over the aperture by which the internal membrane of the tube escapes, rises a thin lamina, being a continuation of the substance of the tube. It gradually narrows, and is continued in the form of a very delicate thread, for a greater or less extent. From the sides of this shaft rise two series of barbs, and from the barbs two series of barbules, as in the ordinary feather itself, all the parts being extremely fine, and entirely disunited. The barbules are very much elongated, and loose, resembling in these respects those of the lower part of the webs of feathers in general. This miniature feather may be called the accessory feather or plumule. In feathers possessed of this structure, the internal membrane of the tube comes out entire between the accessory feather and the feather properly so called, and is not continued internally along the back of the shaft.

With respect to this accessory plumule, there is a curious and beautiful gradation among birds, from the diving species, in which it scarcely exists, to the gallinaceous order, in which it is two-thirds of the length of the feather, and the Cassowary and Emu, in which it equals the feather. Previous to the publication of my paper on feathers in the Edinburgh Philosophical Journal, the double-feather had been noticed in the Emu, Cassowary, and Ptarmigans; but in the other birds there mentioned its existence does not seem to have been known. Since that period, however, considerable attention has been paid to the form and texture of feathers, although I am not aware that any person excepting Dr. Richardson and Mr. Audubon have so much as mentioned my observations. In birds possessing this sort of feather, the quills and large tail-feathers, as well as the first row of superior and inferior

quill-coverts, are in most cases perfectly simple, although there are some birds, especially among the Rasores, and, in particular, the Ptarmigans, which in those feathers have a very distinct rudimentary accessory feather, existing in the form of a short tapering lamina, fringed along its free edges with small simple barbs.

Feathers, considered with regard to their uses, may be distinguished into two kinds. Those which are more especially employed as the medium of locomotion, are much stronger, more compact, and more elongated than the others. Of this kind is the row of feathers bordering the wing behind, and that terminating the coccygeal extremity or tail. The name of quills ought to be applied to these latter, although it is usually confined to the former. The feathers which lie immediately over the wing-quills, on both sides of the wing, partake in this respect of the nature of the quills themselves; but those which lie over the tail-quills are seldom, if ever, of so dense a texture.

In the feathers of many birds, the downy part, Fig. 20, *c*, occupies by far the greater portion; in some it is merely the tip that is compact, while in others the loose part is limited to a very small extent, and in others scarcely exists. As an example of feathers all downy, may be mentioned the subcaudal feathers of the Peacock, and the abdominal feathers of Owls. The Gallinaceous birds and Pigeons have a very large proportion of down upon their feathers, although the latter are destitute of the accessory plumule so highly developed in the former. The crest-feathers of many birds are almost entirely destitute of downy filaments, which is also the case with quills. In the downy barb the filament or shaft is nearly equal in all its diameters, and is extremely attenuated. The barbules are also elongated in many of the Gallinaceous birds, for example, being twenty times the length of the barbules of the apicial part of the feather. These barbules are in all cases biserial like the others, but very frequently they assume a direction the reverse of these, coming off from the filament, not in the plane of the web, but at right angles to it, or, in other words, from the face and back of the web, so as to present on these surfaces a layer

of minute silky filaments. This arrangement is especially remarkable in the Gallinaceous birds. Frequently the filament becomes spirally twisted, in which case the barbs seem to have a circular arrangement, although they are still biserial.

With respect to relative magnitude, the following is an account of the ordinary distribution of the feathers. From the head, backwards to the tail, they increase in length and size; those on the face, or around the base of the bill, being smallest, the tail-coverts longest. The wing-feathers are much shorter than those of the body, and also increase backwards. Those of the upper or dorsal half of the body are almost always shorter than those of the lower or abdominal; and the disproportion seems to have reference to the degree of obliquity of the body in its ordinary posture; for in those birds which have a nearly vertical position, such as Penguins, Auks, and Guillemots, the feathers of the lower surface are scarcely longer than those of the upper. The feathers of the upper parts are also more compact than those of the lower.

Besides the feathers properly so called, there enters into the composition of the plumage or general envelope, another modification of the same general nature. On removing the whole of the feathers whose tips appear externally, in certain orders, and especially in the aquatic birds, we find the skin still covered with a more or less dense envelope of a very soft, filamentous, highly flexible, and very elastic substance, the *down*. It also consists of individual parts, plumules or down-feathers, and is analogous to the soft hair or fur of quadrupeds, while the feathers themselves represent their long hair or pile.

The *plumule* or down-feather consists of two parts:—a small tube, very narrow, and soft in texture, not well defined in its lower or proximal part, and having its walls composed rather of soft scales than of one continuous piece; and a pencil of filaments issuing from the base of this tube internally, without any connecting shaft. These filaments vary in length and number according to the species. In all cases they are extremely slender, pliant, sinuous, and more or less spirally twisted. They consist of an extremely delicate shaft, along the sides of which there come off, in general, two sets of short

delicate filaments. The former may be denominated the filaments, the latter the filamentules, corresponding to the barbs and barbules of the feather. These filamentules have the same relation to the filament, their shaft, that the barbules of the feathers have to their barb, and are, in general, equally distichous; but they enter into no connection, remaining perfectly loose, and, owing to the manner in which the shafts are twisted, have the appearance of coming off all round them. Unlike the barbules of the feather, they generally come off at right angles to the filament.

As the down is well known to be a bad conductor of caloric, it is presumed that it serves in the aquatic birds, and particularly in those of cold climates, to retain the heat generated in their bodies. In birds which are not furnished with down, but which yet inhabit cold countries, the deficiency might be supposed to be supplied by the downy feathers which we observe in those birds, as in the Snowy Owl, White-tailed Sea Eagle, and Golden Eagle. In the Gallinaceous birds, the accessory feather might, in like manner, be imagined to be subservient to this purpose. But when we reflect that the Eagles, Owls, and Gallinaceous birds of cold climates are at least not much better furnished with down or downy feathers than species of the same genera inhabiting warm climates, we naturally look for some other reason for which birds are furnished with down. In most of the land birds there is no universal layer of down immediately covering the skin.

In the Falconine family, and especially the larger species, besides down of the above nature, there exist plumules of the following description. From the upper part of a short tube there issue two filamentary shafts, which are flattened and exceedingly delicate. From these there branches out on either side a series of extremely delicate filaments, having each two lateral series of filamentules. The whole has the appearance of a single tuft of extreme fineness, and silky texture. The filaments have a considerable degree of elasticity. The tube is open above, between the two shafts, there being a direct continuation of it on either side into the shafts, and at this opening the pith comes out and terminates. These plumules

being largest on the belly, may be best seen there; they exist, however, in the other parts of the body, but are not readily distinguishable from the down-feathers, properly so called. If it be necessary to give these feathers a name, they may be called *flake-feathers.*

In most birds, after the feathers have been removed, we find a sort of envelope, consisting of hairs as it were, set so widely, and so small in themselves, that they might readily be overlooked. These are the hairs that are singed off in a fowl after it has been plucked. In the Pheasant their structure is as follows:—from a very short bulbiform tube rises a very slender roundish piliform shaft, resembling a hair of the human head, but much smaller, and straight, which, at the extremity, gives off two or three short simple barbs on either side. This is the most simple modification of the feather, if we except the quill of the Cassowary.

In all nestling birds, before they have received their full plumage, the skin is covered with a greater or less quantity of down, resembling that described above as occurring in adult birds. This down is generally more or less developed, even before exclusion from the egg. It consists of two orders of plumules. One set, which is connected solely with the skin, is similar in structure and relations to the down of the adult bird, each plumule consisting of a tube, out of which issues a pencil of filament, furnished with filamentules. The other set, which, at first sight, is not distinguished from the former, being blended with it, is of the following nature. The plumules at first arise from the skin in the ordinary manner and form, but having fewer filaments than the others. Shortly after, when the feathers begin to sprout, they are observed to be elevated from the skin, being borne upon the tips of the feathers. The tips of the extreme barbs of the feathers are drawn together, and united into a point by a scaly envelope, similar to that which encloses the feather itself during the first stages of its growth. From this point there proceeds a pencil of filaments, consisting of a variable, but generally small, number. These filaments have two lateral series of filamentules, and are loose and floating, and more or less spirally twisted. The filaments

are continuous with the tips of the barbs, as is proved by discussing the point of adhesion with a needle, when the scales fall off, and the filaments remain attached to the tips of the barbs, and continue so until rubbed off, which, in some species, and in certain parts of the body, the head in particular, does not take place until the bird has been fully fledged.

Considered with respect to situation, feathers may be named as follows:

Frontal, on the fore part of the head.

Vertical, on the upper part of the head.

Occipital, on the hind part of the head.

Genal, on the side of the head, under the eye.

Loral, on the space between the bill and the eye.

Marginirostral, round the basal margin of the bill.

Auricular, about the aperture of the ear.

Palpebral, on the eyelids.

Ciliary, on the edges of the eyelids.

Cervical, on the neck; anterior, lateral, posterior; upper, middle, and lower.

Anterior, *medial*, and *posterior dorsal*, on the fore, middle, and hind parts of the back.

Pectoral, on the breast; anterior, middle, and posterior, on the fore, middle, and hind parts of the breast; lateral pectoral, on the sides of the breast.

Abdominal, on the belly.

Hypochondrial, on the sides of the body, under the wings.

Upper Alar, on the upper part, or dorsal aspect of the wings.

Lower Alar, on the lower part or sternal aspect of the wings.

Alar quills, or wing quills, large feathers projecting from the posterior edge of the wing.

Primary or *digital quills*, those on the hand or pinion.

Secondary or *cubital quills*, those on the cubitus or fore-arm.

Tertiary or *humeral quills*, those on the humerus or arm. Some writers consider the inner elongated feather-like cubital quills as the tertiary.

Quill-coverts, a row of feathers immediately covering the base of the quills;—there are humeral, cubital, and digital quill-coverts on both surfaces of the wing, and therefore upper and lower.

Scapulars, a bunch or series of long feathers, situated at the proximal extremity of the arm, apparently on the back.

Axillary feathers, a series of long straight feathers, situated at the proximal extremity of the humerus, under the wing.

Tibial feathers, covering the tibia or leg.

Tarsal, covering the tarsus.

Digital, covering the toes.

Caudal quills, terminating the body behind.

Caudal quill-coverts, upper and lower, feathers covering the caudal quills at their base, above and beneath.

Caudal feathers, upper and lower, on the coccygeal region.

I have judged it necessary to be thus minute on the subject of the feathers, because they are of the utmost importance for distinguishing the species and genera, and because the plumage affords one of the most beautiful illustrations of the divine wisdom, the considerations connected with which will so readily present themselves to any person who examines its structure, that it is needless to indulge here in any remarks on the subject.

The ordinary terminology applied to the leaves of plants is that which I adopt for distinguishing the forms of feathers. Thus,

Ovate, having the outline of an egg. Fig. 21.

Lanceolate, tapering at both ends. Fig. 22.

Linear, narrow, with the edges parallel. Fig. 23.

FIG. 21.

FIG. 22.

FIG. 23.

Abrupt, cut even at the end. Fig. 24.

Rounded, having the extremity broadly rounded. Fig. 25.

Obtuse, narrowly rounded. Fig. 23.

Acute, sharp-pointed.

Acuminate, with a long taper point. Fig. 22, 26, *b*.

Accuminate and abrupt. Fig. 26, *a*.
Emarginate, having a notch at the end. Fig. 27.

FIG. 24. FIG. 25. FIG. 26, *a*. FIG. 26, *b*. FIG. 27.

The proportional size of the quills on the cubitus and hand, together with their form, gives rise to several important distinctions, which, being characteristic of the different families and orders, will be pointed out in the body of the work. A few circumstances however may be here mentioned as relating to the wings.

The breadth of the wing depends chiefly upon the length of the cubital quills; its length principally upon that of the digital. Considered as a whole, the wing may be very long, while its bones are very short, as in Swallows, Fig. 29, and Humming-birds, in which the cubitus in particular is extremely diminutive. In some birds, as Gulls and Eagles, the humerus and cubitus are very long; in others, as partridges, very short; and the same remark may be made as to the digital quills.

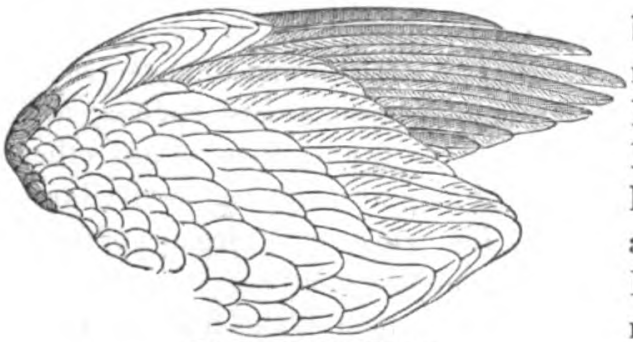


FIG. 28. *Wing of Grouse.*

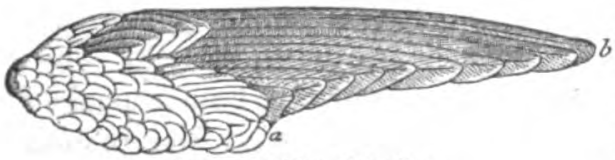


FIG. 29. *Wing of Swallow.*

The wing is short, broad, convex, and rounded, in Grouse, Partridges, and other Rasores, Fig. 28; long, broad, straight, and pointed in most Pigeons. In the Peregrine Falcon, it is acuminate, the second quill being longest, and the first little shorter; and in the Swallows is still more so, the first quill being longest, and the rest rapidly diminished in length, Fig. 29. Between these long, pointed wings, and the short, rounded ones

of the Rasores, Fig. 28, there are various gradations. The primary and secondary quills vary greatly in form, but the former are almost always narrower than the latter.

The tail, by which is here meant the feathers of that organ, may be extremely short, short, moderate, long, extremely long,

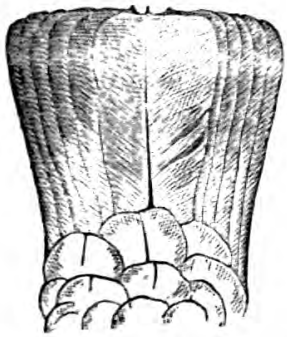


FIG. 30. *Tail of Dove.*

FIG. 31. *Finch.*

FIG. 32. *Black Martin.*

and of all intermediate gradations; even, Fig. 30; rounded, graduated, or wedge-shaped, Fig. 33, at the end; tapering, pointed, emarginate, Fig. 31; or forked, Fig. 32. The number of its quills varies from eight to twenty or more, although in by far the greater proportion of birds it is twelve.

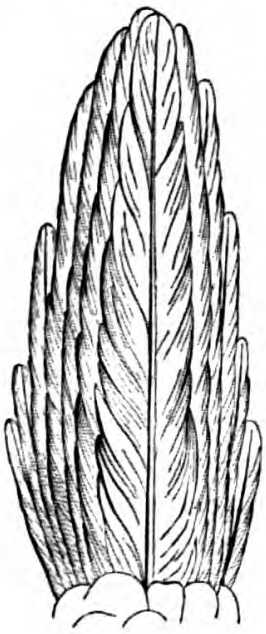


FIG. 33. *Tail of Parrot.*

The tints or varieties of colour presented by the plumage are almost endless, and greatly excel in beauty those of any other class of animals, although our native birds are more distinguished for elegance of form, than for gaudiness of attire.

The development of the feathers takes place by means of an elongated cylindrical matrix consisting of a capsule, a bulb, and intermediate membranes, by which the matter secreted by the bulb is moulded. Like the foliage of trees, the plumage of birds is shed and renewed annually. In many cases the change takes place twice every year. The feathers being entirely extravascular, or, when full-grown, destitute of blood-

vessels and completely inorganic, like horns, hoofs, and other parts of the skin, do not undergo any other change of colour than that produced by the fading of their tints from long exposure to the weather, or that caused by the abrasion or fall of the extremities of their filaments, when a fresh surface of a different colour is exposed. Many birds attain the permanent colours of their plumage at their first moult, while others take four or five years before they acquire their full dress. On this subject various misstatements have been made by authors, some of which I shall endeavour to rectify, when opportunities occur, in describing the species in which the appearances alluded to are most prominent.

Those who may be desirous of prosecuting the anatomy of birds will find it advantageous to consult more especially Cuvier's Leçons d'Anatomie Comparée; Carus's work on the same subject; the article Birds, by Macartney, in Rees' Cyclopædia; Dr. Grant's Outlines of Comparative Anatomy; the article Aves, by Mr. Owen, in Todd's Cyclopædia of Anatomy and Physiology, and Dr. Milne Edwards' Elémens de Zoologie; of the details in some of which I have occasionally availed myself in drawing up these observations, although in no case have I set down any thing that I have not seen and examined in nature for myself. It is necessary to remark, however, that no progress can be made in comparative anatomy without repeated and varied dissections; and that to derive the full advantage from zoological descriptions, it is requisite to have the bird treated of, or at least its skin or its portrait, at hand for inspection. Above all modes of acquiring a knowledge of birds, that is to be recommended in which nature is chiefly consulted, and books, especially those composed of critical disquisitions respecting names and classifications, referred to only on rare occasions. If one should know the structure and habits of a species, although he should be ignorant of its name, or rather its half-dozen names,—for it must be a rare bird indeed that has not in the present improved state of science at least as many as a German princess,—he may consider himself more fortunate than if he had learned to distinguish a dozen species in a museum.

Some ingenious writers have attempted to show that a knowledge of the internal structure of animals is not essential to the zoologist, who, it is said, may get on remarkably well, and form the most natural arrangements, by attending merely to the exterior. The views of such persons are not likely to find much favour in the eyes of those who have studied animals as organized beings, and who do not remain satisfied with inspecting their surface.* Zootomy regards the entire structure of animals, which must be examined in all their parts, before the zoologist can arrange them according to their affinities. The study of their interior must in fact form the basis of all arrangement; and although many natural groups may be formed by attending exclusively to the exterior of animals, it is only because their internal organization is presumed to be similar. The external parts afford an index to the internal; and if we find a bird having a short hooked bill and curved claws, we shall not be wrong in inferring that it has a wide œsophagus and a large membranous stomach. The great divisions of

* As affording a sample of the once prevalent, but now declining, notions of this class of ornithologists, who, although they boast of being in advance in the matter of the manufacturing of genera, subgenera, and names, are yet at least a century behind in every thing that relates to structure. I may adduce a portion of the 24th paragraph of Mr. Swainson's "*Natural History and Classification of Birds.*" "Comparative anatomy regards two distinct portions of the structure of an animal,—its *inward* and its *outward* organization. The study of the first is not so essential to the zoologist as the last; and, although both are intimately connected, they may be, and have been, pursued separately. It is, for instance, by no means necessary for the clear understanding of the ruminating quadrupeds, that the naturalist should be informed that they possess more stomachs than any other animal; nor is it essential to his object of defining and classifying them, that he should know which species ruminate their food, and which do not. But were he to neglect the study of the external anatomy of these beasts, and disregard the form, direction, and substance of their horns, the size and situation of their teeth, and other parts of their external anatomy, he would be utterly unable to proceed; nay, more—he would be scarcely able to define what difference there was between an ox and an elephant. As with quadrupeds, so with birds. The form and structure of the body, and all its various members, is comprised under the head of external anatomy; and it is from the various modifications and appearances which these parts assume, that the ornithologist is capable of drawing such discriminating characters as enable him to form clear conceptions of their respective peculiarities. Were he, on the other hand, to make their *internal* anatomy the basis of his system, he might

zoology can be laid out only by a zootomist; but the details of the system may occasionally, perhaps frequently, but never with absolute certainty, be elaborated by him who regards only the exterior. No rational system of ornithology has ever appeared, for these two reasons: because no system-maker has been equally acquainted with the internal structure, the external parts, and the habits and actions of birds; and, more especially, because birds have not yet been subjected to a sufficiently minute examination. I have been induced to offer these remarks because I regret that the science has been degraded by having been left entirely in the hands of those who appear to despise, because they have no knowledge of, the internal structure of birds; and I have considered it my duty to impress upon the student the necessity of dissecting with all diligence. Were it possible to cast away all the knowledge already acquired, and commence anew upon the plan of considering birds as admirable specimens of divine workmanship, to be examined in all their details, we should, I believe, be great gainers in real knowledge.

I have now to point out briefly the parts observable in the exterior of a bird, and for this purpose make reference to the figure of a Kestrel in outline, Fig. 34.

It has already been stated that a bird may be primarily divided into certain parts: The head, *a*; the neck, *b*; the body, *c*, *c*; the tail, *d*; the anterior extremities or wings, *e*; and the posterior extremities or legs, *f*. The basis of all these parts

be able to classify those native birds which, from being common, might be procured for dissection; but thousands of others must be left undetermined: and after all, however elaborate might be his system, it would be utterly useless for practical purposes, and unintelligible to all but professed anatomists." A serious refutation of opinions like these, which belong to the "dark ages," would seem in some measure ludicrous; and therefore I offer no comment upon them. Yet the same writer elsewhere exultingly exclaims—"How superficially do we study nature!" *We* truly,—men in general,—but not the discoverers of "the only natural method." Yet also, Mr. Macleay, the founder of the circular system, distinctly declares that "the only probability of our ever understanding the great scheme of the creation *must depend on studying the method in which the organs and properties of natural beings vary*;" and Mr. Swainson quotes this with approbation, even while recommending a method constructed of bills, feet, and feathers, without a single muscle or nerve.

has been seen in the skeleton figured in Plate I. The head is composed of the brain, its membranes, the bones of the skull and face, the organs of sight, hearing, smelling, and tasting, with those of prehension and deglutition, and various other parts. The neck is the more or less elongated and flexile part by which the head is joined to the body, and is composed of the cervical vertebræ, various muscles, the œsophagus, the windpipe, nerves, and blood-vessels. The body is the basis of the whole, consisting of the dorsal and sacral vertebræ, the ribs, the sternum, the clavicles, the scapula, the heart, bronchi, lungs, liver, stomach, intestines, kidneys, genital organs, and various other parts. The tail is composed of the coccygeal vertebræ, their muscles, and the quills. The anterior extremity consists of the bones of the humerus, cubitus, and hand, with the muscles, and quills; the posterior extremities of the femur, leg, tarsus, and toes, with their muscles. All these parts, excepting the bill, the nostrils, the eyes, the tarsi, and the toes, are generally covered with feathers.

Now, considering the Kestrel with reference to its exterior only, we observe the following parts:

The *bill*, 1, 2, composed of two *mandibles*, an upper, 1, and a lower, 2, which are formed of horny substances ensheathing the jaws.

In the upper mandible are distinguished the base, 3; the culmen or ridge, 4, of which the outline is named the dorsal line; the edges, 5; the point, 6.

In the lower mandible are seen the base, 7, 8, distinguished into the crura, 7, covering part of the rami of the jaw, and the angle, 8, or junction of the crura; the ridge, 9; the edges, 10; and the point.

The cere, 11, which is not of general occurrence, is a portion of bare skin at the base of the upper mandible.

The nostrils, 12.

The angle of the mouth, 13.

The lore, 14, or part between the angle of the mouth and the eye.

The eye, 15, in which are distinguished the pupil or dark central part, the iris or coloured circle surrounding the pupil,

the eyelids, upper and lower, the supraocular ridge, 16, not general in birds. There are besides frequently a bare space about the eye, or a membrane above it, and various fleshy or carunculated appendages.

There are also frequently bristle-like feathers at the base of the mandibles, as well as tufts of feathers on the head.

The anterior part of the head is named the forehead, or frontal region, 17; the upper part, the crown, or vertical region, 18; the hind part, the occiput, or occipital region, 19. The sides of the head include the space from the ear to the angle of the mouth, in which are distinguished especially the ear-coverts, 20. The feathers on these parts are named frontal, vertical, occipital, and lateral, or facial.

The neck may be divided into the upper, middle, and lower parts, each of which has a posterior, a lateral, and an anterior portion, which however it is not always necessary to specify. The feathers covering this part are named cervical, and may be anterior, lateral, posterior, superior, and inferior. Those on the upper part or throat, 21, are often named gular; on the lower anterior part, 22, jugular; on the upper hind neck, nucha, or nape, 23, nuchal. The part at the angle of the jaw, or interspace of the crura of the lower mandible, some name the chin; but this term is absurd, birds having no chin properly so called, and the part in question not being at all analogous to the chin in man.

In the body, the following parts are distinguished:

The back, of which there are the anterior, 24, the middle, 25, and the posterior, 26, regions.

The scapular region, 27, is that over the scapula and humerus.

The hypochondrial space, or side, lies under the wing.

The breast commences at the anterior part of the sternum, 28, and extends to near its posterior extremity, 29; or, as the thorax and abdomen are not separated by a diaphragm, as in quadrupeds, it may be better to consider the entire space defined by the sternum as the fore part of the thorax.

The abdomen, 30, in that case, is the space from the posterior edge of the sternum to the anus or vent.

The feathers covering the back are named dorsal; the breast, pectoral; the sides, hypochondrial or lateral.

In the tail are distinguished the tail-feathers, or tail-quills, 31; and the upper and lower tail-coverts, the latter marked 32.

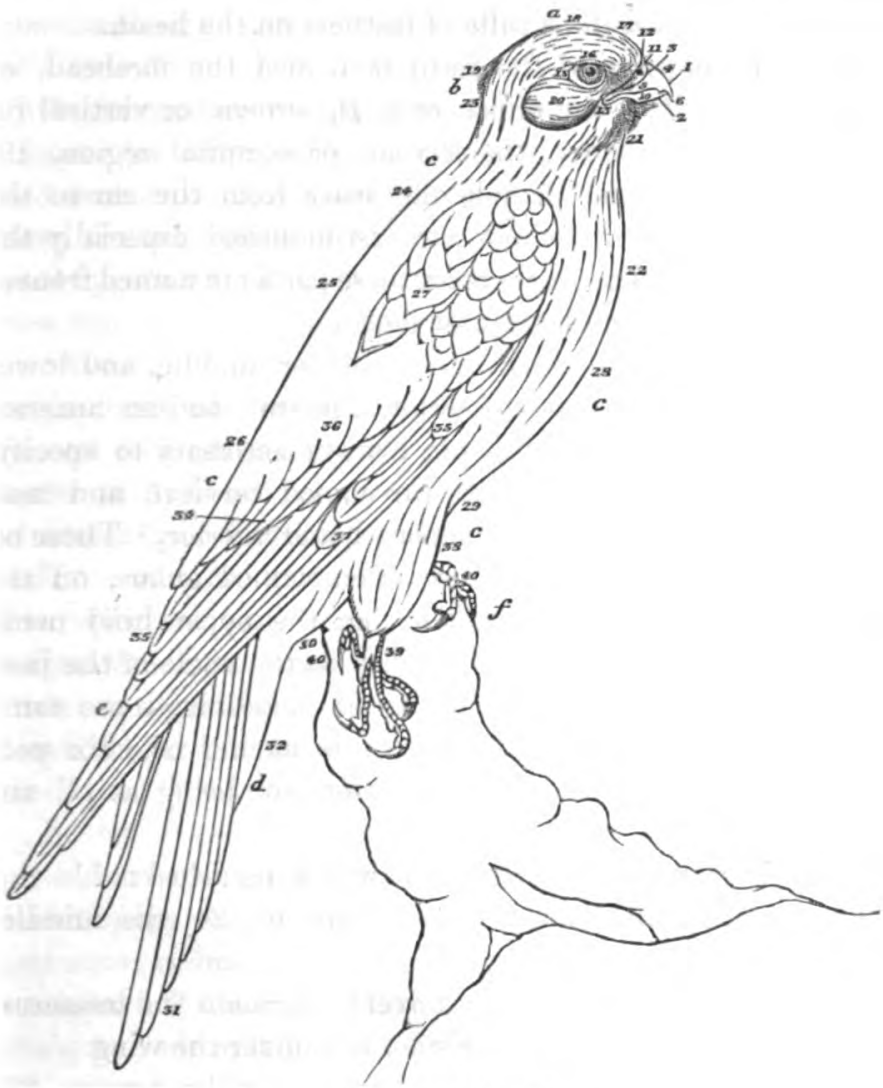


FIG. 34. *The Kestrel.*

The wings are the anterior extremities, in which are distinguished the different parts already pointed out in speaking of the skeleton; the humerus, cubitus, and hand or pinion. Hence the quills, or large feathers, are divided into humeral, usually termed tertiary by ornithologists, who begin to count at the wrong end, 33; cubital, or secondary, 34, and Fig. 29,

a; and digital or primary, 35, and Fig. 29, *b*. Those on the first finger, 35, are named alular. The series of large feathers immediately covering the quills is composed of the larger coverts, which are also named humeral, cubital or secondary, 36, and digital or primary, 37. The other feathers of the wing are named the smaller wing-coverts. The lower surface of the wing is similarly feathered.

In the posterior extremities, or legs, are distinguished the femoral region or thigh, generally concealed; the leg properly so called, or the tibia, 38, generally feathered, sometimes bare for a greater or less extent above the ancle joint, which is generally mistaken for the knee; the tarsus, 39, almost always bare, and covered with scales or plates, of various forms, and variously disposed.

Lastly, we have the toes, 40, which vary in number, although there are never more than four, unless the spur be considered as a toe, nor fewer than three; for the Ostrich, which was formerly held to have only two, has lately been shewn by Dr. Riley to have moreover a rudimentary inner toe. They are covered above with scales of large size, laterally with smaller, beneath with papillæ, and have their extremities sheathed with horny claws, varying much in length and form in the different species, and in the present bird, the Kestrel, long, curved, and tapering to a fine point.

These introductory observations will suffice to enable the reader to follow me in my descriptions, which comprehend, besides the details of the exterior, several particulars respecting the internal structure of the different species. To acquire a satisfactory knowledge of any bird, one must, in the first place, obtain a general idea of its external appearance, so as not only to be able to distinguish it at sight, but also to know in what respects it resembles others, or differs from them. Then he ought to examine its interior, and more especially its digestive organs, which indicate the nature of its food, the latter necessarily determining its haunts. He now seeks it there, and observes its mode of walking and flying, its favourite places of resort, and its various actions, listens to its notes, follows it to

its nest, which he inspects, and takes note of its migrations or local shiftings. The food can be detected with accuracy only by opening the crop and gizzard; and the changes in the colour of the plumage can be ascertained only by procuring individuals at different seasons. In attending to these and other particulars, one necessarily requires much enthusiasm, and consumes much time. Indeed the task of writing the history of a bird not of common occurrence, such as the Golden Eagle, the Raven, or the Rock Pigeon, is by no means so easy as might be imagined, unless to those who merely compose it from the accounts given by original observers, whom they frequently greatly excel in popular estimation, although in very many instances they cannot so much as have seen the objects of which they so confidently write. When the student has rendered himself familiar with a few species, his pursuits daily become more interesting; and if he at the same time compare his notes with the descriptions given by authors, he will find additional pleasure in observing the particulars in which there is a mutual agreement, and perhaps in occasionally detecting errors in his own or their statements. But at what precise period he becomes an ornithologist, I cannot venture to affirm: whether the first day on which he brings home a Sparrow or a Chaffinch, or after he has studied an hundred birds, and read the works of half as many authors.

Notwithstanding the impediments presented by the necessary restrictions preventing persons carrying guns from strolling over the country, there is scarcely any district in Britain that does not present a good field for ornithological research. The uncultivated moors, the craggy summits of the mountains, the wooded glens, the birch and pine forests of the north, the plantations and parks of the south, the cultivated fields, the pastures and downs, the sandy beaches, the rocky shores, and the islands of the sea, have all their peculiar species, whose history can be satisfactorily traced only in connection with the physical geography of the districts or tracts in which they reside. For this reason, some knowledge of geology and botany will always be useful to the ornithologist. The subject of the distribution of birds, even in our own island, small as its extent

is, has not yet received much attention; so that, in occasionally presenting local lists of species, accompanied by explanatory remarks on the nature of the districts, I shall not be unnecessarily extending my observations; and the general results, to be presented at the conclusion of my labours, will, I trust, prove of considerable interest.

In the meantime, it may be mentioned that the number of species hitherto observed in Britain amounts to about two hundred and ninety-five. Of these about a hundred and twenty-five reside in the country throughout the year; sixty visit us in summer, and depart in autumn; thirty are winter visitants; and the rest, about eighty, may be included in the class of stragglers, or accidental, or irregular visitants. Besides these, a species, formerly plentiful in certain districts, the Great Wood Grouse, *Tetrao Urogallus*, has been extirpated; and the same may be said of the Crane, *Grus cinerea*, of which one or two individuals only have been seen of late years.

EXPLANATION OF THE PLATES ILLUSTRATIVE OF THE INTRODUCTION.

The objects are represented half the natural size.

Plate I. Skeleton of the Golden Eagle, Aquila Chrysaëtus.

a, the cranium.
b, the upper jaw.
c, the lower jaw.
d, *e*, cervical vertebræ.
e, *f*, dorsal vertebræ.
f, *g*, sacral and caudal vertebræ.
h, *h*, spinous processes of cervical vertebræ.
i, *i*, their transverse processes.
j, *f*, united sacrum and pelvis.
k, *k*, ribs.
l, spinal portion of rib.
m, sternal portion.
n, *n*, processes of ribs.
o, *p*, *q*, sternum.
o, crest of sternum.
p, body of sternum.
q, its posterior margin.
r, coracoid bone or clavicle.
s, *s*, furcula.
t, scapula.
u, *u*, humeral bone.
v, *w*, cubitus.
v, *v*, ulna.
w, *w*, radius.
x, *w*, the two carpal bones between these letters.
x, metacarpal bones.
y, first digit.
z, bone of first phalanx of finger, to which is appended another.
α, β, γ, os innominatum.
α, ilium.
β, ischium.
γ, os pubis.
δ, ischiadic foramen.
ϵ, obturator notch.
ζ, η, thigh bone.
η, η, its two condyles.
θ, bones of the leg.
θ, tibia.
ι, fibula.
κ, ancle joint.
λ, tarsus and metatarsus united, commonly called tarsus.
μ, small metatarsal bone of first toe.
1, first or hind toe.
2, second or inner toe.
3, third or middle toe.
4, fourth or outer toe.

Plate II. Wing of the Domestic Pigeon, Columba Livia.

Fig. 1. *Upper surface of Wing, the small feathers removed.*

a, *b*, junction of wing with the body.
b, *c*, humerus or arm.
c, *d*, cubitus or fore-arm.
d, *e*, *f*, hand or pinion.
e, alula or spurious pinion.
c, *f*, quills.
c, *d*, cubital or secondary quills.
d, *f*, digital or primary quills.
g, *e*, alular quills.

Fig. 2. *Lower surface of Wing. The same parts marked by the same numbers as in Fig.* 1.

Plate III. Bones and Muscles of the Wing of the Domestic Pigeon, Columba Livia.

Fig. 1. *Bones of the Wing.*

a, scapula.
b, tip of coracoid bone.
b, *c*, os humeri or arm-bone.
c, *d*, cubitus or ulna and radius.
d, carpal bones.
d, *e*, metacarpal bones.
e, *f*, the two phalanges of the finger.
g, pollex or first finger.

Fig. 2. *Muscles seen on the upper side of the Wing.*

a, the body.
b, *c*, humerus or arm.
c, *d*, cubitus or fore-arm.
d, *e*, *f*, *g*, hand.
1, trapezius.
2, serratus magnus anticus.
3, latissimus dorsi.
3, *a*, its anterior portion.
3, *b*, its posterior portion.
4, pectoralis major.
8, supra-spinatus.
9, infra-spinatus.
10, deltoides.
11, tensor plicæ alæ.
12, retractor plicæ alæ.
13, flexor cubiti, or biceps flexor.
14, extensor cubiti.
16, flexor carpi ulnaris.
22, extensor carpi ulnaris.
23, extensor primi digiti.
24, extensor digitorum.
25, extensor carpi radialis brevis.
27, adductor primi digiti.
28, abductor primi digiti.
29, abductor digiti.
30, adductor digiti.
31, supinator or extensor digiti.

Fig. 3. *Muscles seen on the lower side of the Wing.*

a, the body.
b, *c*, humerus.
c, *d*, cubitus.
d, *e*, *f*, *g*, hand.
4, pectoralis major.
11, tensor plicæ alæ.
12, retractor plicæ alæ.
13, biceps flexor.
14, extensor cubiti.
15, extensor metacarpi radialis longior, or supinator radii longus.
16, flexor carpi ulnaris.
17, palmaris longus.
18, flexor digitorum.
19, flexor carpi radialis.
20, extensor carpi.
21, pronator radii teres.
26, flexor primi digiti.
27, adductor primi digiti.
28, abductor primi digiti.
29, abductor digiti.
30, adductor digiti.

Fig. 4. *Muscles concealed by the pectoralis major.*

5, pectoralis medius.
6, pectoralis minor.
7, clavicularis.

PLATE IV. Digestive Organs of the Peregrine Falcon, Falco peregrinus.

FIG. 1. *Head.*

a, upper mandible.
b, cere, and nostril.
c, dorsal outline of upper mandible.
d, angle of mouth.
d, *e*, lower mandible.
d, *b*, base of upper mandible.
d, *f*, base of lower mandible.
f, angle of lower mandible.
g, dorsal outline of lower mandible.

FIG. 2. *Roof of Mouth.*

a, *b*, *c*, posterior aperture of the nasal organs.
a, *a*, its anterior part, or palatal slit.
b, *e*, series of pointed papillæ.
c, *a*, *a*, flat surface, on which the tongue is applied.
d, curved series of papillæ.
f, edges of upper mandible.

FIG. 3. *Tongue and aperture of Windpipe.*

a, *b*, tongue, soft, rounded.
b, papillæ at base of tongue.
c, aperture of glottis.
d, *d*, sides of pharynx.
e, posterior part of pharynx.
f, *f*, pointed papillæ.

FIG. 4. *Tongue, Trachea, Intestinal Canal, Heart, and Liver.*

a, *b*, *b*, tongue and hyoid bones.
c, *d*, trachea.
d, *e*, bronchi.
e, *f*, divisions of aorta.
g, *h*, heart.
h, pericardium left on one side.
i, *j*, lobes of the liver.
a, *b*, *d*, œsophagus.
k, *k*, dilatation of œsophagus, or crop.
l, commencement of intra-thoracic portion of œsophagus, passing behind the heart and liver, but shewn by Fig. 5.
n, *o*, stomach.
o, one of its tendons.
p, *q*, *r*, duodenal fold of intestine.
x, anus or vent.

FIG. 5. *Part of Œsophagus, Stomach, and Intestine.*

l, *m*, lower part of œsophagus.
m, proventriculus.
n, muscular fibres of stomach.
o, one of its tendons.
p, *q*, *r*, duodenal fold of intestine.
p, pylorus.
r, entrance of biliary ducts.
s, *s*, pancreas.
t, gall-bladder.
u, *v*, *w*, intestine.
w, cloaca.
x, anus.

FIG. 6. *Rectum and Cœca.*

a, *b*, rectum.
a, *a*, cœca.
c, *d*, ureters, entering at *e*, below which is the aperture of the bursa of Fabricius.

FIG. 7. *Proventriculus laid open.*

a, *b*, longitudinal section of proventriculus.
1, 2, 3, 4, proventricular or gastric glandules slightly divided into four masses; their orifices seen on the inner surface.

FIG. 8. *Section of Proventriculus.*

a, *a*, its outer coats.
b, its inner coat.
The cylindrical glandules are seen between them.

FIG. 9. *Glandules of natural size.*

FIG. 10. *Inner surface of Stomach.*

The soft epithelium, or inner coat, elevated into tortuous rugæ.

FIG. 11. *Valve of pylorus.*

PLATE V. Digestive Organs of the Snowy Owl, Syrnia Nyctea.

FIG. 1. *Tongue, Trachea, Intestinal Canal, Heart, and Liver.*

a, tongue.
b, *b*, hyoid bones.
c, *d*, trachea.
e, *e*, bronchi, or division of trachea.
f, heart, with pericardium removed.
g, *h*, lobes of liver.
i, abdominal parietes.
j, two air-cells.
b, *k*, *l*, œsophagus, very wide, without dilatation or crop.

FIG. 2. *Digestive Organs concealed in Fig.* 1.

l, *m*, *n*, lower part of œsophagus.
m, proventriculus.
n, *o*, stomach.
n, its muscular fibres.
o, one of its tendons.
p, pylorus.
p, *q*, *r*, duodenal fold of intestine.
s, *s*, pancreas.
x, extremity of intestine.

FIG. 3. *Tongue, and aperture of Glottis.*

a, *b*, tongue, having the base emarginate and papillate, the tip notched.

FIG. 4. *Part of inner surface of Proventriculus.*

FIG. 5. *Longitudinal section of Proventriculus, shewing the apertures of the Glandules.*

FIG. 6. *Three proventricular Glandules of natural size.*

FIG. 7. *Inner surface of Epithelium or lining of Stomach, shewing tortuous rugæ.*

FIG. 8. *Rectum, Cloaca, and Cæca.*

a, *a*, *f*, cœca, enlarged towards the anterior extremity.
a, *a*, *b*, rectum.
b, *c*, cloaca.
d, *d*, ureters, entering at *e*, below which is seen the larger aperture of the bursa of Fabricius.

PLATE. I.

Skeleton of the

GOLDEN EAGLE.

AQUILA CHRYSAETUS.

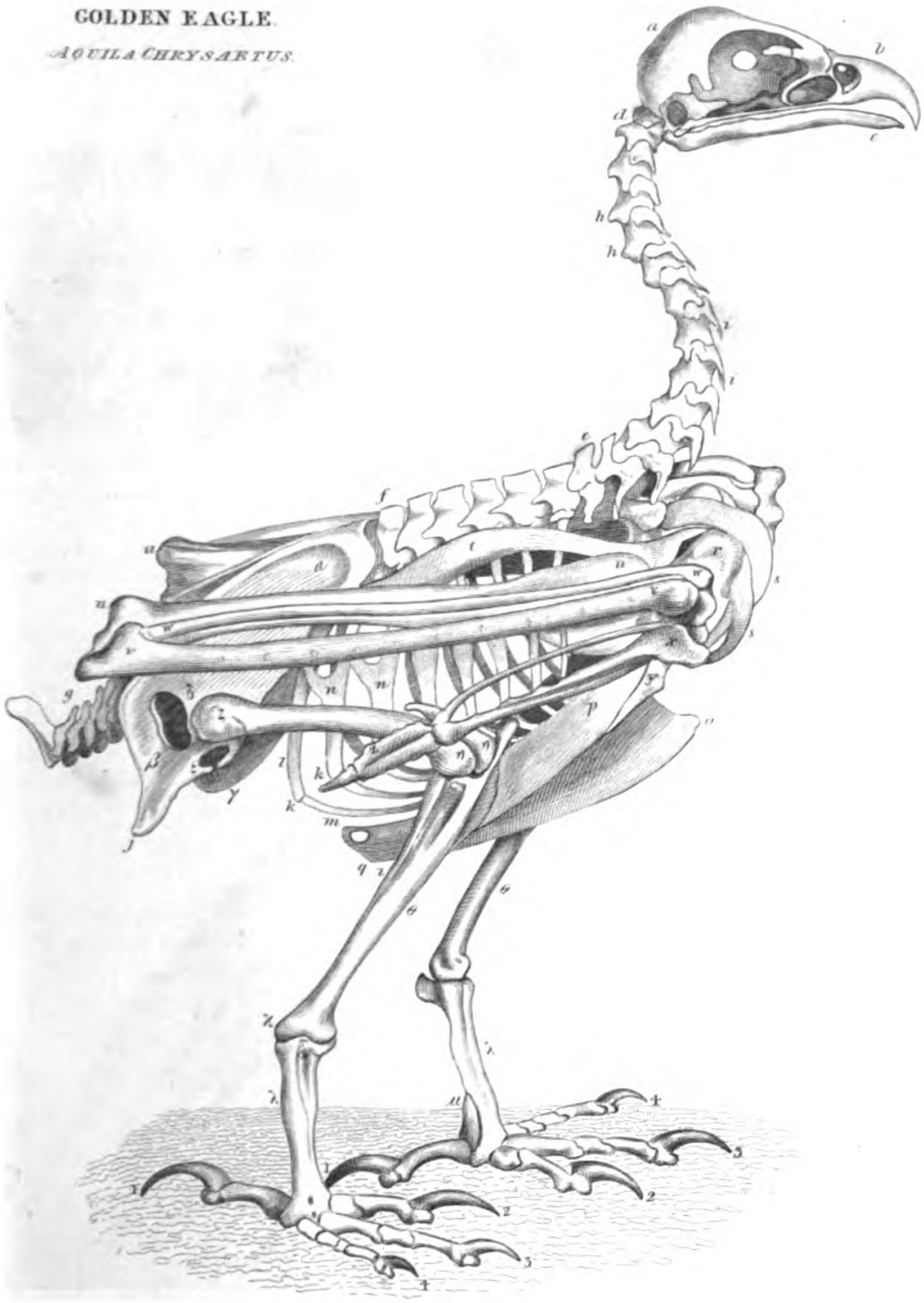


PLATE II.

Fig 1.

Wing of the

DOMESTIC PIGEON

COLUMBA LIVIA.

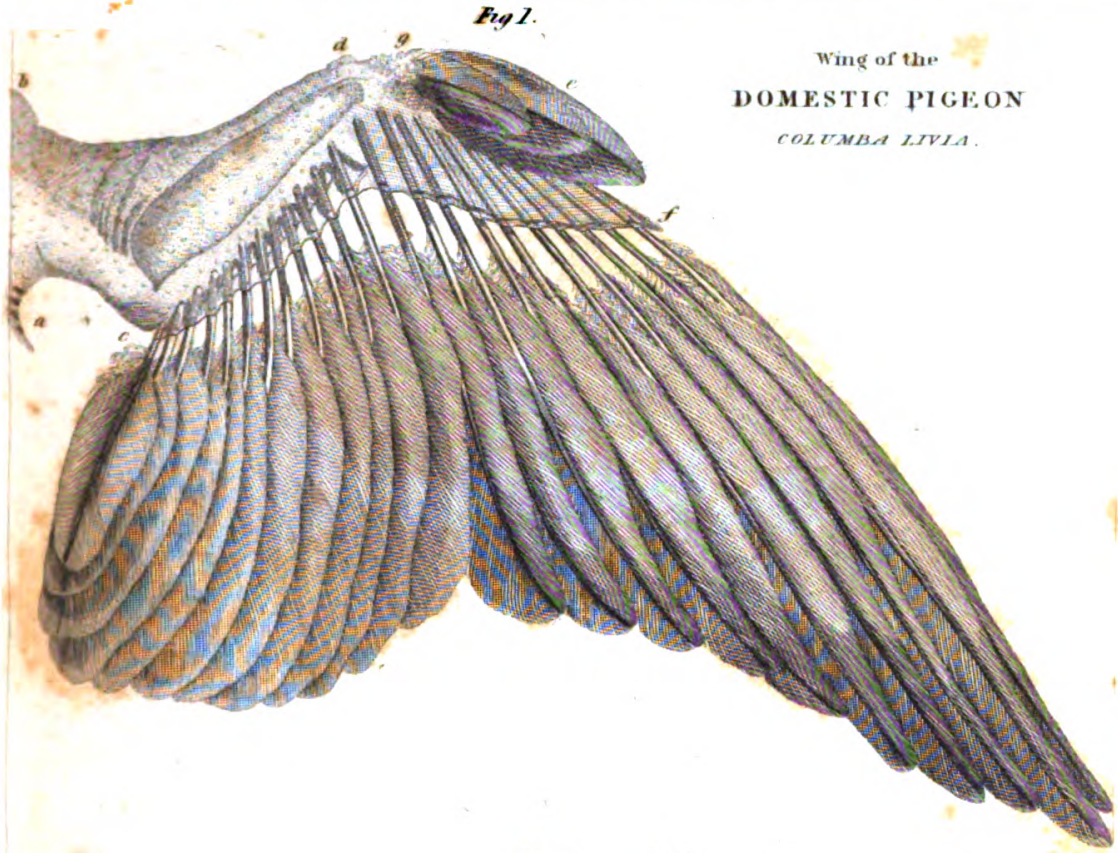
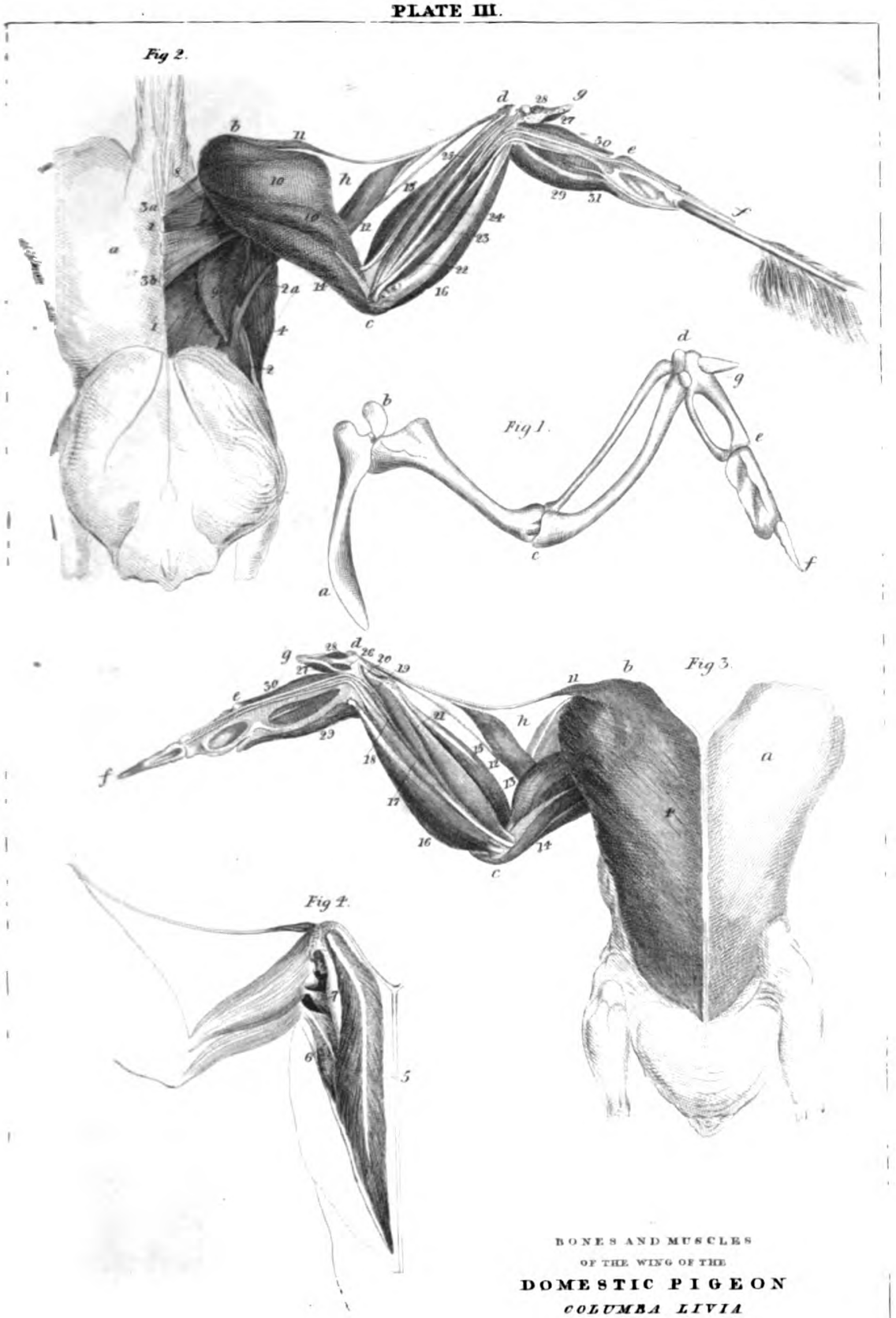


Fig 2.

PLATE III.



BONES AND MUSCLES
OF THE WING OF THE
DOMESTIC PIGEON
COLUMBA LIVIA

PLATE IV.

Digestive Organs of the

PEREGRINE FALCON.

FALCO PEREGRINUS.

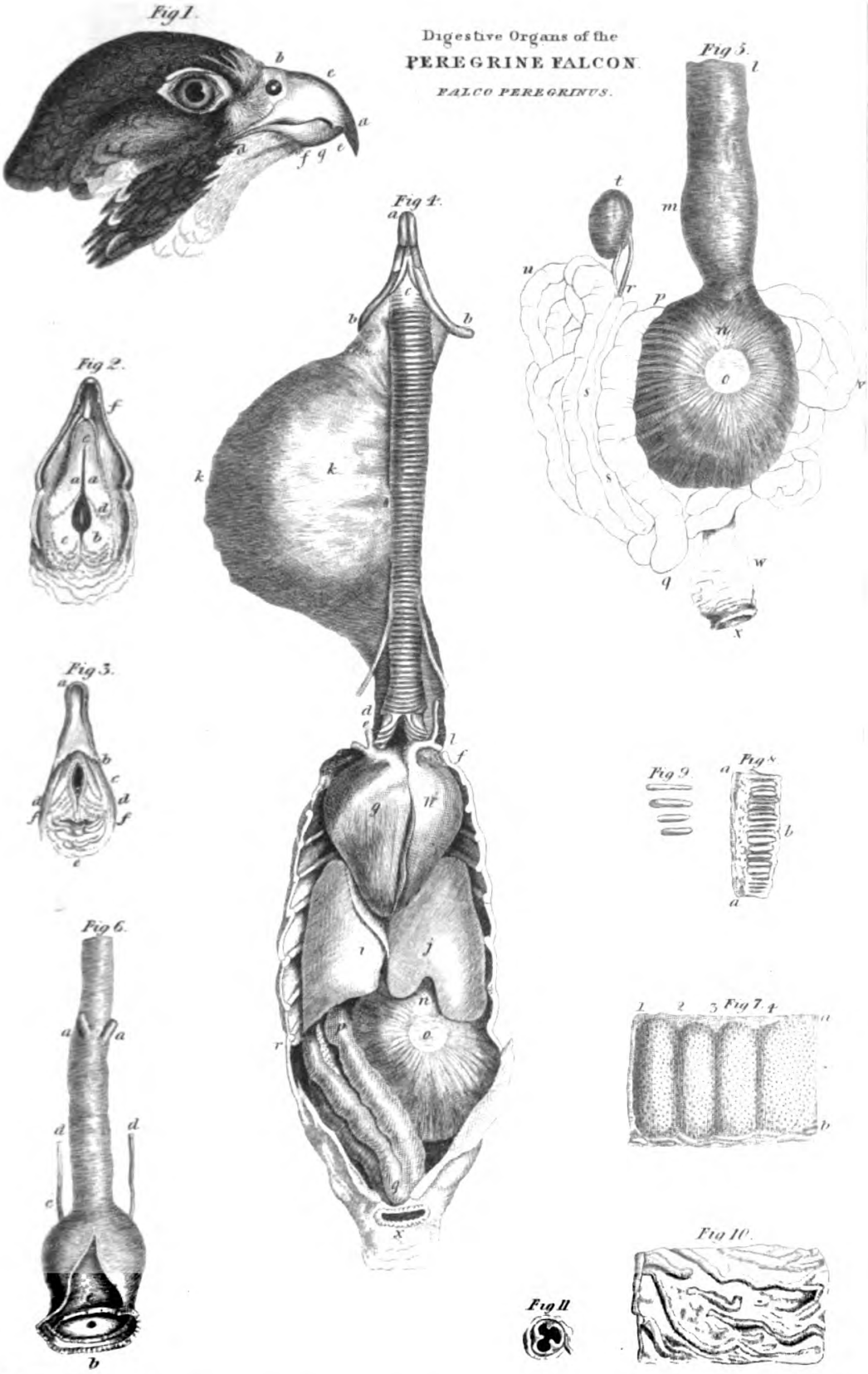
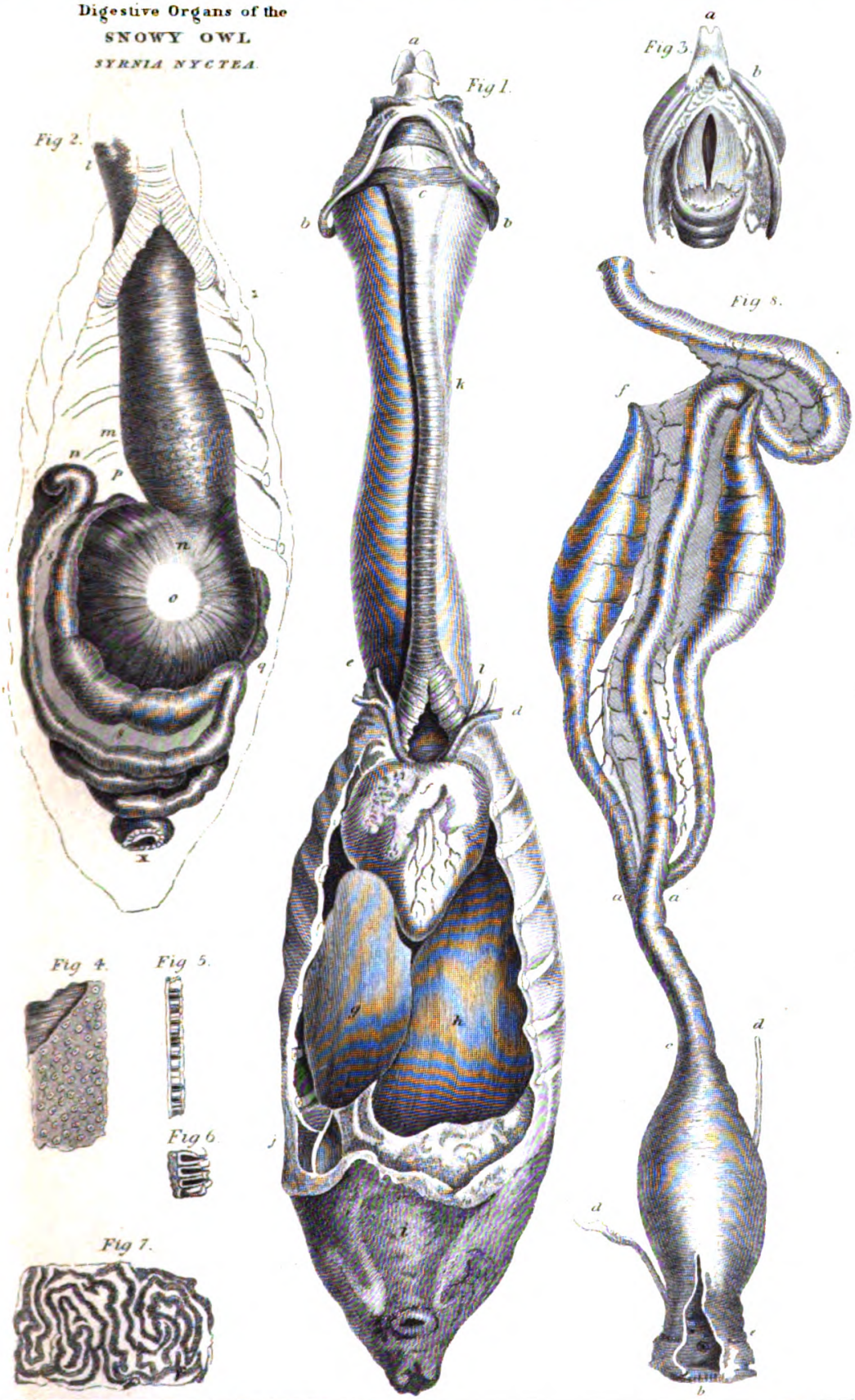


PLATE V.

Digestive Organs of the
SNOWY OWL
SYRNIA NYCTEA.



HISTORY

OF THE

INDIGENOUS BIRDS

OF

GREAT BRITAIN.

ORDER I. RASORES. SCRAPERS, OR GALLINACEOUS BIRDS.

II. GEMITORES. COOERS, OR PIGEONS.

III. DEGLUBITORES. HUSKERS, OR CONIROSTRAL BIRDS.

IV. VAGATORES. WANDERERS, OR CROWS AND ALLIED SPECIES.

ESSENTIAL CHARACTERS OF THE ORDERS.

The Orders of which the British species are described in this volume, may be distinguished by the following brief characters, of which the most important, or *those derived from the digestive organs*, are represented by the accompanying sketches.

Fig. 35.

Rasores.

Fig. 36.

Gemitores.

Fig. 37.

Deglubitores.

Fig. 38.

Vagatores.

By simply inspecting the intestinal canal of a bird belonging to any of these species, one can invariably refer it to its proper order. It is to be observed, however, that the various characters are elsewhere given in detail.

ORDER I. RASORES. SCRAPERS.

Bill short, of moderate strength; upper mandible with a flattened nasal membrane, its extremity arched and rather depressed, with overlapping edges, and obtuse tip. Œsophagus narrow, with a very large globular crop having a small aperture; proventriculus bulbiform, with oblong sacculated glandules; stomach a powerful gizzard, with very thick lateral muscles, a prominent distinct inferior muscle, and thick rugous epithelium or inner coat. Intestine of moderate length and nearly uniform diameter, but having appended two cœca of extreme size, being together of equal capacity with the intestine. Legs strong, short or of moderate length; toes rather short, strong, flattened beneath; three before, spreading, united by a web at the base; hind toe very short and a little elevated, or wanting; claws arched, more or less depressed, and obtuse. Wings short, curved, and much rounded; the primaries attenuated and separated towards the end. *Fig.* 35, *and Pl. VI.*

ORDER II. GEMITORES. COOERS.

Bill of moderate length, slender; upper mandible with a bare, tumid, fleshy nasal membrane, its extremity enlarged and compressed, with sharp edges, and narrow blunt tip. Œsophagus immediately dilated into an extremely large transverse crop, internally reticularly rugous in the breeding season, and having a small aperture; proventriculus bulbiform, with oblong glandules; stomach a powerful gizzard, with very thick lateral muscles, a prominent distinct inferior muscle, and thick rugous epithelium. Intestine long, and narrow; the cœca reduced to very small cylindrical adnate mucous tubes. Legs short, of moderate strength; toes three before, spreading, rather short,

flattened beneath; one behind, in the same plane, shorter than the two lateral, which are equal; the third or middle toe much longer; claws short, compressed, moderately arched, rather blunt. Wings long, straight, more or less pointed, with the second, third, and fourth quills longest. *Fig.* 36, *and Pl. VII.*

ORDER III. DEGLUBITORES. HUSKERS.

Bill short, or of moderate length, very strong, conical; upper mandible slightly emarginate at the base, with a very short, broad, feathered nasal membrane, its edges involute, the tip acute. Œsophagus gradually dilated above into a membranous bag of moderate size, lying on the right side, and sometimes curving round the back of the neck; proventriculus oblong, with cylindrical glandules. Stomach a powerful gizzard, with very thick lateral muscles, a prominent inferior muscle, and thick rugous epithelium. Intestine short and rather wide; cœca minute, oblong, adnate. Feet rather short, of moderate strength; toes compressed, three before, moderately spreading; one behind, stronger but shorter than the two lateral, which are equal, and much exceeded by the third, the latter united at the base to the fourth; claws rather long, arched, much compressed, acute. Wings of moderate length, acute, but with the three or four outer quills nearly equal, the first, which is extremely small, not included. *Fig.* 37, *and Pl. VIII.*

ORDER IV. VAGATORES. WANDERERS.

Bill of moderate length, strong, tapering, compressed, pointed; upper mandible with a rather long basal sinus, filled by the nasal membrane, which is covered by stiff reversed feathers.

Œsophagus rather wide, without crop or dilatation; proventriculus bulbiform, with oblong or cylindrical glandules. Stomach rather large, roundish, more or less compressed; its muscular coat of moderate thickness, not separated into distinct muscles, but composed of uniform fasciculi inserted into circular tendinous spaces; the epithelium thin, and slightly rugous. Intestine of moderate length and diameter; cœca very small, cylindrical, adnate. Legs of moderate length, rather stout; toes three before, one behind; the first of about the same length as the second and fourth, the third much longer, and united at the base with the fourth; claws arched, stout, compressed, acute. Wings of moderate length, much rounded, the primaries narrowed and separated towards the end, the first very short, the fourth and fifth longest. *Fig.* 38, *and Pl. LX.*

I. RASORES. SCRAPERS.

OR GALLINACEOUS BIRDS.

The extensive order of the Rasores, or Gallinaceous Birds, is composed of species whose direct utility to man is more obvious than that of any other group, the flesh of all of them affording a much esteemed and wholesome food, for which reason several of the larger kinds have been reduced to a state of domesticity, in which they are found to be highly profitable. In this respect, as well as in the nature of their food, and therefore also in the structure of their digestive organs, they bear an obvious analogy to the Ruminating Quadrupeds, as the Bull, the Ram, and the Goat. To this important series belong the Turkey, the Peacock, the Common Fowl, the Pheasants, and the numerous species of Grouse and Partridge, which, although not capable of being collectively defined by characters derived from the exterior, are yet clearly separated from all other birds by the peculiar form of their intestinal canal. The Pigeons, which by many ornithologists have been referred to this order, I consider as constituting a family, nearly allied in some respects, but in others so different that several authors have associated them with the "Insessores" or "Passeres." The Ostrich, Cassowary, and Bustard, are, in my opinion, so unlike the true Rasores, that they could be ranked with them only by persons whose preconceived theoretical arrangements rendered such an association necessary.

Taking a general view of the different species, and disposing them into genera and families, we should find the following

classification not obviously inconsistent. The first family, *Pavoninæ*, is composed of the genera Meleagris, Pavo, and Diplectron; the second, *Gallinæ*, of Argus, Phasianus, Gallus, Lophophorus, and Tragopan; the third, *Cracinæ*, of Crax, Ourax, and Penelope; the fourth, *Perdicinæ*, of Numida, Cryptonyx, Tetrao, Perdix, Coturnix, Ortyx, and Pterocles. Besides these genera, several other groups have been referred to this order. Of the families mentioned above, only one, that of the Perdicinæ, contains birds naturally indigenous in Britain; although the Common and Ring-necked Pheasants, now generally distributed over the country in a semi-domestic or naturalized state, belong to the second family.

It is extremely difficult to elaborate characters equally applicable to all the species of this order. They are generally heavy birds, having the body full, the neck of moderate length, the head rather small and oblong, the feet stout, short, or of moderate length, the toes four, rather short, the hind one very short, or sometimes wanting; the claws slightly arched, more or less flattened and obtuse. The bill is for the most part short, with the upper mandible arched, transversely concave, its edges overlapping, and the tip blunt. It will serve to elucidate the characters of the digestive organs to refer to Plate VI, which represents those of the Brown Ptarmigan, *Lagopus Scoticus*. The bill, Fig. 1, *a*, is short, broad, triangular, and acute. The fauces are of moderate width, or rather narrow. The œsophagus, *b*, *c*, *d*, *e*, is narrow, but about the middle of the neck is expanded into a large subglobular sac or crop, *c*, *d*, of which the upper walls are reflected over the trachea and œsophagus, and terminates below in an oblong or bulbiform proventriculus, Fig. 3, *b*, completely lined with rather large ovato-oblong glandules. The stomach, *f*, is a powerful gizzard, of which the outer coat is composed of two pairs of very thick muscles, inserted into two tendinous centres; the middle coat thick and tough; the inner or cuticular coat, forming two thick, elliptical, transversely rugous plates, opposite the muscles, but in the other parts thinner. The form and structure of the stomach will be better understood on referring to Figs. 3. and 4, the former representing its exterior, the latter its interior.

In Fig. 3, *a*, is the lower part of the œsophagus; *b*, the proventriculus; *c*, *d*, *e*, *g*, the stomach or gizzard; *h*, the commencement of the intestine. The very strong lateral muscles, *d*, *e*, have their tendons inserted into an oblong or circular space of a white colour, *f*, where the walls are very thin. A distinct transverse muscle, *g*, occupies the lower part or bottom of the organ, and its fibres are inserted into the central space, *f*, under the edge of the kind of bridge formed by the tendons of the lateral muscles; while at the upper part there is also a muscular apparatus, *c*, thinner than the rest. In Fig. 4, the œsophagus, *a*, the proventriculus, *b*, and the gizzard, *c*, *d*, are laid open, the section being through one of the lateral tendons, *f*, of Fig. 3. At *b*, are seen the oblong glands in the section of the proventriculus, and on the inner surface of that organ their apertures in the middle of rounded eminences. The lateral muscles are seen at *d*, *e*. The three coats or layers are marked: the muscular or outer, *f*; the middle, *g*; the inner or cuticular, *h*, its inner surface longitudinally rugous. The mass of food, of a cylindrical form, *i*, is impressed with rugæ, from the action of the organ. The intestine is long and rather wide, and is seen convoluted at *g*, *h*, *i*, *j*, *k*, in Fig. 1. The cœca are in these birds very remarkable, as in them they receive their greatest development, so as sometimes to exceed the intestine in capacity. They are represented by Fig. 2, in which *a*, *b*, is a part of the intestine; and are seen coming off at *c*, where for some length they are narrow, but afterwards enlarge, are marked with longitudinal lines, are contorted along the course of the intestine, *e*, *f*, and terminate in nipple-like points, *g*, *h*. The structure of these parts will be more particularly explained when I come to speak of the Grouse and Ptarmigans.

The legs are generally strong; the tarsi of moderate length or short, stout, and either scutellate or feathered; in the former case sometimes having a knob or spur behind, Fig. 40. There are always three anterior toes, connected at the base by membranes, which however are sometimes scarcely apparent; and when a hind toe, or pollex, exists, it is generally small, and elevated above the rest. The claws are moderately arched, depressed, and obtuse. The

wings are generally concave, short, or of moderate length; but the tail varies from extremely short to excessively long, and exhibits numerous modifications of form.

The arrangement of the plumage is as follows:—There are four kinds of feathers: quills, feathers, down-feathers, and hair-feathers.

The quills, inserted along the posterior edge of the wing vary in number, but are generally twenty-five, ten being primary. Five pollical quills. From twelve to twenty tail-feathers inserted close together, the two middle above the line of the rest.

The feathers properly so called are inserted on the head all round; but in many cases there are bare spaces on the head, cheeks, eyebrows, or throat; on an elevated line along the back of the neck, expanding on the back, and continued to the uropygial gland; on a similar line down the fore part of the neck, at the middle of which it forks, each division becoming broader as it passes along the side of the breast, where it terminates opposite the knee; from a narrow space near the centre of the thorax and abdomen, on which it terminates before the anus; on a narrow line coming off from that on the fore-neck, and running along the edge of the wing, then crossing the humerus, and ending on its posterior edge, giving rise to the feathers named scapulars; on both sides or surfaces of the wing, there being above a band composed of the smaller upper wing-coverts, and a line of upper large coverts,—below, a narrower band of smaller lower coverts, and a line of large lower coverts; on a broad surface from the knee-joint above, laterally to near the rump; from the whole surface of the leg or tibia; on a small transverse space above, and another below the tail. The ears and anus are also margined with a distinct circle.

The down-feathers cover the intervals between these feathered spaces, and are interspersed among the feathers. All the surfaces from which the feathers come off are sparsely covered with very slender hairs, which are penicillate at the tip, or terminated by a few short barbs.

The feathers vary extremely in form and texture, and the plumage of the males is generally more richly coloured, and

more developed than that of the females; but in all the species, the plumule, or accessory feather—Fig. 20, *b*, p. 75—is very large and tufty, in which respect the Rasores differ essentially from the Gemitores.

Representatives of this order are found in all parts of the world, from the forests and jungles of the Indian isles, where the Peacock unfolds his gorgeous train, to the frozen shores of Labrador and Greenland, where the Ptarmigan burrows among the snow in search of the scanty herbage. Certain genera are peculiar to particular regions, as the Turkeys to America, the Argus to India and China, the Pheasants to the warm and temperate parts of Asia, the Guinea-fowls to Africa; while others, as the Grouse and Partridges, are generally distributed. The affinities of the Rasores are various: on one hand, with the Pigeons, through Crax and Penelope; on the other with the Bustards, which lead to the Plovers; and with the Gallinules and Rails.

They feed on seeds, berries, fruits of various kinds, and on buds, twigs, and herbaceous plants, as well as occasionally on insects and worms. Their digestive organs are peculiar, in possessing the large globular crop or recipient of their food, and the extremely large cœca, in which it undergoes a second elaboration after passing through the small intestine. Their bill is, of course, admirably adapted for cutting, breaking off, or wrenching, the vegetable substances on which they feed; and which are ground to a coarse pulp in the stomach, the action of which is aided by the numerous particles or fragments of quartz swallowed for that purpose. The food, being comparatively innutritious, besides undergoing the usual elaboration in the intestine, requires for its complete assimilation a very great length of tube, which is supplied by the cœca. They seek their food on the ground, on which very many constantly reside; but some are of arboreal habits. They run with great celerity, and many have a strong, rapid, and continued flight, although for the most part they fly heavily, by continued quick flaps of their short curved wings. Their nests are always placed on the ground, and very artlessly constructed, being usually a slight hollow, with some blades of grass, twigs, or leaves. The eggs

are numerous, and the young, which are born with their eyes open, and their body covered with close stiffish down, are able to run about in a few minutes or immediately after exclusion. From the nature of their food, they do not always require the care of their male parent, but are led by their mother, who manifests the greatest anxiety for their welfare, protects them from cold and wet under her wings, feigns lameness to draw intruders after her, while they remain squatted, and eagerly points out to them the substances on which they may feed. Many of the Gallinaceous birds habitually scrape up the earth and dry leaves with their feet, for the purpose of exposing the seeds or insects; and it is for this reason that they have obtained the name of Rasores or Scrapers. They have also a habit, like the Pigeons, Huskers, and some other birds, of lying in the sand or dry earth, and scattering it over them with their feet and wings; or rather, they are fond of basking in the sun, and of lying in warm sheltered places.

The British species are too few and too little diversified to render it useful to speak generally of them here; further than that, being all of moderate or large size, excepting one, they are exposed to numerous enemies, of whom, however, man, while he fosters them, commits greater havock among them than all the rest. They belong to the genera *Phasianus*, *Tetrao*, *Lagopus*, *Perdix*, *Coturnix*, and *Ortyx*. The first of these belongs to the family of Gallinæ, of which it is not necessary to give the general characters, as our only species and the Domestic Fowl, with which every person is familiar, are representatives sufficiently characteristic to afford a good general idea of those beautiful birds, whose natural residence is in the warmer and temperate parts of Asia, especially India and China.

PHASIANUS. PHEASANT.

Bill short, strong, slightly decurved, deeper than broad at the base, depressed at the end. Upper mandible with a deep nasal sinus, the dorsal outline sloping at the base, arcuato-declinate towards the end, the sides convex, the edges slightly arched, horny, sharp, and overlapping nearly in their whole length, the tip rounded and thin-edged. Lower mandible narrower than the upper, its angle of moderate length and rounded, the dorsal outline very slightly convex, the back broad, the sides convex, the edges direct, thick, and rather blunt, the tip obtuse.

Mouth rather narrow; mandibles internally concave. Palate flat, with two curved longitudinal, slightly papillate, soft ridges, terminating behind the aperture of the nares in a slight papillate lobe. The aperture of the posterior nares is oblong behind, linear before, papillate in its whole length, its posterior lateral space covered with very small sparse papillæ, the anterior with several transverse series of papillæ. A soft ridge from the fore part to the mandible, and on each side a deep groove within the edge of the mandible. Tongue of moderate size, fleshy, tapering to a point, triangular in its transverse section, slightly concave above, horny beneath, with two transverse rows of papillæ at the base. There are two masses of mucous crypts in the angle of the lower jaw; also a series on the lower side of the tongue on each side towards the base; and a great quantity in the space between the root of the tongue and the aperture of the glottis, which is defended by two transverse flaps of pointed papillæ.

Œsophagus narrow, but opening into, or enlarged so as to

form, a crop of great size, lying over the fore part of the neck and thorax, its internal or intra-thoracic part also narrow. In its whole extent it is abundantly supplied with mucous follicles, and below the crop, which is glandular only at the base, the inner membrane is raised into longitudinal rugæ. The proventricular glands are few, very large, oblong, sacculate, placed very obliquely. Stomach a powerful gizzard of a subrhomboidal form, with the two lateral muscles transverse, the lower thin, its fibres inserted into the central tendons under the rest; the middle coat rather thin and tough; the inner or cuticular with longitudinal rugæ on the sides. The pyloric orifice is situated in a transverse depression, between the slight upper lobe and the lateral muscle, and has no valvular apparatus. Intestine long, rather wide, of nearly uniform diameter; cœca very long, wider than the intestine; rectum long, cylindrical. The duodenum is nearly smooth internally; the small intestine villous; the rectum granulated.

Nostrils linear-oblong, slightly recurved, in the lower and fore part of the nasal membrane, which is thick, rather firm, vaulted, and smooth. Eyes of moderate size; eyelids bare, and with a large space surrounding them, and extending along the whole side of the head to the bill, bare, and covered with small cutaneous papillæ, intermixed with series of plumules. External ear of moderate size, roundish, the inner aperture transverse, in the form of a slit.

Head oblong, rather small, compressed, the forehead sloping. Neck of moderate length. Body large, full. Legs, Fig. 40, of moderate length, strong; tarsi of moderate length, stout, a little compressed, anteriorly covered with two series of alternating scutella, continuous with the third and fourth toes, posteriorly also with two series, the inner interrupted by the spur, which is short, conical, obtuse. Toes strong, the anterior connected at the base by thick webs; the third much longer than the other two, which are nearly equal; the first very small, and a little elevated. Claws of moderate size, slightly arched, flat beneath, rather compressed, and rather blunt.

Plumage various, the feathers generally ovate or oblong, compact, on the head and neck of the males splendent. The

feathers are curved, have very short tubes, rather large spongy shafts, their downy part extended to two-thirds of their length, the plumule long, narrow, and densely downy. The wings are short, broad, rounded, curved, the third and fourth quills longest, the secondary quills nearly as long as the primary. Tail long, graduated, slightly curved or straight, of eighteen tapering feathers.

The skeleton more than perhaps any other portion of the animal structure, excepting the digestive organs, affords characteristic differences, which are readily perceptible by a practised eye. The skeleton of the Common Pheasant, Phasianus colchicus, compared with that of birds belonging to other families, exhibits the following peculiarities, most of which are more or less distinctive of the Gallinaceous order, excluding always the Pigeons, which are in many respects very different.

The head is comparatively small, its occipital portion rather elongated, the frontal outline sloping. The orbits, large in all birds, are comparatively of moderate size, the septum between them complete. The superciliary bone is rather large, the nasal vacuity elliptical. The jaws are comparatively short, the upper tapering and a little decurved, the lower also curved a little downwards. The jugal bone is slender, and the os quadratum to which both jaws are articulated, is forked above. The cervical vertebræ are twelve ; the dorsal nine. There are nine ribs, the first merely rudimentary, the second very short and not attached to the sternum, the rest complete, that is, having a vertebral and a sternal portion ; five of them are furnished with posterior ascending processes ; and they are all very slender and thin. There are thirteen lumbar and sacral vertebræ, anchylosed with the pelvis into a large thin bone. Six of the dorsal vertebræ are also anchylosed or united. The coccygeal are seven, the first generally united to the sacrum, the last apparently composed of two united.

The sternum is long, but very incomplete, there being two deep vacuities, filled with membrane, on each side, leaving only two very slender processes ; the central piece is also very nar-

row, but the ridge or crest is very prominent. The clavicles are stout; the furcula narrow, with slender rounded crura, their junction expanded into a triangular plate, which is connected with the sternum by a ligament. See Fig. 41, which, although representing the sternum of another bird, exhibits all these characters.

The scapula is slender and sabre-shaped; the humerus strong and rather short; the cubitus of about the same length. The pollex is tapering; the metacarpus is composed of two bones united at the extremities, and having between them an elliptical space; the first phalanx is also double, but the pieces are united by a bony lamina; the terminal phalanx tapering.

The sacrum, ilium, and ischium are united, the only separate bone being the os pubis, which is very slender and curved; but, as in other birds, the pelvis is separated in front. The sciatic foramen is elliptical; the thyroid very small and narrow. The thigh-bone is of moderate length and stout; the tibia a third longer; the fibula extremely slender and incomplete for a third of its length; the metatarsus is a little shorter than the femur, with a posterior thin edge, on which is developed the short convex nucleus of the spur. The pollex is elevated, and composed of three short bones; the second toe of three also; the third of four; the fourth of five phalanges.

The form of the jaws is obviously indicative of being adapted for vegetable food. The legs are strongly constructed, and as the claws are not much curved or pointed, the animal must be a powerful walker. The short but strong wings, having powerful muscles attached to them, indicate a strong, but heavy, and not protracted flight. The pectoral muscles must be very large, judging by the great height and length of the crest of the sternum, and as these are the principal organs of flight, that action is necessarily powerful, but, as the wings are short, performed by frequent beats. A buoyant flight, on the contrary, requires a long wing, whether its length be owing to the elongation of the bones, or of the quills, or of both. In many of these respects the Gallinaceous Birds differ from the Pigeons as much as any two groups of land birds differ from each other.

The genus Phasianus is composed of birds of rather large size, which inhabit the warmer and temperate parts of Asia, and portions of Africa. They reside in woods and thickets, seeking their food chiefly on the ground, reposing either there or on trees, and nestling among the herbage. Their food consists of seeds of various kinds, and vegetable substances in general, as well as occasionally larvæ and insects. It is first deposited in the crop, then pounded in the gizzard, reduced to a pulpy state in the duodenum, and partially deprived of its nutritious parts in the small intestine, which is of moderate length. The finer parts of the residue enter the cœca, and are further acted upon there, while the refuse passes into the cylindrical rectum in a concrete form, and is voided in a small heap.

PHASIANUS COLCHICUS. THE COMMON PHEASANT.

COMMON, RING-NECKED, AND BOHEMIAN PHEASANT.

FIG. 39.

Phasianus Colchicus. Linn. Syst. Nat. I. 270.
Phasianus Colchicus. Lath. Ind. Orn. II. 629.
Common Pheasant. Mont. Orn. Dict.
Phaisan Vulgaire. Phasianus Colchicus. Temm. Man. d'Orn. II. 453.
Common Pheasant, Phasianus Colchicus. Selb. Illustr. I. 417.
Phasianus Colchicus. Common Pheasant. Jen. Brit. Vert. An. 166.

Male with the head and upper part of the neck of various tints of green and blue; the lower part of the neck and the sides yellowish-red, the feathers terminally margined with dark blue; those of the fore part of the back and the scapulars having three bands of yellowish, black, and red, parallel to the edges. Female with the plumage greyish yellow, variegated with black and brown.

MALE.—The Pheasant, although not originally a native of Britain, yet having become naturalized, and being now

generally distributed over the country, has acquired a right to be admitted into the list of British Birds. At the same time, it appears very doubtful if it should maintain its footing were it entirely left to its own resources. More splendid in its apparel than any really native bird of the Gallinaceous order, it is a favourite with those persons whose chief business is to gratify their taste for whatever is ornamental; and more delicate than most as an article of food, it has become an object of general culture. It is about the average size of the domestic fowl, or somewhat smaller; but as its general form, and the structure of the bill have been sufficiently explained in the generic character, it is unnecessary to describe them here.

The mouth is rather narrow, and furnished with numerous mucous crypts, of which there are two masses in the angle of the lower jaw, a series on each side of the tongue, and two series parallel to the hyoid bone. The œsophagus, which is nine and a half inches long, measured from the base of the tongue to the stomach, is narrow, having a diameter generally of half an inch. At the distance of five inches from the tongue it opens into the large membranous crop, of which the aperture is an inch and a quarter in length. The proventriculus has a length of an inch and four-twelfths, with a diameter of three-fourths of an inch. The whole inner surface of the upper part of the œsophagus is covered with apertures of mucous crypts, which also extend about an inch into the crop; that of its lower part is slightly elevated into rugæ, and also furnished with crypts. The proventricular glands are very large, oblong, oblique, externally lobed, and having a branched sacculated cavity; their apertures being placed at a great distance from each other, one might, on opening the proventriculus, suppose a space between them filled with a different texture; but the whole organ is completely surrounded by the glands. The stomach is a strong gizzard, of a somewhat rhomboidal form, two inches long; the lateral muscles are directly transverse; the lower is distinct; the upper part is furnished with circular fibres. The middle coat is thin and tough. The cuticular lining is longitudinally rugous, hard, and harsh to the touch; that part which covers the pyloric

lobe with grooves crossing each other. The intestine is five feet ten inches long, nearly uniform in diameter, at the upper part half an inch across. The duodenum or first fold is ten inches long; the rectum, which is cylindrical, six inches; and the cœca, which at their commencement are narrow, but afterwards enlarged to a diameter of three-fourths of an inch, are thirteen inches long. The upper part of the intestine is internally smoothish, the rest villous, until within two inches of the rectum, when it is covered with rounded papillæ. At the commencement of the rectum is a sort of valve similar to that at its extremity. The rectum is internally covered with rounded papillæ, which are larger towards the lower end. The narrow part of the cœca, for three inches, is glandular, the rest with seven or eight elevated longitudinal lines, which are here and there connected by transverse ones. The cloaca, properly so called, is only a quarter of an inch long, being separated from the rectum by a slight ring, on which the ureters open, and behind which is the aperture of the bursa of Fabricius. The mesentery is attached to a short space between the lobes of the liver; and the mesorectum extends forwards as far as the proventriculus.

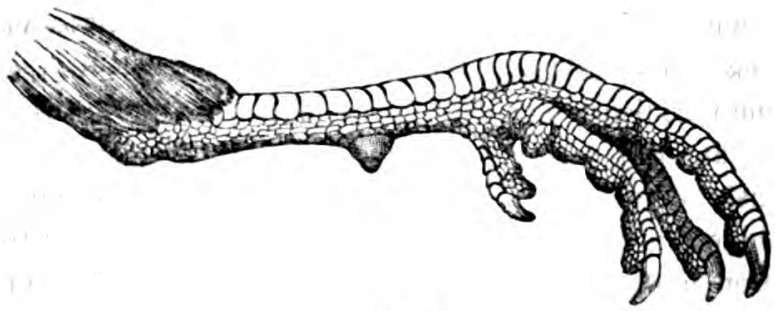


Fig. 40.

The legs are strong; the tarsi, which are stout and a little compressed, have about seventeen plates in each of their anterior series. The first toe, which is very small, has five, the second twelve, the third twenty-two, the fourth nineteen scutella. The spur on the back of the tarsus is conical, blunt, and about a quarter of an inch long.

The feathers of the upper part of the head are oblong and

blended, of the rest of the head and the upper part of the neck imbricated and rounded, of the fore-neck and breast broad, slightly emarginate or abruptly rounded; of the back broad and rounded, of the rump elongated, with loose filaments; of the sides very long, of the abdomen downy, of the legs soft and rather short. Directly over the aperture of the ear is a small erectile tuft of feathers. The wings are short, very broad, curved, rounded, of twenty-four quills; the primaries attenuated from near the base, rounded, the third and fourth longest, the first equal to the seventh; the secondaries broad, rounded, and little shorter than the primaries. The tail is very long, slightly arched, remarkably cuneate or tapering, of eighteen tapering feathers, of which the lateral are incurved, the central straight. Four pairs of the longest tail feathers are concave above towards the end, or channelled.

The bill is pale greenish-yellow, the nasal membrane light brown or flesh-coloured. The bare papillar patch on the side of the head is scarlet, in parts approaching to arterial blood-red, or at some seasons crimson. The eyelids are flesh-coloured, the iris yellow. The feet are light grey, tinged with brown, the claws light chocolate brown.

The feathers of the upper part of the head are deep brownish-green, with yellowish marginal filaments. The upper part of the neck is deep green behind, laterally and anteriorly greenish-blue and purplish-blue. The lower part of the neck is reddish-orange, anteriorly tinged with purple; the breast and sides brownish-yellow; each feather terminally margined with purplish-blue, the dark margin indented in the middle, but the indentation gradually diminishing on the breast. The middle of the lower part of the breast is blackish-brown, glossed with green, the margins of the feathers being of the latter colour. The fore part of the back is yellowish-red, each feather slightly margined with black, and having a central oblong spot of the same. The scapulars are redder, with a slight black tip, the central part dull yellow mottled with dusky, margined with a black band. On the middle of the back the feathers are somewhat similarly variegated, with additional spots of light blue and purple. Those on the rump are of a deep red, with green

and greyish tints. The inner wing-coverts are similar to the scapulars, but edged externally with dark red, the outer yellowish-grey, variegated with whitish and dusky. The quills are light brownish-grey, variegated with pale greyish-yellow; the secondaries more tinged with brown on the outer edges. The tail is dull greenish-yellow, variegated with yellowish-grey, the feathers with narrow transverse bars of black, a broad longitudinal band of dull red on each side, the loose margins red, glossed with green and purple. On the abdomen and legs the feathers are dull greyish-brown; under the tail variegated with reddish. The lower surface of the wing is yellowish-grey.

Length to end of tail 34 inches; extent of wings 32; wing from flexure 10; tail $18\frac{1}{2}$; bill along the back $1\frac{4}{12}$, along the edge of upper mandible $1\frac{5}{12}$; tarsus $3\frac{2}{12}$; first toe $\frac{7}{12}$, its claw $\frac{3}{12}$; second toe $1\frac{5}{12}$, its claw $\frac{6}{12}$; third toe $2\frac{1}{4}$, its claw $\frac{8}{12}$; fourth toe $1\frac{8}{12}$, its claw $4\frac{1}{2}$ twelfths.

Of three other individuals the length 34, 35, 36 inches.

Female.—The female is similar in form to the male, but with the tail much shorter. The bill and feet require no particular description. The anterior scutella of the tarsus are about seventeen in each row; the first toe has five, the second fifteen, the third twenty-two, the fourth eighteen. As in the male there is a bare space under the eye, but scarcely papillar, and more feathered. The feathers of the upper part of the head are somewhat elongated; those of the rest of the head short; of the neck and body oblong and rounded; of the rump not elongated as in the male.

The general colour of the upper parts is greyish-yellow, variegated with black and yellowish-brown; the top of the head and the hind-neck tinged with red. The wing-coverts are lighter; the quills pale greyish-brown, mottled with greyish-yellow, as in the male. The tail is yellowish-grey, minutely mottled with black, and having, in place of transverse bars, oblique irregular spots of black centred with a pale yellow line. The lower parts are lighter and less mottled, the throat whitish, and without spots. The bill is horn-colour, tinged

with green; the tarsi wood-brown, the toes darker, the claws of the same tint.

Length 26 inches; extent of wings 30; wing from flexure $9\frac{1}{4}$; tail $11\frac{1}{2}$; bill along the back $1\frac{1}{4}$; tarsus $2\frac{1}{2}$; first toe $\frac{1}{2}$, its claw $\frac{4}{12}$; second toe $1\frac{2}{12}$, its claw $\frac{6}{12}$; third toe $1\frac{10}{12}$, its claw $\frac{7}{12}$; fourth toe $1\frac{4}{12}$, its claw $\frac{5}{12}$.

Variations.—The Pheasant, like other birds more or less subjected to the direct influence of man, undergoes numerous modifications in the colour of its plumage. The first or slightest change is that in which an incomplete ring of white appears on the neck at the lower margin of its dark-coloured part. This ring may be seen in different states. Sometimes there are merely a few white tips on each side, while in its highest degree two-thirds of the circumference of the neck are marked with a white band, which is broader at its anterior extremities. I am aware of all that has been said on this subject; but I am perfectly persuaded that all the Ring-necked Pheasants which I have seen were merely varieties of the Common Pheasant, and very slight varieties too, the form, size, and plumage being precisely similar. Some writers, in order to make out a good case, have misrepresented the objects, and put into their specific characters differences which have no existence. I have therefore selected from among many an individual in perfect condition, that the descriptions of the two may be compared.

Ring-necked Pheasant.—The proportions of the parts are precisely the same as in the Common Pheasant. The tarsi have about seventeen scales in each of their anterior series. The first toe has five, the second nine, the third twenty, the fourth seventeen scutella. The spur is conical, blunt, and four-twelfths of an inch long.

The feathers of the upper part of the head are oblong and blended; of the rest of the head and the upper part of the neck imbricated and rounded; of the fore-neck and breast broad, slightly emarginate, or abruptly rounded; of the back broad and rounded; of the rump elongated, with loose filaments; of the sides very long; of the abdomen downy; of the legs

soft and rather short. There is the same tuft of small feathers over the ear. The wings and tail are precisely similar, even to the concavity of the extremities of the longer feathers of the latter.

The bill is horn-colour, or greyish-yellow, tinged with green; the nasal operculum flesh-colour. The iris is yellow, and the bare papillar space about the eye crimson.

The upper part of the head is brownish-green, the forehead, sides, and tuft, deep green. The upper part of the neck is deep blue, glossed with purple and green, the latter predominating behind. At the lower edge of this dark-coloured part is a white band, extending along two-thirds of the circumference of the neck, narrow behind, broader at the two anterior extremities. This band is composed of white tips only. The rest of the fore part of the neck is of a rich coppery tint, glossed with purple in some lights, fading below into brownish-yellow, of which colour also are the sides. On the neck and breast each feather has a terminal margin of purplish-blue, which in some lights is black. This margin is distinctly indented, but the emargination gradually disappears on the lower feathers. The middle and lower part of the breast is blackish-brown, glossed with green. The fore part of the back is yellowish-red, each feather slightly margined with black, and having a central oblong spot of the same. The scapulars are redder, with a slight black tip, the central part dull yellow mottled with dusky, and margined with a black band. The hind part of the back is confusedly variegated with yellowish-red and green. The feathers of the rump are of a deep red at the ends, variegated with green tints. The tail-feathers have the shaft dusky, the central part dull greenish-yellow, with transverse black bars, exterior to which is a broad longitudinal band of dull red, then the broad loose margin glossed with green and purple. The lateral feathers are gradually more mottled with black. The upper wing-coverts are dull yellow, the inner edged with dull red; the quills wood-brown tinged with grey, barred with greyish-yellow; their coverts similar.

The œsophagus is 9 inches long. The crop commences at 4 inches from the top. The stomach is 2¼ inches long. The

intestine 6 feet 6 inches; of which the duodenal portion is 11, the rectum 6. The cœca are $16\frac{1}{2}$ inches long, their greatest diameter $\frac{10}{12}$, their extremity obtuse.

Length to end of tail 35 inches; extent of wings 32; bill along the back $1\frac{1}{4}$, along the edge of lower mandible $1\frac{5}{12}$; tarsus 3; first toe $\frac{7}{12}$, its claw $3\frac{1}{2}$ twelfths; second toe $1\frac{1}{4}$, its claw $5\frac{1}{2}$ twelfths; third toe 2, its claw $\frac{7}{12}$; fourth toe $1\frac{5}{12}$, its claw $\frac{5}{12}$.

Length of another individual 35 inches; wing from flexure $10\frac{1}{2}$; tail $20\frac{1}{2}$; bill along the back $1\frac{2}{12}$, along the edge of lower mandible $1\frac{4}{12}$; tarsus $2\frac{3}{4}$; first toe $\frac{7}{12}$, its claw $\frac{4}{12}$; second toe $1\frac{4}{12}$, its claw $5\frac{1}{2}$ twelfths; third toe $2\frac{1}{4}$, its claw $\frac{7}{12}$; fourth toe $1\frac{5}{12}$, its claw $\frac{5}{12}$; spur $\frac{1}{4}$.

The female of this variety I am unable to distinguish from that of the other or common kind.

There is before me at present an individual in all respects precisely similar to that above described, only that the ring is reduced to a slight spot on each side of the neck, four or five feathers there having a white tip. Were these five feathers pulled out, there would be no difference between it and the common bird.

In general the common ringless Pheasant has the colours somewhat deeper than the ringed variety; but in both kinds there are slight variations in the colouring. Individuals speckled or patched with white are not uncommon; and others entirely white are sometimes seen. A more beautiful variety is that which has been named the Bohemian Pheasant, which, like the Ring-necked, may be considered as a distinct race. All the races and varieties breed together, and the produce is equally prolific; a fact which of itself is sufficient to prove their specific identity.

Bohemian Pheasant.—This variety is in form, proportions, and texture of plumage, similar to the common. The bill and feet are nearly of the same colour, or somewhat paler. The top of the head is dull grey; the rest of the head and the upper part of the neck, dark green and blue, but much less glossy than in the common variety. The feathers of the lower part of the neck, the breast, and the sides, have a terminal band of

blackish-blue, forming a deep indenture, which gradually disappears on the lower feathers. Those of the hind-neck have also a narrow terminal edge, with a central spot of black. On the back, the dark markings of the Common and Ring-necked Pheasants are retained; as are the transverse bars of the tail. The ground colour of the whole plumage however, excepting that of the head, upper part of the neck, and middle of the breast, is pale reddish-grey or cream-colour, deeper and more glossy on the fore-neck. The hind part of the back is chiefly a pale dull green. The middle of the breast is blackish-brown, the feathers tipped with green. The quills and tail-feathers are mottled with pale brown. On the tarsus are about nineteen scales in each of the anterior series, on the first toe seven, the second fifteen, the third twenty-two, the fourth seventeen.

Length to end of tail 35 inches; tail 21; wing from flexure 10; bill along the back $1\frac{1}{4}$; tarsus $2\frac{3}{4}$; first toe $\frac{7}{12}$, its claw $3\frac{1}{2}$ twelfths; second toe $1\frac{4}{12}$, its claw $\frac{5}{12}$; third toe $2\frac{2}{12}$, its claw $\frac{8}{12}$; fourth toe $1\frac{5}{12}$, its claw $5\frac{1}{2}$ twelfths; spur $\frac{1}{2}$.

This Bohemian Pheasant cannot of course be considered in any other light than as a mere variety or race. I am informed that it as often has a white ring on the neck as not. It is also alleged by some gamekeepers that the Ring Pheasants have not the white ring until the third year.

A very remarkable variation, which, however, occurs in other Gallinaceous birds, is exhibited by some females, which, in a less or greater degree, assume the plumage of the male.

Habits.—The Common Pheasant is generally supposed to have been originally brought from the banks of the Phasis, one of the rivers of Colchis, whence its name, Phasianus Colchicus; and our Ring-necked Pheasant is alleged to be the spurious descendant of another species, Phasianus torquatus, introduced into this country from China. The pale-coloured, or Bohemian, is merely an accidental variety, which appears occasionally in preserves. The species is said to be generally distributed over Europe, excepting the northern parts, which are too cold for its constitution. It is now very abundant in most parts of England, and in the southern and middle di-

visions of Scotland, being harboured, on account of its beauty, the excellence of its flesh, and the sport which it affords, by most of the great landed proprietors. Although scarcely able to subsist, if left to itself, it is yet in a great measure naturalized. Its favourite places of resort are thick plantations or tangled woods by streams, where, among the long grass, brambles, and other shrubs, it passes the night, sleeping on the ground in summer and autumn, but commonly roosting in the trees in winter. Early in the morning it betakes itself to the open fields to search for its food, which consists of the tender shoots of various plants, grass, bulbous roots, roots of grasses and Potentilla anserina, turnip tops, as well as worms and insects. In autumn, and the early part of winter, it obtains a plentiful supply of grain, acorns, beech nuts, and small fruits. In severe weather, however, especially where great numbers are kept, the pheasants require to be fed with grain, when they learn to attend at the call of the keeper.

This bird walks and runs much in the same manner as the domestic fowl, which it greatly resembles in its manners. Although it betakes itself to trees either for repose, or when disturbed by an intruder, its proper place is on the ground, where it runs with great speed, keeping its tail nearly horizontal. When feeding without apprehension, it holds the tail more elevated, the wings rather drooping, traverses the ground in a stooping posture, running at intervals; and on being alarmed, either speeds on foot to the nearest cover, or flies off. Its flight is heavy, direct, performed by rapid beats of the wings, the tail expanded.

From its habits it becomes an easy prey to the sportsman and poacher. Its great size and direct flight render it no difficult matter for an indifferent marksman to hit it, while the paths which it forms in the thickets, whence it issues to search the neighbouring fields, afford favourable places for snares. It is even caught on its roost with a noose affixed to a long pole, or suffocated with the fumes of sulphur.

The males generally keep by themselves during winter, and in spring separate, each selecting a particular spot, where he struts, and invites the females by crowing and clapping his

wings. The crowing of the pheasant resembles that of a young domestic cock in its earliest attempts, and is often heard in the woods in April and May. The female, after depositing her eggs among the long grass, or under the shade of a bush, having merely scraped a slight hollow which she has scantily lined with dry leaves, is deserted by the male, and performs the task of bringing forth and leading about the young without his assistance. The eggs, from six to ten in number, are of a regular oval form, smooth, but minutely dotted, averaging in length an inch and ten-twelfths, in breadth an inch and five-twelfths, and varying in colour from pale greenish-brown to greyish-white, tinged with green, being generally very similar to those of the Common Partridge. Comparatively few of the eggs, however, are hatched by the parent birds, they being for the most part put under domestic hens, and the young, when grown up, are let loose.

Young.—The young when fledged resemble the female, being of a dull greyish-yellow, variegated with brown and black. The male may be distinguished from the female by having the bare space under the eye less feathered, and the colouring somewhat richer. Young Pheasants are very subject to a distemper called the *gapes*, occasioned by a parasitic worm, Fasciola tracheæ, which lodges in the wind-pipe, and by causing it to inflame produces suffocation. Montagu has given an ample account of this disease, and of the best mode of treating it. Garlic, chives, or young onions, he states, may be given very beneficially in the early stages; but in the advanced state of the disorder, nothing is so effectual as fumigation with tobacco, the diseased chickens being confined in a box, having a door on one side, with its hinges so placed as to open downwards. The smoke is blown in with a common pipe, and the birds exposed to its influence until they are reduced to a state of stupefaction.

One of the most remarkable facts relative to this bird that have come under my observation, was the occurrence of a very large quantity of fronds of Polypodium vulgare in the crop of

one which I opened in the winter of 1835. I am not aware that any species of fern has ever been found constituting part of the food of either a ruminating quadruped or gallinaceous bird; and if it should be found by experiment that the Pheasant thrives on such substances, advantage might be taken of the circumstance.

In England, Pheasants are extensively bred for supplying preserves, and in the southern parts of that country are therefore to be found only in a semidomesticated state, so as to afford little sport to a person who finds pleasure in pursuing game in its wild haunts. The quantity killed at the winter convocations of persons addicted to this sort of slaughter is often immense, from 800 to 1000 head of game, the greater part Hares and Pheasants, being, according to Sir William Jardine, a frequent daily amount at the Christmas batteau. These exploits are scarcely more manly or dignified than those of Jonathan Duggins, Esq., as recorded in the Comic Annual for 1837.—" Heard some pheasants crowing by the side of a plantation.—Got within gun-shot of two of the birds. vich Higgins said they vos two game-cocks: but Hicks, who had often been to Vestminster Pit, said, No sitch thing; as game-cocks had got short square tails, and smooth necks, and long military spurs. Shot at 'em as pheasants, and believe ve killed 'em both; but hearing some orrid screams come out of the plantation immediately hafter, ve all took to our eels and ran avay vithout stopping to pick either of 'em up.—At the end of a mile came suddenly upon a strange sort of bird, vich Hicks declared to be the cock-of-the-woods. Sneaked behind him and killed him. Turned out to be a peacock." For my part, having had no practice in this way, I am much inclined to persuade myself, as the fox did when he could not get at the grapes, that a brace of ptarmigan brought home after a day's hard marching to the craggy summit of some misty hill in the Gael-land, would afford more pleasure than a whole thicketful of pheasants.

Instances of crossing between these birds and the domestic fowl sometimes occur; and more rarely, between them and the Black Grouse, of which one is recorded in the Magazine

of Zoology and Botany, for February 1837, as described by William Thompson, Esq. of Belfast. He states that only three other cases have occurred to him in the course of his inquiries on this subject: one mentioned by White in his Natural History of Selborne; the second exhibited at a meeting of the Zoological Society of London, on the 24th of June 1834, by Joseph Sabine, Esq.; the third, announced to the same society, on the 12th of May 1835, by T. C. Eyton, Esq.

PERDICINÆ.

PARTRIDGES, GROUSE, AND ALLIED GENERA.

The beautiful family of the Perdicinæ, represented in Britain by the Red Partridge, the Grey Partridge, the Virginian Colin, the Quail, the Black Grouse, and the Brown and Grey Ptarmigans, is composed of birds varying in size from that of a Sparrow or Corn Bunting to that of a Turkey, but presenting a general similarity by which they are readily distinguished by the most untheoretical observers as belonging to one and the same group. The Partridges being even by the supporters of our newest and most fashionable system considered as forming the "typical" family or genus, it is obviously inconsistent to deny them the honour of giving name to this group, which, for reasons similar to those that have given rise to the idea of their systematic preëminence, I have elevated to the dignity due to them. Some of the Grouse are more or less allied to the Turkeys, Peacocks, and Pheasants; the Partridges to the latter, the Grouse, and the genus Pterocles, which in its turn indicates an affinity to the Pigeons; but both groups are so nearly allied, and so run into each other, that Linnæus considered then as forming a single genus. It is very doubtful if the Tetrao paradoxus of the older authors, the Syrrhaptes of Temminck, belong to the Rasores. It seems to me to be much more allied to the Gemitores; but its place can be determined only by reference to its digestive organs.

The birds composing this family are generally robust, having the body full and rather heavy, the neck short or of moderate length, the head rather small and oblong, the feet short and stout. The bill, Figs. 41, 44, 46, 47, is short, strong, and slightly curved; the upper mandible with its dorsal outline at first straight,

then arcuato-declinate, the edges sharp and overlapping, the tip rounded but sharp-edged; the gape-line more or less arched; the lower mandible narrower, with involute edges, and a slightly convex dorsal outline. Both mandibles are internally concave; the palate flat; the tongue short, triangular, flat above, and acute. The pharynx is of moderate width, or rather narrow. The œsophagus, Plate VI, Fig. 1, is narrow, but opens on the middle of the neck by a small aperture into a very large globular membranous crop, *c*, *d*; the proventriculus bulbiform, and studded with ovato-oblong glandules of large size. The stomach, Figs. 3, 4, is a powerful gizzard, roundish, compressed, with two strong lateral muscles *d*, *e*, having radiated, tendons, a lower distinct muscle, *g*; and a dense tough, longitudinally rugous inner coat, Fig. 4, *h*. The intestine is of moderate length, of nearly uniform diameter throughout, and having two extremely long, internally ridged, generally cylindrical cœca, Fig. 2, *c*, *d*, *e*, *g*, *h*, the capacity of which is often equal to that of the intestines.

The eyes are of moderate size; the eyelids feathered or bare, their edges crenate. External ear of moderate size, roundish. Nostrils oblong, in a rather broad, feathered membrane, covered with a horny operculum, and generally concealed by the feathers.

The legs are short or of moderate length; the tarsus with a double row of scutella before, and scutellate or scaly behind, or covered with feathers. Some species have a spur or knob behind, indicating their affinity to the Pavoninæ and Gallinæ, while those that approach the Grouse have none. Toes rather strong, with numerous scutella above, or feathered; three before, one behind, first toe very small and elevated, second a little shorter than the fourth, which is much exceeded by the third, the anterior slightly webbed at the base. Claws rather strong, arched, blunt.

The plumage is generally full, soft and blended, but sometimes compact; the feathers generally ovate, with a long tufty plumule; those at the base of the bill small and rounded. The wings are short, broad, concave, and rounded or blunt; the primary quills ten, strong, narrowed towards the end; the secon-

dary numerous, rounded. The tail varies in length, form, and the number of feathers, which are always more than twelve.

The skeleton of these birds presents the following characters. The cranium is proportionally small and narrow; the septum between the orbits generally complete; the lower jaw with a large oblong aperture in the ramus. The cervical vertebræ are generally fourteen; the dorsal seven, and commonly anchylosed, excepting the anterior two, as well as frequently the last two; the lumbar and sacral fourteen; the coccygeal seven. The pelvis is very broad, but thin, the pubic bone linear and distinct. There are generally seven slender flat ribs, with posterior linear thin processes. The sternum, Fig. 43, *a*, *b*, *c*, *d*, *e*, *f*, *g*, is in

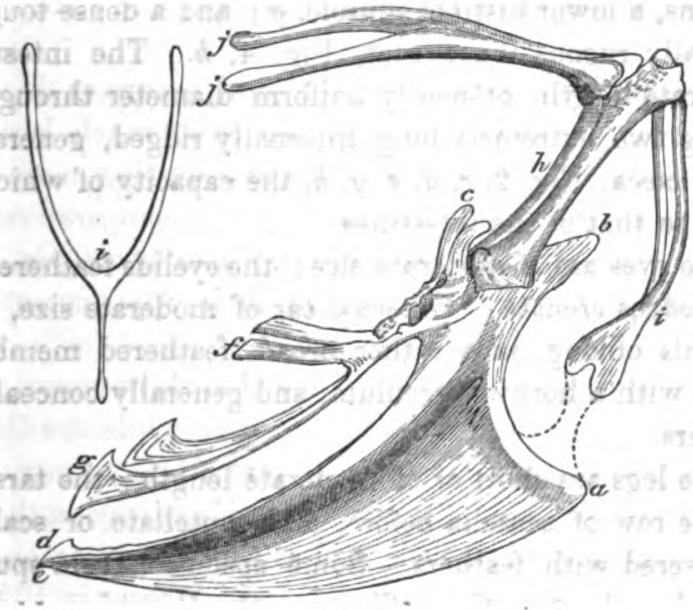


Fig. 43.

reality large and very broad; but, having two very deep sinuses on each side, leaving only two linear lateral processes, *f*, *g*, having their interspaces filled with membrane, it seems reduced to a very narrow plate, *b*, *e*; its crest, *a*, *e*, long and anteriorly high, but with a very large and oblique anterior sinus, *a*, *b*, and a thin crest-like process, *b*, between the coracoid bones. The latter, *h*, are rather stout, but spread little. The furcula, *i*, in the form of the letter U, is very slender, with a flattened triangular process beneath the union of its crura, attached to the anterior edge of the crest of the sternum by a

ligament. The scapula is linear, and gently deflected towards the end. The humerus is short and of moderate strength; the cubitus of the same length; as is the hand, composed of two carpal bones, a thin slender pollex, two distinct metacarpal bones, two digital united by a thin plate, and a slender tapering extreme phalangeal bone. The femur is of moderate length and thickness; the tibia rather long, and slender; the fibula extending for two-thirds of the length of the leg downwards, very slender and tapering; the tarsus short, depressed, with a thin incomplete ridge behind. The hind toe is composed of a distinct metatarsal bone and two phalanges; the second of three; the third of four; the fourth of five; the extreme phalanges short, slightly arched, and somewhat compressed.

The digestive organs are of the same nature as those of the Phasianinæ. The Grouse have the cœca much larger, indicating that they live upon substances requiring more elaboration, while in the Partridges they are comparatively short, these birds being more granivorous. The fœces pass in a more or less solid form, resembling in their appearance those of some Ruminating Quadrupeds.

The Partridges are generally distributed, but more abundant in the temperate and warmer regions; while the Grouse are more numerous in the temperate and frigid countries of the northern hemisphere. These birds reside chiefly on the ground. but some of them seek their food at times on trees, and several occasionally perch. Of the species which occur in Britain, the Black Grouse prefers low, damp, grassy or ferny places in the neighbourhood of woods or thickets; the Brown Ptarmigan resides on the open heaths; the Grey Ptarmigan is found on the summits of the higher mountains; the Partridges and Quail choose the cultivated parts, finding food and shelter in the enclosed fields and neighbouring grounds.

All these birds run with great speed, although they generally prefer skulking to avoid danger, and have a strong steady uniform flight, performed by regular beats of the wings, which produce a whirring sound. Their cries are various, but always harsh and strong. They nestle on the ground, and rear a

numerous progeny, seldom breeding more than once in the season. They are objects of keen research to the sportsman and his dogs, who commit great havock among them; but being protected by legal enactments, and the care of landed proprietors who foster them on account of the pleasure or profit yielded by them, they are in no danger of being extirpated. Their flesh is much esteemed, but in delicacy is inferior to that of many smaller birds, as the Snipe, Land Rail, and all the Huskers, as well as Thrushes, Larks, and other birds, which escape persecution only on account of their insignificant size, or because they are not known to be so savoury as they are.

SYNOPSIS OF THE BRITISH GENERA AND SPECIES.

GENUS I. TETRAO. GROUSE.

A bare papillate space over the eye. Bill short, strong, slightly curved; upper mandible having its dorsal outline nearly straight at the base, then arcuato-declinate, the edges arched, the tip rounded; lower mandible with its dorsal outline slightly convex. Tarsi short, anteriorly and laterally feathered; toes bare, covered above with numerous transversely elongated scutella, laterally pectinated with linear projecting scales, the hind toe small and elevated; claws rather short, strong, arched, somewhat compressed.

1. *Tetrao Urogallus. Wood Grouse.* Male with the tail rounded, the upper parts minutely undulated with grey and black, the throat and lower parts greenish-black. Female variegated with yellowish-red, white, and brownish-black. Extinct.

2. *Tetrao Tetrix. Black Grouse.* Male with the tail much forked, the four lateral feathers on each side elongated and curved outwards; the general colour of the plumage black. Female with the tail slightly forked, its lateral feathers straight; the general colour yellowish-red, spotted and undulated with brownish-black.

GENUS II. LAGOPUS. PTARMIGAN.

A bare papillate space with a loose fringed edge over the eye. Bill short, strong, slightly curved; upper mandible having its dorsal outline arcuato-declinate, the edges arched, the tip rounded; lower mandible with its dorsal outline straight. Tarsi short, covered with feathers; toes also feathered above, without lateral prominent scales; the hind toe very small and elevated; claws rather long, arched, depressed, with parallel edges.

1. *Lagopus Scoticus. Brown Ptarmigan.* Male with the plumage chestnut-brown, inclining to red on the neck, on the body variegated with black, on the breast blackish, mottled with white. Female reddish-yellow, spotted and barred with black. The tints of the summer plumage lighter.

2. *Lagopus cinereus. Grey Ptarmigan.* At all seasons, the tail black, the wings and lower parts white, the shafts of the primaries brown. In winter, the male and female white; the former with a black band from the bill to the eye. In spring both sexes white, mottled with dark grey. In summer the upper parts and sides spotted and barred with yellow and brownish-black. In autumn the upper parts and sides finely barred with greyish-white and greyish-black; the head, neck, and sides retaining the yellow summer feathers longest.

GENUS III. PERDIX. PARTRIDGE.

Bill short, strong; upper mandible having its dorsal outline arcuato-declinate, the edges arched, the tip blunt; lower mandible with its dorsal outline slightly convex. A bare space behind the eye. Tarsi short, strong, anteriorly covered with two series of scutella, posteriorly with two series of scales, and in the male bearing a blunt or flattened tubercle. Toes marginate, with numerous scutella above; claws short, strong, moderately compressed, arcuato-declinate. Wings with the first quill longer than the seventh. Tail short, rounded.

1. *Perdix rubra. Red-legged Partridge.* Bill and feet red;

upper parts uniform greyish-red; forehead ash-grey; throat and cheeks white; a black band from the bill down the neck.

2. *Perdix cinerea. Grey Partridge.* Bill and feet bluish-grey; upper parts barred with grey, brownish-red, and black; forehead and throat yellowish-red.

GENUS IV. ORTYX. COLIN.

Bill very short and strong; upper mandible having its dorsal outline much arched, the sides convex, the tip blunt; lower mandible with its dorsal outline convex. A bare space behind the eye. Tarsi short, strong, anteriorly covered with two series of scutella, posteriorly with two series of scales, but without spur or tubercle. Toes marginate, with numerous scutella above; claws short, stout, compressed, arcuato-declinate. Wings rounded. Tail of moderate length, much rounded.

1. *Ortyx virginiana. Virginian Colin.* About ten inches long; brownish-red variegated with black; throat and a band over the eye white; loral space and a band down the neck black.

GENUS V. COTURNIX. QUAIL.

Bill very short, compressed; upper mandible with its dorsal outline sloping at the base, then arcuato-declinate, the edges direct, arched, the tip very narrow; lower mandible with its dorsal outline straight. Head entirely feathered. Tarsi short, compressed, stout, anteriorly covered with two series of scutella, posteriorly with two series of scales forming a sharp edge, but without spur or tubercle. Toes rather slender, slightly marginate; claws slender, short, slightly arched, compressed. Wings with the first quill scarcely shorter than the second. Tail extremely short, the feathers weak and decurved.

1. *Coturnix dactylisonans. Common Quail.* Eight inches long; upper parts variegated with greyish-yellow, reddish and black; three whitish bands on the head, and numerous pointed streaks of the same on the neck and back.

TETRAO. GROUSE.

Bill short and strong, slightly curved ; upper mandible having its dorsal outline nearly straight at the base, towards the end arcuato-declinate, the ridge broad and convex, the sides convex towards the end, the edges nearly straight, and ascending to beyond the nostrils, then declinate, sharp, and overlapping, the tip rounded and thin-edged ; lower mandible with its angle broad and rounded, the dorsal outline slightly convex, the back broad, the sides convex, the edges arched, thin, erect, the tip rounded.

Mouth narrow ; upper mandible concave internally, with a prominent central ridge ; lower mandible concave, with a broad central groove, and two prominent lines. Palate flat, with two slightly papillate soft ridges, from which a papillate flap proceeds to the middle of the nasal aperture, and another curves behind it. Aperture of the posterior nares oblong behind, anteriorly linear, its edges papillate ; the anterior space, defined by the soft ridges, covered with pointed papillæ in transverse series, the posterior space sparsely covered with smaller papillæ. Tongue short, triangular, flat above, papillate at the base, horny beneath at the end, acute. Two masses of mucous crypts in the angle of the lower jaw ; also a series on the lower side of the tongue on each side, and a great quantity in the space between the root of the tongue and the aperture of the glottis. The latter is defended behind by two transverse flaps of pointed papillæ.

Œsophagus narrow at its two extremities, enlarged into a crop of great size, lying over the forepart of the neck and thorax. In its whole extent it is abundantly supplied with mucous follicles, as is the crop for a short space around its

aperture. The proventriculus is somewhat bulbiform, its glands few, large, placed rather obliquely. Stomach a powerful gizzard, of a roundish, subrhomboidal form, with the two lateral muscles transverse, the lower muscle thin, its tendinous fibres passing under those of the rest; the middle coat rather thin; the inner or cuticular strong, hard, longitudinally rugous. The cardiac orifice is situated in a transverse depression, between the slight cardiac lobe and the upper edge of the lateral muscle, and has no valvular apparatus. Intestine long, rather wide, of nearly uniform diameter. Cœca extremely long, wider than the intestine, cylindrical in the greater part of their length. Rectum long, cylindrical. The intestine within is beautifully marked with regular series of small depressions; towards the cœca are numerous roundish soft papillæ disposed in series; there is a slight circular valve or margin at the commencement of the rectum, which is covered with mucous crypts at its upper part, with rounded papillæ at its lower, and marked with faint longitudinal rugæ. The cloaca is small, and separated from the rectum by a circular valve.

Nostrils basal, lateral, oblong or elliptical, with a thick arched operculum, and concealed by the short feathers. Eyes of moderate size; eyelids feathered; over the upper is a semilunar space of bare skin, covered with papillæ, and having a thin fringed margin. External ear of moderate size, roundish, its thick margin surrounded with a circle of feathers.

Head small, oblong, rather compressed. Neck rather short. Body full and large. Legs rather short, strong; tarsi covered with feathers anteriorly and on the sides, behind with roundish scales, concealed by the feathers. The toes are rather small and slender; the first very small and elevated; the second and fourth of moderate length, and about equal; the third much longer; the anterior connected at the base by a short scaly membrane; they are covered above with numerous transversely elongated scutella, on each side of which is a single row of squarish scales, then a marginal series of linear, flattened, obtuse scales, projecting like the teeth of a comb. Claws rather short, strong, considerably arched, obtuse, somewhat compressed, flattened beneath.

Plumage full, close, compact or blended. The feathers at the base of the bill small, on the head oblong; on the body generally oblong; more than half of their length is downy, and the plumule is nearly as long; the tube short, enlarged at the base. The feathers on the hypochondrial species and abdomen downy. The wings are short, broad, curved, and much rounded; the primary quills ten, strong, narrowed from near the base, the fourth longest, the third and fifth nearly as long, the first longer than the eighth; the secondary quills from fifteen to eighteen, decurved, rounded. Tail of sixteen or eighteen feathers, varying in length and form.

The Grouse, of which only a single species exists in Britain, but of which there are several on the continent of Europe, and many more in Asia and America, are generally strong, heavy birds, varying in size from that of a Turkey to that of a common Pigeon. They live upon vegetable substances, twigs, and leaves of trees and shrubs, grasses, berries, and seeds. Although they generally gather their food on the ground, some of them also betake themselves to trees for that purpose, and many of them perch on occasion. The food is collected in the crop, where it remains unaltered, or merely becomes moistened. It gradually passes into the gizzard, where, besides being mixed with the proventricular fluid, it is triturated by the action of the muscles, and the rugæ of the cuticular lining, aided by numerous particles of quartz. Thus comminuted, it passes into the intestine in a pulpy state, but with the vegetable fibres still distinct, and is there further diluted. As it passes downward, the mass gradually becomes more dry, and at length enters the rectum in a concrete form; but in passing the cœca, all the finer parts remaining are carried into them, and there subjected to further elaboration and absorption. The fœces form a heap of cylindrical fragments.

The species have a strong, often rapid, and protracted flight, which is performed by quick beats of the wings, with occasional intermissions. They walk and run with agility, and frequently prefer eluding their enemies by skulking among the shrubs and herbage to flying off to a covert. They nestle on the ground, producing numerous eggs, generally spotted, cloud-

ed or freckled with dark brown. The young run about as soon as they are born, and follow their mother until winter. The males generally separate from the females after the breeding season.

Only one species of this genus, the Black Grouse, is now found in Britain, the Capercailzie, or Wood Grouse, having become extinct.

The differences between the Grouse, properly so called, and the Ptarmigans, are so inconsiderable, as may be seen by comparing the detailed characters which I have given, and the smaller Grouse are so similar to the Ptarmigans, that I have hesitated much to admit them as distinct genera. Their essential characters have been already given, and it has been seen that it is chiefly in the clothing and want of pectination of the toes that the Ptarmigans differ. Compared with our Grouse, the Black Cock, their tail might be considered distinctive, but many foreign species have that organ pretty similar.

TETRAO UROGALLUS. THE WOOD GROUSE.

WOOD GROUSE. COCK OF THE WOODS. CAPERCAILZIE. CAPULL-COILLE. COILEACH-COILLE.

Tetrao Urogallus. Linn. Syst. Nat. I. 273.
Tetrao Urogallus. Lath. Ind. Orn. II. 634.
Wood Grouse. Mont. Orn. Dict.
Tetras Auerhan. Tetrao Urogallus. Temm. Man. d'Orn. II. 457.
Tetrao Urogallus. Wood Grous. Jen. Brit. Vert. An. 168.

Male with the tail rounded; the upper parts minutely undulated with grey and black; the throat, lower part of fore-neck, and fore part of breast, black, the tips of the feathers glossy dark green; the lower wing-coverts and feathers under the tail, white. Female variegated with yellowish-red, white, and brownish-black.

Male.—This magnificent bird, the chieftain of the Grouse tribe, although once plentiful in Scotland, where it was known by the name of Capercailzie, has long ceased to be a denizen of our forests. It might therefore be judged unnecessary to describe it in a work like the present; and I should certainly be of that opinion had I not some particulars to relate respecting the structure of its digestive organs, which are interesting as presenting the peculiar characters of the genus in the highest degree of development.

The Wood Grouse is a bird of great size, being not much inferior to the Turkey, and proportionally more robust. The body is full; the neck of moderate length and strong; the wings rather short; the feet of moderate strength; the tail rather long.

The bill is very strong, short, as broad as deep at the base; the upper mandible with its dorsal outline nearly straight to

beyond the nostrils, towards the end declinato-convex, the ridge convex, as are the sides, the edges a little inclined and sharp, the tip rounded and sharp-edged; the lower mandible has the angle rounded, the dorsal line slightly concave, the back very broad, the sides very convex, the edges inflected, arched, strong, and very thick.

The mandibles are deeply concave internally, the upper with a prominent central line, the lower with a central groove and two prominent lines. The aperture of the posterior nares is narrow, with papillate edges; the palate in its vicinity covered with transverse series of papillæ. The tongue is triangular, acute, flat above, horny beneath, an inch and three and a half twelfths long. The œsophagus is fourteen inches and a half long; its general diameter one inch; but the pharynx dilatable to two inches. The crop, which has an orifice of two inches in length, commencing at the distance of seven inches and a half from the tongue, is capable of being inflated to a diameter of seven inches. The proventriculus is two inches long, an inch and a quarter in diameter, its glands oblong and lobulated. The gizzard is obliquely elliptical, its transverse muscles extremely large, that of the left side thicker; the longest diameter three inches and a quarter; the lower muscle prominent, of moderate thickness; the cuticular lining thick and longitudinally rugous. The pylorus is without a valvular apparatus, and lies in a groove between the upper edge of the right lateral muscle and the proventricular lobe. The intestine is eighty-nine and a half inches long; the duodenum being thirteen and a half; from the entrance of the gall duct to the cœca sixty-six; the rectum ten. The duodenum has a diameter of about four-twelfths, the rest of the intestine generally seven-twelfths; the rectum one half. The cœca, which are thirty-nine and a half inches long, are for the first seven inches narrow, their diameter being from three to four twelfths; then enlarged, their greatest diameter ten-twelfths; they are marked internally with eight longitudinal ridges. The rectum is nearly uniform in diameter, and not much wider than the rest of the intestine.

The nostrils are oblong, and small, being four-twelfths long.

The aperture of the ear has a diameter of six-twelfths within the margin. The eyes are of moderate size; the bare papillate supraocular space small and of a semilunar form.

The feet are short, and of moderate strength; the toes of moderate size; the first very small and elevated, with ten scales; the second a little shorter than the fourth, with eighteen scales; the third much longer, with thirty scales; the fourth with twenty-one. On each side of the series of scutella, is a row of square scales, below which is a lateral pectiniform series of linear scales directed obliquely forwards. The webs connecting the fore toes are comparatively large. The claws are rather short, strong, arched, with declinato-convex sides.

The plumage is ordinary, the feathers generally oblong and rounded. Those of the throat are elongated, compact, and glossy. The wings are of moderate length, broad, much rounded, convex; with twenty-eight quills; the fourth primary longest, the third almost equal, the first intermediate between the seventh and eighth. The tail is rather long, rounded, of eighteen feathers. The tarsi are covered with rather downy feathers.

The bill is yellowish-grey; the iris brown; the supraocular space scarlet; the toes and claws dark greyish-brown. The head, upper part of the neck, and the back, are undulated with grey and black transverse lines; the elongated feathers of the throat black, glossed with green. The lower part of the neck anteriorly and laterally, and the fore part of the breast, are black, the broad tips of a glossy dark green. The breast is brownish-black, some of the middle feathers tipped with white; the sides are undulated with grey and black; the axillaries white; the lower wing-coverts, excepting some of the outer, white; the vent feathers mostly white; the lower tail-coverts black, tipped with white. The upper wing-coverts are brownish-red with black undulations. The alula, primary coverts and quills, are greyish-brown. Half of the outer webs of the second, third, fourth, and fifth quills are white, towards the end undulated; the outer webs of the secondaries are undulated with reddish-brown; the edge of the alula is white, as is that of the wing under it. A white spot from the axillar feathers

appears externally. The tail is black and glossy; but there are some white irregular marks on the feathers about a third from the end. The feathers of the legs are greyish-brown tipped with white; those of the tarsi greyish-brown, minutely undulated with reddish-brown.

Length to end of tail 34 inches; extent of wings 52; wing from flexure 16; tail $10\frac{3}{4}$; bill along the back 2, along the edge of lower mandible 2; tarsus 3; first toe $\frac{3}{4}$, its claw $7\frac{1}{2}$ twelfths; second toe $1\frac{3}{4}$, its claw $\frac{9}{12}$; third toe $2\frac{1}{2}$, its claw $10\frac{1}{2}$ twelfths; fourth toe 2, its claw $\frac{8}{12}$.

Of another individual, the length 34 inches; extent of wings 48; wing from flexure $15\frac{1}{4}$; tail $10\frac{1}{2}$; bill along the back $2\frac{1}{2}$, along the edge of lower mandible $2\frac{1}{2}$; tarsus 3; first toe $\frac{3}{4}$, its claw $\frac{7}{12}$; second toe $1\frac{9}{12}$, its claw $\frac{8}{12}$; third toe $2\frac{8}{12}$, its claw $\frac{3}{4}$; fourth toe 2, its claw $8\frac{1}{2}$ twelfths.

Female.—The female is much smaller, and has the plumage variegated with yellowish-red, brownish-black, and white.

Remarks.—The native Wood Grouse has not been seen in Scotland for at least half a century. Some attempts have since been made to naturalize it by introducing individuals from Norway; but, in so far as I can learn, without success. Were it to be propagated from the foreign race, it could no longer, however, be considered as an indigenous species. An account of one of these attempts is given by Mr. James Wilson in the Edinburgh New Philosophical Journal for July 1832. According to various authors, it is plentiful in many of the wooded mountainous districts of the Continent, and especially in Norway, whence were imported the individuals from which I obtained the description given above. A very full and interesting account of its habits is given in Lloyd's *Northern Field Sports*, from which the following particulars are extracted.

"In the forest, the Capercailzie does not always present an easy mark; for, dipping down from the pines nearly to the ground, as is frequently the case, they are often almost out of distance before one can properly take aim. Towards the commencement of, and during the continuance of the winter, they

are generally in packs. These are usually composed wholly of cocks (the hens keeping apart), and do not separate until the approach of spring. These packs are sometimes said to contain fifty or a hundred birds, usually hold to the sides of the numerous lakes and morasses with which the northern forests abound; and to stalk the same in the winter-time with a good rifle is no ignoble amusement. Among other expedients resorted to in the northern forests for the destruction of the Capercailzie is the following:—During the autumnal months, after flushing and dispersing the brood, people place themselves in ambush, and imitate the cry of the old or young birds, as circumstances may require. By thus attracting them to the spot, they are often enabled to shoot the whole brood in succession. In other instances, the Capercailzie is shot in the night-time, by torch-light. This plan, which is said to be very destructive, is, I believe, confined to the southern provinces of Sweden, for in the more northern parts of that country I never heard of its being adopted. In Smaland and Ostergothland, this is said to be effected in the following manner:—Towards night-fall, people watch the last flight of the Capercailzie before they go to roost. The direction they have taken into the forest is then carefully marked by means of a prostrate tree, or by one which is felled especially for the purpose. After dark, two men start in pursuit of the birds: one of them is provided with a gun, the other with a long pole, to either end of which a flambeau is attached. The man with the flambeau now goes in advance, the other remaining at the prostrate tree, to keep it and the two lights in an exact line with each other. By this curious contrivance they cannot well go astray in the forest. Thus they proceed, occasionally halting, and taking a fresh mark, until they come near to the spot where they may have reason to suppose the birds are roosting. They now carefully examine the trees; and when they discover the objects of their pursuit, which are said stupidly to remain gazing at the fire blazing beneath, they shoot them at their leisure. Should there be several Capercailzies in the same tree, however, it is always necessary to shoot those in the lower branches in the first instance; for, unless one of these birds falls on its companions,

it is said the rest will never move, and, in consequence, the whole of them may be readily killed."

In the *Historia Scotorum* "nobilis et prædocti viri Hectoris Boethii Deidonani," we find the following passage relative to this species:—"Avium raptu viventium, Aquilæ sunt, Falcones, Accipitres, et id genus aliæ. Cæterum Aquatilium, tam varius ingensque est numerus, ut pro miraculo notari haud ridiculum est. Sed medii inter eas quædam generis præter cætera reperiuntur aliis regionibus incognita. Unum magnitudine corvum paulo superans Auercalze, i. silvestris equi apellati, solius pinus arboris extremis flagellis victitantes. Alterum illo minus galli gallinæque sylvestres vocati, frumento abstinentes, cibum habentes enascentia minutaque cytisi folia. Utrumque humanæ gulæ admodum suave. Tertium genus Fasiano carne ac magnitudine simillimum at nigra pluma rubentibus admodum palpebris, sylvestrem gallum nostrates dicunt, estque frumento victitans."—*Scot. Regn. Descript.* Fo. xii. 47. That is to say:—"Of birds of prey there are Eagles, Falcons, Hawks, and others of the same kind. As to water fowls, their number and variety are so great as to be really wonderful. And of an intermediate kind between these some among others are found which are unknown in other countries. One kind, a little larger than a Crow, which is called Auercalze, that is, wood-horses, and feeds entirely on the extreme twigs of the fir tree. Another, of smaller size, called Wood cocks and hens, does not feed on corn, but uses as food the young and small leaves of the broom. Both are very pleasant to the palate. A third kind, much resembling a Pheasant in flesh and size, but with black plumage, and bright red eyelids, our country people name the Woodcock, and it feeds on corn." This is a very lame account of the matter; but we may at least conjecture that the birds here meant are *Tetrao Urogallus*, *Lagopus Scoticus*, and *Tetrao Tetrix*. If the "very learned man" had possessed a tithe of the knowledge of one of our modern rustics, he might have known that the Blackcock no more feeds on corn than the Moorfowl on broom tops. The only good authority on the subject of the former occurrence in Scotland of the Capercailzie, is Pennant, in whose

"Tour in Scotland," (1769) is the following notice:—"Near Castle Urquhart is the broadest part of the loch (Loch Ness), occasioned by a bay near the castle. Above it is Glen Moriston, and east of that Straith Glas, the Chisolm's country, in both of which are forests of pines, where that rare bird, the Cock of the Wood, is still to be met with; perhaps in those near Castle Grant. Formerly was common throughout the Highlands, and was called Capercalze and Auercalze; and in the old law books Capercally." In his British Zoology he says: "This species is found in no other part of Great Britain than the Highlands of Scotland, north of Inverness, and is very rare even in those parts. In our country I have seen one specimen, a male, killed in the woods of Mr. Chisolme, to the north of Inverness."

The Wood Grouse is obviously a bird not fitted for the present populous condition of Britain; and, doubtless, its great size, beauty, and especially the quantity of wholesome food supplied by it, were the causes which gave rise to its destruction; just as the same circumstances have already produced the disappearance of the Turkey in many parts of America, where, before the axe of the white man resounded in the forests, it was abundant. In the times of the Celt and the Red Indian, these birds were permitted to stock the woods; but when the swarms of the civilized races invaded their respective countries, they ceased to prosper, and at length disappeared. It is indeed melancholy to think of the fate of birds and men; and, although the Capercailzie is no longer a denizen of the wild woods of Albyn, I hope I may be excused for paying this tribute to his memory, as some future historian may do to that of the ancient Gael, when their destiny has been fulfilled.

But we have still remaining a very fine species of Grouse, inferior though it be to the great Cock of the Woods; and having done our duty to the dead, we may now turn to the living.

TETRAO TETRIX. THE BLACK GROUSE.

BLACK GAME. BLACK GROUSE. BLACK COCK, COILACH DUBH,—THE MALE.
GREY or BROWN HEN, CEARC LIATH,—THE FEMALE.

FIG. 41.

Tetrao Tetrix. Linn. Syst. Nat. I. 272.
Tetrao Tetrix. Lath. Ind. Orn. II. 635.
Black Grouse. Mont. Orn. Dict.
Tetras Birkhan. Tetrao Tetrix. Temm. Man. d'Orn. II. 460.
Black Grouse. Tetrao Tetrix. Selb. Illustr. I. 423.
Tetrao Tetrix. Black Grouse. Jen. Brit. Vert. An. 169.

Male with the tail much forked, the four lateral feathers on each side elongated and curved outwards; the general colour of the plumage black, the neck and back glossed with deep blue; the lower wing-coverts, lower tail-coverts, and bases of the secondary quills, white. Female with the tail slightly forked, its lateral feathers straight; the general colour yellowish-red, spotted and undulated with brownish-black.

MALE.—The Black Grouse is one of the most beautiful, and in several respects one of the most remarkable, of our native birds. Its form is robust and rather heavy, and, although a

strong bird, it does not in ordinary circumstances exhibit much vivacity. The body is very full, the neck of moderate length, the head of ordinary size, oblong, and rather compressed. The feet are rather short and strong; the tarsus is short, feathered anteriorly and on the sides, covered behind with roundish scales concealed by the feathers. The toes are rather small and slender for so large a bird; the first very small, the second and fourth of moderate length and about equal, the third much longer; the anterior connected at the base by short scaly membranes; the soles padded, soft, covered with large, soft, rounded tubercles. On the first toe are ten, on the second eighteen, on the third thirty, on the fourth twenty-two transversely elongated, imbricated scutella; on each side of which is a single row of squarish scales, then a marginal series of linear, flattened, obtuse scales, projecting like the teeth of a comb. These linear scales are wanting on the hind toe. The claws are rather short, strong, considerably arched, obtuse, somewhat compressed, flattened beneath.

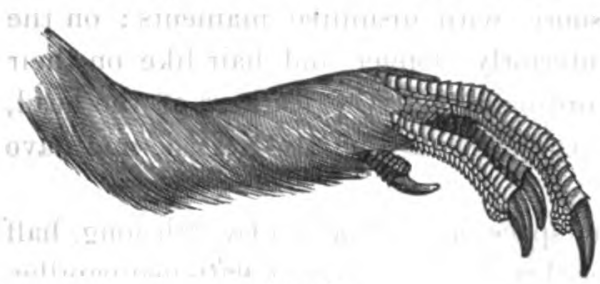


Fig. 42.

The wings are short, broad, curved and much rounded. The quills twenty-five; the primary strong, decurved, narrowed from near the base; the fourth longest, the third and fifth almost as long, the second longer than the seventh, the first longer than the eighth; the secondary incurved, truncato-rotundate and acuminate. The tail is composed of eighteen feathers; those in the middle short and truncate, the four lateral on each side gradually elongated, curved outwards, truncato-rotundate, with a slight notch.

The plumage in general is remarkably full, the feathers being abundantly downy at the base, and furnished with rather long plumules. About the base of the bill they are very short, rounded, and compact; on the head small, narrow, and rounded; on the neck large, broad, abruptly rounded; on the fore

part of the back also large and rounded; on the rest of the back smaller, oblong, but with a broad extremity; on the breast nearly of the same form; on the sides elongated; on the abdomen rather downy; under the tail large and full, some of the coverts extending about an inch beyond the middle of the tail-feathers; the upper tail-coverts only about half an inch shorter; on the legs short, with disunited filaments; on the tarsi short and soft anteriorly, longer and hair-like on their sides. The lustre is ordinary, but the feathers of the head, neck, and hind part of the back, are highly glossed, and have a silky smoothness.

Over the eye is a bare space, an inch and a twelfth long, half an inch in height, covered with long tapering, flattened papillæ, and without an upper free margin. The eyes are of moderate size, the eyelids thinly covered with very small feathers, and having a narrow crenate margin. The aperture of the ear is circular, four-twelfths of an inch in diameter, with a thickened slightly elevated margin. The nostrils are oblong, with a thick arched opercular margin, and concealed by the feathers which cover the nasal membrane.

The bill is very strong, but proportionally not larger than in the Brown and Red or Willow Ptarmigans, and many other species belonging to all the sections of the genus. The upper mandible is deeply sinuate in its basal outline; its dorsal outline is nearly straight at the base, towards the end arcuato-declinate, the ridge broad and convex, the sides convex towards the end, the edges nearly straight and ascending to beyond the nostrils, then declinate, sharp and overlapping, the tip rounded and thin-edged. The lower mandible has the angle broad and rounded, the dorsal outline slightly convex, the back broad, the sides convex, the edges arched, thin, erect, the tip rounded.

The upper mandible is concave within, with a central and two lateral prominent lines; the lower deeply concave, with a broad central and two lateral grooves. The mouth is rather narrow; the palate flat, anteriorly covered with pointed papillæ arranged in transverse series, posteriorly with smaller scattered papillæ; the space corresponding to the tongue bounded by two lateral longitudinal lines, having a transverse papil-

late line behind the tongue, and terminating behind the aperture in a curved papillate flap. The posterior portion of the internal nares oblong, narrow; the anterior linear; the edges of both papillate. The tongue is short, eight-twelfths of an inch in length, broad, triangular, flat above, acute, emarginate and papillate behind. The aperture of the glottis with two papillate transverse flaps behind.

The fauces are of moderate width. The œsophagus, which is twelve inches long, has for two inches a diameter of an inch and a quarter, then contracts to nine-twelfths. About the middle it is anteriorly and laterally expanded into a very large subglobose sac or crop, of which the posterior walls are reflected upwards over the trachea and œsophagus, and downwards over the anterior part of the thorax, so that the portion of the œsophagus which forms part of the sac is only about a fifth of its whole length. On entering the thorax, the œsophagus contracts to a diameter of eight-twelfths, and then enlarges to form the proventriculus, which is of an ovato-oblong form. Its internal diameter, however, is not greater than that of the rest of the œsophagus, its bulk being produced by the interposition between its walls of numerous oblong, sacculated or branched glandules, placed obliquely, and opening on small rounded papillæ on the inner surface, with numerous small mucous crypts in the intervals. Some of these glandules are half an inch long. The whole inner surface of the œsophagus is abundantly supplied with mucous crypts, and the upper and lower orifices of the crop, especially the latter, have the walls thickened and furnished with scattered glandules.

The stomach is a very powerful gizzard of a roundish, sublobate or subrhomboidal form, considerably compressed. Its structure may be described as follows: On the middle of each of its two flattened surfaces is a roundish thin tendinous centre, from which on each side diverge tendinous filaments terminating in muscular fibres, which thus pass from the one to the other tendon, forming two very thick muscles, the inner fibres of which are complexly reticulated, although disposed in laminæ attached to the subjacent coat. Of these, the lateral muscles, the left is somewhat larger, and has a thickness of nine-twelfths,

that of the right half an inch. The upper part is surrounded by transverse muscular fibres, and forms a small sac on the right side, between which and the upper edge of the lateral muscle is the pylorus. The lower part, or fundus, has also a muscular coat, comparatively thin, and composed of fasciculi converging towards the central tendons. Applied internally upon the muscular coat of the stomach is a thin tough dense layer of compact cellular tissue, elastic, and nearly of cartilaginous toughness, marked with ridges and depressions, and on both surfaces minutely villous. It adheres firmly to the muscular coat, and is more easily separated from the inner or cuticular. The latter is about one twenty-fifth of an inch in thickness, tough, elastic, formed of transverse glistening fibres, and undulated with rugæ, which are impressed on the middle coat. These rugæ are longitudinal on the sides, continue over the fundus, where they are transverse to the muscular fibres, and are transverse on the pyloric lobe. The upper part of this cuticular coat, or that next the proventriculus, is much softer and of a lighter colour; over the two lateral muscles it is thickened, forming two elliptical plates; and over the lower muscle it is thin. The interior of the gizzard, as defined by the cuticular coat, is an oblong, or subcylindrical cavity, with longitudinal rugæ, and having on the right or upper side a sac, in a transverse fissure of which is the pylorus. The stomach is two and a half inches long, two inches and a quarter in breadth, one and three quarters in thickness.

The intestine, measured from the pylorus to the extremity, is seventy-one inches long; its diameter varies from six-twelfths to five-twelfths at the upper part, and diminishes to four-twelfths near the cœca. It first, as usual, forms a fold along the edge of the stomach, five inches long, including the pancreas, then curves under the right lobe of the liver, passes downwards on the same side, bends upwards and is convoluted on the mesentery behind and to the right of the stomach, over which it gives off the two cœca; which, although thirty inches long, are contorted only along ten inches of the intestine, with which they are connected by narrow mesocœca. The rectum is six inches and a quarter long, at its commencement four-

twelfths in diameter, but towards the end enlarged to eight-twelfths. The cloaca, marked by an obscure valve or rim, on which are seen the orifices of the ureters, and behind which is the entrance of the bursa of Fabricius, is only half an inch long. The cœca are nearly half the length of the intestine, being thirty inches long. They come off with a large oblique aperture, for six inches are nearly of the same diameter as the intestine, varying from three to four twelfths, then enlarge to about twice its size, from eight to ten twelfths, and so continue to the extremity, which is oblong, narrowed, with a nipple-like termination.

Under the tongue, in the angle of the lower mandible, is a large mass of mucous crypts, of which there is also a series on each side on the edge of the tongue. The fauces and the whole extent of the œsophagus are abundantly supplied with mucus from crypts scattered over their whole surface, and which are larger at the aperture of the crop. The latter organ, which is extremely thin, has no mucous crypts excepting around its orifice. The proventriculus emits from its glandules a very copious clammy fluid of a greyish colour, as well as a mucous secretion from small crypts. These fluids pass into and line the cavity of the gizzard. The inner surface of the small intestine is even and villous in its whole length, excepting towards the entrance of the cœca, where it is covered for about two inches with flattened tapering projections, which are larger below, and disposed so as to form a kind of ring or imperfect valve between the small intestine and the rectum. The latter is smooth and even within, glandular, and plentifully supplied with mucus. The cœca are internally villous, and, excepting for six inches at the commencement, have their inner coat raised into seven or eight longitudinal prominent ridges, which are thick, villous, and, being white, are seen externally through the muscular and peritoneal coats.

The liver is of two unequal lobes, the right two inches and three quarters, the left two inches, long. There is no gall-bladder; and the biliary ducts enter at the distance of ten inches from the pylorus.

The bill is brownish-black, as are the claws; the toes wood-

brown; the soles chocolate. The iris is brown; the eyelids flesh-coloured. The superciliary membrane, or pad of linear flattened papillæ, is of an arterial blood-red, or deep carmine. The general colour of the plumage may be described as black. The head, neck, middle and hind part of the back, are highly glossed with deep blue; the scapulars and wings tinged with brown; the primary quills deep brown, with brownish-white shafts; the secondary slightly tipped with whitish. The bases of the secondary quills, of the inner primaries, of the primary and secondary coverts, and of the alular quills, are white, a conspicuous band of which is seen on the secondaries. The lower wing-coverts, excepting those on the edge of the wing, are also white; and when the wing is closed, a few of them are seen at its bend. The breast and sides are brownish-black; the abdominal feathers tipped with white; the legs and tarsi have whitish specks. The lower tail-coverts and adjacent feathers are white; the upper brownish-black; the tail-feathers deep black.

Length to end of middle tail-feathers $19\frac{3}{4}$ inches, to extremity of tail $23\frac{1}{4}$; extent of wings 33; bill along the back 1, along the edge of lower mandible 1; wing from flexure 10; middle tail-feathers $4\frac{1}{2}$; outer feather extended $8\frac{1}{2}$; tarsus $2\frac{1}{4}$; first toe $\frac{1}{2}$, its claw $\frac{4}{12}$; second toe $1\frac{1}{4}$, its claw $\frac{5}{12}$; third toe 2, its claw $\frac{6}{12}$; fourth toe $1\frac{1}{4}$, its claw $4\frac{1}{2}$ twelfths.

Of another individual the dimensions were as follows. Length to end of tail 23 inches, to end of middle tail-feathers 20; extent of wings 30; bill along the back $1\frac{2}{12}$, along the edge of lower mandible $1\frac{2}{12}$; eye $\frac{5}{12}$; ear $\frac{4}{12}$; tarsus $2\frac{1}{4}$; first toe $\frac{1}{2}$, its claw $\frac{4}{12}$; second toe $1\frac{4}{12}$, its claw $\frac{5}{12}$; third toe $1\frac{10}{12}$, its claw $\frac{8}{12}$; fourth toe $1\frac{2}{12}$, its claw $\frac{6}{12}$; wing from flexure $10\frac{1}{4}$; middle tail-feathers $4\frac{1}{4}$, outer along the curve $8\frac{1}{2}$. Tongue $\frac{10}{12}$ long; œsophagus 12; intestine from pylorus to cœca 52; rectum 6; cœca 30, convoluted along 10 inches of the intestine.

Female.—The female of the Black Grouse, which among sportsmen and others bears the name of Grey Hen, has a considerable resemblance to the Red Grouse both in colour and proportions. The body is full; the neck of moderate length;

the head rather small and oblong; the wings rather short, broad, and curved; the tail short; the feet of moderate length, and rather stout. The general form, in short, is in most respects similar to that of the male, as is that of the bill and toes.

The œsophagus is nine inches long. The crop, which commences at the distance of three inches and three-fourths from the tongue, is four inches long, its orifice one. The average diameter of the œsophagus, when dilated, is half an inch. The gizzard is two inches long, one inch and three-fourths in breadth, an inch and a half in thickness. The entire length of the intestine is sixty-six inches, the rectum being seven. The duodenum has a diameter of four and a half twelfths, and the rest of the small intestine continues of about the same thickness; that of the rectum is five-twelfths. The cœca, which are twenty-nine inches long, are four-twelfths in diameter at their commencement, contract to two and a half twelfths, then at the distance of five inches enlarge to seven-twelfths, and so continue until near the end, when they contract a little. They are marked with seven or eight longitudinal white bands.

The plumage is full, close, and rather blended; the feathers generally oblong, rounded, with ordinary gloss. The wings are of the same form as in the male, the fourth quill being longest, the third almost equal, the first longer than the eighth. The tail differs considerably in form, being broadly emarginate or retuse, the four outer feathers a little longer, but in no degree curved. It is very short, and composed of eighteen feathers, as in the male.

The bill, feet, and eyes are coloured as in the male. The superciliary membrane, which is villous and much smaller, is scarlet tinged with carmine. The general colour of the head and neck is yellowish-red, barred with brownish-black, each feather on the head with three, on the neck with four bars of the latter. On the fore part of the back and the scapulars the bars are broader and curved, the last bar forming a pointed patch. The hind part of the back is of a deeper red, barred with brownish-black; the upper tail-coverts similar. The breast and sides are of the same colours, but with the dark bars curved, the ends greyish-white, the sides with more red.

The legs and tarsi are greyish-white, obscurely mottled with reddish and blackish; the lower wing-feathers and axillars white, those toward the edge barred with dark brown. The primary quills and coverts are greyish-brown, their edges mottled with red; the secondary quills similar, but their coloured edges broad and undulated, their tips white; those of the secondary coverts also white. The upper wing-coverts are marked like the back; a tuft of white feathers appears at the bend of the wing, as in the male. The lower tail-coverts are greyish-white, some marked with irregular patches of brown and red along the centre towards the end.

Length to end of tail 18 inches; extent of wings 31; wing from flexure 9; tail $4\frac{3}{4}$, the shorter feathers $\frac{10}{12}$ shorter than the rest, the outer $\frac{1}{2}$ shorter than the third, which is the longest; bill along the back 1, along the edge of lower mandible 1; tarsus $1\frac{10}{12}$; first toe $\frac{5}{12}$, its claw $\frac{4}{12}$; second toe $1\frac{1}{12}$, its claw $\frac{5}{12}$; third toe $1\frac{9}{12}$, its claw $\frac{6}{12}$; fourth toe $1\frac{2}{12}$, its claw $\frac{4}{12}$.

Variations.—Old males vary little in colour, the brown shades being merely lighter or deeper according to the season. In length they vary from 22 to 24 inches, in extent of wing from 30 to 33. Young males have the tints less deep, and the feathers more or less mottled. The intestinal canal of four individuals measured as follows:

Edge of lower mandible	1	1	1	1
Œsophagus in length	12	12	12	12
Stomach in length	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{1}{2}$
——— in breadth	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$
Small intestine	52	65	51	65
Cœca	30	30	$32\frac{1}{2}$	30
Rectum	6	6	$6\frac{4}{12}$	$6\frac{1}{4}$

It is only in the length of the intestine that the difference is considerable, and there it amounts to rather more than a foot. Great apparent differences may be found in the dimensions of the parts. Thus, the crop when empty contracts to the size of a walnut, and may be inflated to a diameter of more than

four inches. To obtain uniform measurements therefore, the parts ought to be inflated.

Habits.—If we take the digestive organs, with their functions, as a point from which to set out in tracing the habits of this or any other bird, we shall be enabled to present a more connected account of them than is usually found in our most approved works. Let us suppose that, early on a sunny morning in October, excited by a peculiar sensation which we denominate hunger, the Black Grouse is seen threading his way among tufts of heath in some wild glen of the Grampians. By means of its short, strong, sharp-edged bill, it picks off small portions of the fresh twigs of Erica cinerea, Calluna vulgaris, Vaccinium Myrtillus, Willows, and other shrubs, with which, and occasionally other substances, such as berries of Vaccinium Vitis-idæa, Vaccinium Myrtillus, and Empetrum nigrum, and leaves of various plants, it gradually fills its crop, which is capable of containing a very large quantity, in fact a globular mass from three and a half to four inches in diameter. These twigs are all cut of a length not exceeding half an inch, arrive in the crop slightly moistened, and remain there for a time without apparently undergoing any other change than that of being in a small degree moistened. A quantity passes into the gizzard until it is filled, when it is acted upon by the powerful muscles of that organ and its cuticular lining, of which the action is aided by numerous fragments of quartz, many of which, by long use, are often rounded and polished. The crude food passes down the œsophagus in the form of a compact cylinder, completely filling it, sliding along its lubricated surface, and in passing through the proventriculus receiving a quantity of fluid from its glands. In the gizzard it presents the same form, impressed with the rugæ of the inner coat, and being intimately mixed with the fragments of quartz, is triturated into a coarse pulpy but slightly moistened mass, in which state it enters the intestine by the pylorus, which seems to have the power of rejecting the mineral particles, as none of them are ever found beyond the stomach. In the upper or duodenal part of the intestine it is diluted with the pancreatic and biliary fluids, and

has a yellowish-green colour. Beyond this, it assumes a greyish-brown tint. The nutritious parts are extracted in this course by the lacteals, and as the mass passes into the rectum, the finer particles are absorbed or drawn in by the cœca, the contents of which are a uniform pultaceous mass of a dull yellowish-brown colour, in which the vegetable fibres can no longer be distinguished by the naked eye, whereas in the rectum they are very perceptible. It would appear that the coarser parts pass directly from the small into the large intestine, and that the more comminuted only enter the cœca, adhering to the villous surface, and especially to the rugæ of which we find an impalpable deposit, which is absorbed. The fœces in the rectum are comparatively dry, and form a continuous cylinder, in which state, mixed with the urine, they are voided, forming a small heap of cylindrical fragments.

According to the season, the food varies, although heath twigs always form the principal part. In spring the tops of eriophora, carices, blades of grass, willow-catkins, and buds of trees; in summer leaves of various shrubs; and in winter juicy twigs of all kinds, are found in the crop.

The Black Grouse, then, like other species of the genus, is a phytophagous bird, which, feeding on substances containing comparatively little nourishment, introduces a large quantity at a time, like a ruminating quadruped, and gradually triturates it in the gizzard. In feeding, it walks about among the shrubs and herbage, where it has time to select fragments of the proper size and quality. The crop is merely a recipient, in which the food undergoes little or no change. It passes thence into the gizzard, mixed with the juice from the proventricular glands. When triturated, it enters the duodenum, where it assumes a pulpy appearance, and undergoes the process of digestion. The nutritious parts are absorbed as it passes along; but as its passage requires to be rapid, it undergoes a farther elaboration and absorption in the extremely large cœca, into which, however, the coarser fibres do not enter.

In searching for food, the Black Grouse frequents the lower grounds of the less cultivated districts, not generally removing far from the shelter of woods or thickets, to which it betakes

itself as occasion requires. In spring its fare consists principally of twigs and catkins of alder, birch, and willow; in summer of tops of heath, Vaccinium Myrtillus, and Empetrum nigrum; in autumn of heath, and of crowberries, cranberries, blaeberries, and whortleberries; in winter of tops and buds of these plants and of fir; but at all seasons its staple food is heath and vaccinia. It sometimes makes an excursion into the stubble-fields in search of seeds of the cereal plants, and in summer and autumn occasionally includes those of gramineæ and junceæ among its desiderata. While thus employed, it walks and runs among the herbage with considerable agility, and when apprehensive of danger, flies off to a sheltered place, or settles down and remains motionless until the intruder passes by. It perches adroitly, and walks securely on the branches, but its ordinary station is on the ground, where also it reposes at night. It may often, especially in spring, be seen on the turf top of the low walls enclosing plantations. Its flight is heavy, direct, and of moderate velocity, and is capable of being protracted to a great distance.

This species, however, does not wander far from its ordinary haunts, nor, like some, make excursions into the neighbouring districts. Its favourite places of resort are the lower slopes of hills covered with coppice, interspersed with heath, rank grass, and ferns, or valleys flanked by rocky and wooded ranges. In such situations it is plentiful in many parts of the northern and middle divisions of Scotland, including some of the larger islands, such as Mull and Skye; but in the Shetland and Orkney islands, and in the long range of the Outer Hebrides, which are destitute of wood, it is never seen. In some parts of the southern division it also occurs in great abundance, more particularly in the border districts, and in wooded glens of the hilly regions. Mr. Selby states that "in Northumberland it is very abundant, and has been rapidly increasing for some years past, which may be partly attributed to the numerous plantations that, within that period, have acquired considerable growth in the higher parts of the country, as supplying it both with food and protection." Montagu observes that "population and culture have driven it from the south, except

in a few of the more wild uncultivated parts; in the New Forest in Hampshire, Dartmoor, and Sedgemoor in Devonshire, and the heathy hills in Somersetshire, contiguous to the latter. It is also found in Staffordshire, and in North Wales, and again in the north of England." But it is more especially in the north of Scotland that it seems to find an abode best suited to its nature, although even there it undergoes the same alternate protection and persecution as in other places, and with its brethren the Red Grouse and Ptarmigan, is sold to furnish a somewhat barbarous pastime to the "Southrons," who now make their autumnal irruptions into the ancient land of the Gael, with more security than in the days of Waverley and Rob Roy.

In autumn, the Black Grouse, from its habits and mode of flight, falls an easy prey to the sportsman; but in winter and the early part of spring, it is shy and difficult to be procured. As the males weigh from three to four pounds, and the females about two, it ranks among the most important of our native birds as an article of food. Its flesh is whiter than that of the Red Grouse, especially the smaller pectoral muscles, which are nearly as light-coloured as those of the Pheasant. The natural enemies of the Black Grouse are foxes, polecats, and a few of the larger rapacious birds, in particular the Golden Eagle and Peregrine Falcon. It is alleged that in some districts, and especially in the south-western parts of Scotland, great injury is inflicted on the Black Grouse by the adders or vipers, which abound on the heaths, and in the plantations, and which destroy the eggs as well as the young birds.

Like the polygamous, or rather promiscuously-breeding quadrupeds, such as the Stag, the males separate from the females and young, and during autumn and winter keep by themselves in small flocks, living together in harmony. Towards the middle of spring they separate, quarrel whenever they meet, and engage in desperate combats, in which several individuals frequently join. So intent are they on this occupation that a person may easily get near enough to shoot them. At this season the supraocular space assumes a deeper red, and the bird manifests much activity and vivacity, but the gloss of

its plumage, as alleged by some writers, following the popular notion that in the breeding season all birds are more gorgeously apparelled, is not brighter than in winter. Although destitute of spurs, it fights in the same manner as the domestic cock, lowering its head, erecting and spreading its tail, and leaping against its adversary, endeavouring to drive him off and if possible tear him to pieces. These combats, however, are less bloody than those of our game-cocks, although they are engaged in with so much earnestness that an unscrupulous fowler might easily carry destruction among the gallants. A cock who has beaten off his opponents from his favourite station, betakes himself to it morning and evening, struts in a pompous manner, with spread tail, and stiffened wings rustling against the ground, calls aloud with a harsh grating voice, and invites the neighbouring females, or rather challenges those of his own sex within hearing to come forward and dispute his claims to the favour of his elect bride. When this season of excitement is over, the males, forgetting their animosities, meet together, and endeavour to recruit their diminished energies by following their ordinary occupations in peace.

The females meanwhile, having sought out a fit place, generally in the shelter of some low bush, or among rank grass, and formed in it their inartificial nest, composed of withered grass and occasionally a few twigs placed in a slight hollow, deposit their eggs, to the number of from five to eight or ten. They are of a regular oval shape, generally two inches long, one inch and seven-twelfths broad, with a ground colour varying from yellowish-white to very pale yellowish-red, irregularly spotted and dotted with brownish-red. As the nests are usually placed in low situations, it frequently happens that in very wet seasons, they are partially or entirely inundated.

The following letter with which I have been favoured by Mr. W. Smellie Watson, better known as a distinguished portrait-painter, than as a naturalist, although in the latter capacity he inherits the spirit of his ancestor, the celebrated author of the *Philosophy of Natural History*, will, I have no doubt, be read with much pleasure, as affording information derived from personal observation of the habits of this interesting bird:

"My Dear Sir—Agreeably to your request, I have the pleasure of sending you a few remarks respecting Black Game, which I made in the course of my shooting excursions in Dumfriesshire and Galloway. Black Grouse were particularly abundant in the year 1831. About the end of the month of August of that year, my friend and I started after breakfast to have some sport upon his own estate, in the parish of Parton, six or eight miles from Castle Douglas, which ever was celebrated for this species of game. In the course of two hours, not more I am sure, we bagged thirty birds, and had we not been interrupted by a very heavy thunder shower, we should have doubled that number. The unusual proportion of young cocks attracted our attention, as we did not follow the usual method of picking them out, but killed indiscriminately: out of thirty, only three were hens. It is not easy to distinguish the young cocks early in the season. I used to pick them out on the wing by their white feathers, and they always appeared to me to be more shy than the hens. Later in the season, say the middle of September, the cocks are easily made out. Previous to and during rain Black Grouse are very restless and wild. I never found this species far from water; and the many nests I have stumbled on, generally in a heather bush or among long grass, were invariably within thirty yards or so of a spring. The nests were composed of hay, *nicely* put together. On approaching a brood, I remarked that the first bird which rose was the old hen, and always at a considerable distance from her progeny, in a fluttering manner, so that a person unaccustomed to see this stratagem would suppose her to be wounded. She conducts herself in fact precisely as the hen Partridge when similarly disturbed. With the Red Grouse it is the old cock that rises first. Early in the season I have frequently observed the old Blackcock with the brood, and he too is famous for leading the dogs from them. I have often followed the run of an old cock for a great distance before he would rise, and afterwards returned to the spot from whence I started, and found the young brood. The cocks do not challenge when disturbed, as those of the Red Grouse

do. Farther on in the season, the old cocks are most frequently found among ferns, and very deep heather or long grass, near to water. I have also often found them among loose grey stones, near to craggy cliffs, sometimes three or four together. On one occasion I killed a very fine Blackcock in rather a singular way. I happened to be near to an old plantation, and my friend at least six hundred yards into the moor, when he called *Mark!* I turned round, and observed a cock flying directly towards me. Raising my gun, I waited until I judged him sufficiently near, when I fired, and brought him dead to the ground. It is very difficult to shoot a bird flying directly towards you, and I have no doubt that in this instance his eyes were directed towards the dogs, and not to me. At the beginning of the season, the 20th of August, they sit so close that I have again and again taken them alive with my hands in a heather bush. When wounded they always get to the first hole they can find, or bury themselves deep in the heather. Near to Craigdarroch, the seat of Cutlar Fergusson, M. P., my friend and I had a day's shooting, and although we travelled over excellent ground, we did not see above eight old hens, five of which we killed. They were all barren, and not one young bird did we meet with. I remarked that the old hens kept together, and if my memory does not deceive me, the five were all killed in one field. My friend always made it a rule to kill the barren hens, for he alleged they fought with their prolific neighbours and destroyed their young. Late in the season, and in very stormy weather, they all get into packs, in the same manner as the Red Grouse, and then defy the skill of the sportsman. Their feeding time seems to be the morning and evening. I have shot many in corn fields, but never far from their cover. They seem to be particularly fond of barley. It is supposed by many that Black Game are driving the Red Grouse from their ground. This, however, I do not think is the case, as I have always observed that the former prefer low marshy ground, and the latter young heather on high ground. When the old Red Cock raises his head from the heather (a phenomenon which sports-

men designate by the phrase *Bottle-neck)*, to discover the cause of alarm, there is no hope of getting within shot, for he immediately calls, and all take wing that instant. I have shot this species also in corn-fields, near to heather."

Young.—The young are at first covered with close fine down. The bill is umber brown, its tip paler. The general colour of the down is greyish-yellow; the upper parts mottled with black and chestnut; the sides and fore part of the head spotted with black, its upper part reddish-brown, not bordered with black as in the Brown Ptarmigan. The sides and back of the neck are minutely mottled with dusky; the tarsi are yellowish-grey, the toes pale greyish-brown. They are easily distinguished from the young of the Brown Ptarmigan, by the want of down on the toes, and by the lighter brown of the top of the head. At first it is difficult to distinguish the males from the females; but by the time their first moult commences they are very easily known.

In the male, when its first plumage is complete, the colours are as follows. The upper parts are pale reddish-brown, banded with brownish-black; the lower similar, but paler, the dark markings narrower. The tail-feathers are also barred, as are the quills, although minutely; the secondaries broadly tipped with white, their bases of the same colour. The abdominal feathers are loose, grey and barred with dusky, as are the tarsal. Those on the throat are greyish-white. The bill is brownish-black; the feet light brown.

The young female differs little, having the colours merely somewhat paler.

Progress towards maturity.—The young male after the first moult, resembles the adult; but the feathers of the neck are minutely barred with chestnut, as are the wing-feathers. The white band on the wing is distinct. The tail-feathers are curved outwards, but not so much as in the adult. As the bird advances in age, the colours assume a deeper and purer tint, the minute mottling of the dorsal and other feathers becoming less apparent at each successive moult.

Remarks.—The peculiar form of the tail in this bird is by no means sufficient to cause it to be separated from the other Grouse, and to constitute a genus of itself, for in all other essential respects it agrees with the other species. The female has the tail but slightly forked, and in colour and form greatly resembles the female Brown Ptarmigan or Red Grouse. There is reason to believe that these two species sometimes breed together; at least I have seen three specimens which presented intermediate characters. One of these, a male, I had the good fortune to inspect when entire and afterwards dissect. It was obtained by Mr. Fenton, preserver of animals in Edinburgh, on the 6th December 1836, and is now in the possession of Mr. W. Smellie Watson of that city. It was much emaciated, but in perfect plumage. The following description I transcribe from my note-book.

In form and proportion it is similar to a female Black Grouse. The bill is of the same form as in that bird. The supraocular membrane resembles that of the Red Grouse, having a thin *free fringed margin*, which is not the case with that of the Blackcock. The feathers are generally oblong, broadly rounded, and have a large tufty plumule. The tail is complete, slightly forked, as in the female Black Grouse, but of only *sixteen* feathers, as in the Red Grouse. The quills are twenty-six. The tarsi are feathered all round, without a bare space behind. The toes are also feathered a third down, as are the interdigital membranes, and the plumage of these parts is as bushy as in the Red Grouse. They are margined with pectiniform scales, as in the Black Grouse. The claws are very long, arched, with thin parallel edges, like those of the Red Grouse and Grey Ptarmigan.

The bill is brownish-black; the supraocular membrane scarlet; the toes wood-brown; the claws brownish-black. The upper part of the head is minutely mottled with brownish-red, brownish-black, and grey; the hind-neck with a larger proportion of grey. The rest of the neck is black, with a tinge of reddish-purple. On the throat the feathers are margined with white, on the sides of the neck obscurely barred with brownish-red. On the lower parts generally the feathers are black,

tipped with white; those of the sides banded with red, of the lower part of the tail black, with a large white terminal space. The lower surface of the wing and the axillar feathers are white.

The upper parts generally are very minutely undulated with brownish-black and brownish-red, with very narrow terminal bands of white. The wing-feathers and secondary quill-coverts are similar, as are the secondary quills, which are all tipped with greyish-white. The primary quills, their coverts, and alular feathers, greyish-brown; the outer edges of the primaries mottled with white. A white spot appears at the axilla, but there is not a white band on the wing, as in the Black Grouse. The tail is black, the two middle feathers very obscurely mottled with reddish; the eight middle narrowly tipped with white. The tarsal feathers are greyish-white, those on the outer side mottled with red.

Length to end of tail $20\frac{1}{2}$ inches; extent of wings 31; bill along the back $\frac{11}{12}$, along the edge of lower mandible $1\frac{1}{12}$; wing from flexure $9\frac{1}{2}$; tail to end of middle feather $5\frac{1}{4}$, to end of lateral feather $6\frac{2}{12}$; supraocular membrane $\frac{9}{12}$ in length, and $\frac{5}{12}$ in height; middle toe $1\frac{1}{4}$, its claw $\frac{11}{12}$.

On inspecting the body, the cause of emaciation was obvious. The trachea and bronchi were much inflamed, the left lung perfectly sound, but the right gorged with blood. The rectum was dilated in its lower part to the diameter of $1\frac{1}{4}$ inch, and filled with a substance resembling putty, and composed chiefly of uric acid, which completely obstructed the passage of the fœces. The kidneys were natural, but the right ureter was much enlarged, and filled with a substance similar to that in the rectum, but softer. The testes oblong, one $3\frac{1}{2}$ twelfths, the other $\frac{5}{12}$ in length; but I failed in tracing their ducts, and have some reason to believe that they did not exist.

Œsophagus 8 inches long; stomach 2; intestine only 42, of which the rectum 6; cœca 26 long, their greatest diameter half an inch.

In form and size this bird resembled a female or a young male Black Grouse, to which it was also similar in its internal organization, but with the intestinal canal much shorter and of

nearly the same dimensions as in the Red Grouse. In the plumage and colouring it was as exactly intermediate between the two species as could be imagined. The imperfection of the genital organs also corresponds with the idea of its being a hybrid.

Hybrids are alleged to be occasionally produced between the Pheasant and Black Grouse; but I have not seen a specimen, and were it not for Mr. Thompson's observations already alluded to, should have imagined that the birds supposed to be of this character were merely young Blackcocks.

LAGOPUS. PTARMIGAN.

Bill short and strong, slightly curved. Upper mandible having its dorsal outline arcuato-declinate, the ridge broad and convex, the sides convex towards the end, the edges straight and ascending to beyond the nostrils, where they are inflected, then declinate, sharp and overlapping, the tip rounded and thin-edged. Lower mandible narrower than the upper, its angle broad and rounded, the dorsal outline straight, the back broadly convex, the sides nearly erect and convex, the edges arched, thin, and erect, the tip rounded.

Mouth narrow; upper mandible concave internally, with a prominent soft central ridge and four convergent lines; lower mandible concave, with a broad central groove, and two prominent lines. Palate flat, with two curved slightly papillate soft ridges, from which a papillate flap proceeds to the middle of the nasal aperture, and another curves behind it. Aperture of the posterior nares oblong behind, anteriorly linear, its edges papillate; the anterior space defined by the soft ridges covered with several transverse rows of pointed papillæ, the posterior space sparsely covered with smaller papillæ. Tongue short, triangular, flat above, papillate at the base, horny beneath at the end, acute. Two masses of mucous crypts in the angle of the lower jaw; also a series on the lower side of the tongue on each side, and a great quantity in the space between the root of the tongue and the aperture of the glottis. The latter is defended behind by two transverse flaps of pointed papillæ.

Œsophagus, Plate VI, Fig. 1, *a*, *b*, *c*, *d*, *e*, narrow at its two extremities, enlarged or opening into a crop of great size, lying over the fore part of the neck and thorax. In its whole extent it is abundantly supplied with mucous follicles, as is the crop

for a short space around its aperture. The proventriculus, Fig. 3, *b*, is somewhat bulbiform, its glands few, large, oblong, placed rather obliquely. Stomach, Fig. 3, *c*, *d*, *e*, *f*, *g*, a powerful gizzard, of a roundish, subrhomboidal form, with the two lateral muscles, *d*, *e*, transverse, the lower muscle, *g*, thin, its tendinous fibres passing under those of the rest; the middle coat rather thin; the inner or cuticular, Fig. 4, *h*, strong, hard, longitudinally rugous. The cardiac orifice is situated in a transverse depression, between the slight cardiac lobe, and the upper edge of the lateral muscle, and has no valvular apparatus. Intestine long, rather wide, of nearly uniform diameter. Cœca, Fig. 2, *c*, *d*, *e*, *f*, *g*, *h*, extremely long, wider than the intestine. Rectum, *b*, *c*, long, cylindrical. The intestine within is beautifully marked with regular series of small depressions; towards the cœca are numerous roundish soft papillæ disposed in series; there is a slight circular valve or margin at the commencement of the rectum, which is covered with mucous crypts at its upper part, with rounded papillæ at its lower, and marked with faint longitudinal rugæ. The cloaca is small, and separated from the rectum by a circular valve.

Nostrils basal, lateral, oblong or elliptical, margined and concealed by the short feathers which cover the nasal membrane. Eyes of moderate size; eyelids feathered; over the upper is a semilunar space of bare skin covered with papillæ and having a thin fringed margin. External ear of moderate size, roundish, its thick margin surrounded with a circle of feathers.

FIG. 44. *Brown Ptarmigan.*

FIG. 45. *Grey Ptarmigan.*

Head small, oblong, rather compressed. Neck short. Body full and large. Legs rather short, strong; tarsi covered with feathers, as are the toes anteriorly, which are rather small and

slender; the first very short and elevated, the third much longer than the second, which is about the same length as the fourth; they have all a few terminal scutella, and the anterior three are webbed at the base. The claws are rather long, arched, depressed, with the ridge narrow, the sides sloping, the edges thin, the tip obtuse; that of the hind toe smaller and more curved.

FIG. 46. *Foot of Brown Ptarmigan.*

Plumage full, close, compact, imbricated. The feathers at the base of the bill small and slender; those on the head oblong; on the body generally oblong; more than half of their length is downy, and the plumule is nearly as long; the tube short, enlarged at the base. The feathers on the hypochondrial spaces and abdomen are entirely downy. The wings are short, broad, curved and much rounded; the primary quills ten, narrow, rounded, the first six cut out from near the base, so that when the wing is extended intervals are left between them; the fourth longest, the first about the length of the seventh; secondary quills fifteen, decurved, rounded. Tail short, broad, slightly rounded and retuse, of sixteen feathers, the two middle ones situated above the line of the rest.

The Ptarmigans, of which only five species are known, viz. *Lagopus scoticus*, *L. vulgaris*, *L. saliceti*, *L. rupestris*, and *L. leucurus*, of authors, are natives of the colder regions of Asia, Europe, and America. They live upon vegetable substances, twigs and leaves of shrubs, grasses, seeds, and berries, which they pick up on the ground. The food is collected in the crop, where it remains unaltered, being merely bedewed with the mucus necessary for deglutition. It gradually passes into the gizzard, where, besides being mixed with the proventricular fluid, it is triturated by the action of the muscles, and the rugæ of the cuticular lining, aided by numerous particles of white quartz. Thus comminuted, it passes into the intestine in a pulpy state, but with the vegetable fibres still distinct, and is there further diluted, first by the pancreatic, then by the biliary fluids, when the chyle is absorbed, and the mass gradually be-

comes more dry, and passes into the rectum in a concrete form; but in passing the cœca, all the finer parts remaining are carried into them, and there subjected to further elaboration and absorption. The fœces form a heap of cylindrical fragments.

The species have a strong, rapid, and protracted flight, which is performed by quick beats of the wings, with occasional intermissions. They walk and run with great agility, and generally elude their enemies by skulking among the shrubs and herbage, although when roused they fly off to a great distance. They never betake themselves to the covert of woods, but live on open shrubby or stony ground. They have numerous eggs, which are spotted with dark brown. The young run about as soon as they are born, and follow their mother until winter, when several families often unite. The males accompany the broods.

In Britain there are two well-known species of this genus or group, the Brown Ptarmigan or Red Grouse, and the Grey Ptarmigan. The former inhabits the heaths from the level of the sea to the height of two thousand feet or more; the latter is found on the sides and summits of hills that exceed that elevation, although in winter it occasionally descends lower. These species never perch on trees. They collect into flocks in autumn, separate towards the beginning of spring, and rear a single brood in the season. They are in much request as food, especially the Brown species, as well as for collections and as domestic ornaments when stuffed.

One of our native species becomes white in winter, excepting the tail-feathers, and two bands on the face; the other retains its colour in winter. In the former, the change is very gradual, and is effected by a substitution of white for coloured feathers, not by a change of colour in the same feather. In both species alike the moult is very gradual; and of neither have I ever examined a specimen at any season that did not exhibit old and new feathers.

LAGOPUS SCOTICUS. THE BROWN PTARMIGAN, OR RED GROUSE.

RED GAME. RED GROUSE. RED PTARMIGAN. MUIR-FOWL. MOOR-FOWL. MOOR-COCK, MOOR-HEN. GOR-COCK. COILEACH-FRAOICH, CEARC-FHRAOICH.

Tetrao Scoticus. Lath. Ind. Orn. II. 641.
Red Grouse. Mont. Orn. Dict.
Tetras Rouge. Tetrao Scoticus. Temm. Man. d'Orn. II. 450.
Red Grouse-Ptarmigan. Tetrao Scoticus. Selb. Illustr. I. 427.
Tetrao Scoticus. Red Ptarmigan. Jen. Brit. Vert. An. 170.

Of the adult male in winter the general colour of the plumage chestnut-brown, inclining to red on the neck, on the body variegated with black, on the breast blackish with many of the feathers tipped with white. Of the female in winter the general colour of the plumage yellowish-red, spotted and barred with black.

The male in summer chestnut-brown, minutely barred and spotted with black, the head and neck also barred, the breast darker and more obscurely barred. The female yellowish-red, spotted and barred with black, most of the feathers on the upper parts tipped with yellowish-white.

The Brown Ptarmigan, or Red Grouse, as it is usually named, although generally distributed in the heathy districts of this country, and abundant in our markets, has hitherto been very inaccurately described, as has also been the case with the Common or Grey Ptarmigan. The variations of colour exhibited by the latter species have been misunderstood and misrepresented; and, although the former does not change to white in winter, its variations are otherwise analogous. For this reason, at the risk of being thought tedious, I have determined to offer to the public a very full account of both.

MALE.—The well-known "Red Grouse" is a strong, full-bodied bird, having a short stout neck, a rather small head, broad rounded wings, a short tail, and legs of moderate length, which, with the toes, are feathered.

The bill is short, broader than high, a little curved; the upper mandible has the ridge indistinct and rounded, the sides convex, the edges inclinate, sharp, and overlapping, the tip broadish, rounded, and sharp-edged; the lower mandible considerably shorter, its back broadly convex, the edges inflected, the tip rounded. The upper mandible is internally concave, with a prominent central fleshy ridge; the lower with a deep groove and two prominent lines. The palate flat, with transverse series of papillæ, and anteriorly with four lines converging forwards. The œsophagus, Plate VI, Fig. 1, *a*, *b*, *c*, *d*, *e*, measured from the base of the tongue to the stomach, is six and a half inches long, its diameter about four-twelfths of an inch. Anterior to the furcula, it is expanded into a large membranous bag, of a depressed roundish form, *c*, *d*, *e*, three inches in diameter, its aperture about an inch in length. The proventricular portion, Fig. 3, *b*, is bulbiform, with a diameter of three-quarters of an inch. The mouth is abundantly supplied with a mucous fluid from the crypts in the angle of the lower jaw, on the sides of the tongue and at its base; the upper part of the œsophagus is also covered with crypts, as is the crop at its entrance only; the inner coat of the intra-thoracic portion is raised into longitudinal folds, and plentifully supplied with mucus; the proventricular glands, Fig. 4, *b*, are oblong, three-twelfths of an inch in length. The stomach, Fig. 3, *c*, *d*, *e*, *f*, *g*, is a powerful gizzard, of a roundish subrhomboidal form, an inch and ten-twelfths in its greatest diameter; its lateral muscles, *d*, *e*, extremely thick, their outer fibres converging to form a large tendon, *f*, on each side, under which are inserted the tendinous fibres of the lower muscle, *g*; and on the upper part is a slight pyloric sac, *c*. The middle coat, *g*, is thin and tough, and impressed with the rugæ of the inner, *h*, which is fibroso-cartilaginous, longitudinally rugous, the rugæ on the sides opposite the tendons, in the fundus, and in the cardiac sac, crossed by others. The intestine, Fig. 1, *g*, *h*, *i*, *j*, is forty inches long;

its diameter in the duodenal or upper portion is five-twelfths, and diminishes very little, so that at the cœca it is still four-twelfths. The rectum, Fig. 2, *b*, *c*, is of the same diameter at its upper part, and is but slightly enlarged below. It has a slight flap or valve at its commencement, and is separated in the same manner from the cloaca, which is about a quarter of an inch long. The cœca, Fig. 2, *c*, *d*, *e*, *f*, *g*, *h*, are twenty-nine and a half inches long, and are convoluted along the intestines for seven inches; their greatest diameter is half an inch, and for four inches at the base it is only three-twelfths. The inner coat of the intestine in its whole length is raised into minute undulations running in transverse series, and delicately villous. For two inches above the cœca it is covered with pretty large papillæ disposed in longitudinal series, the lower being larger and forming a transverse line or valve on the level of the orifices of the cœca, which open obliquely. The narrow part of the cœca is cellular, the rest marked with seven longitudinal rugæ, which are minutely villous. The inner surface of the rectum is covered with distinct mucous crypts, which pour out a large quantity of fluid, and is marked with several longitudinal rugæ.

The eyes are of moderate size; the eyelids feathered; over the upper is a semilunar papillate space, having its upper margin fringed and free; the length of this membrane is ten-twelfths, its height five-twelfths. The nostrils are oblong, in the fore part of the nasal membrane, and concealed by the small rounded feathers with which it is covered. The external aperture of the ear is roundish, three-twelfths in diameter, surrounded by a thick margin beset with feathers.

The legs are short and strong; the tarsus covered with feathers, as are the toes on their upper surface and sides. The first toe is extremely short, the third longest, the fourth a little longer than the second; all tuberculate and reticularly granulate beneath; the anterior webbed at the base, and having three conspicuous terminal scutella. The claws are rather long, arched, depressed, with sloping sides, thin edges, and obtuse tips. The number of scutella that may be clearly traced is on the several toes, three, five, nine, and six.

The plumage is full, compact, soft, with common lustre; the feathers all rounded, with a long downy plumule. Feathers of the nasal membrane short, stiffish; those of the head short; of the neck, back, and breast ovate and of ordinary length; the ventral loose and soft; the tarsal and digital downy, terminated by a bristly point; the middle tail-coverts as long as the tail-feathers. The wings are short, broad, rounded; the primary quills ten, narrow, tapering to a rounded point; the third and fourth longest, the fifth longer than the second, the first about the length of the seventh; secondary quills fifteen, broad, rounded with a slight acumen. Tail short, straight, slightly rounded, of sixteen broad, rounded feathers.

The bill is brownish-black; the iris hazel; the superciliary papillar membrane vermilion; the claws blackish-brown at the base, greyish-yellow at the end.

The general colour of the plumage is reddish-brown, approaching to chestnut, minutely barred with brownish-black. The head, breast, and sides are deep chestnut brown, the top of the head and the hind-neck irregularly transversely barred with brownish black, as are the breast and sides. The palpebral feathers, and a few on each side at the base of the lower mandible, are white. The middle of the breast is blackish-brown, the transverse bars of chestnut being much narrower than the black ones; some of the feathers are white at the end. The lower tail-coverts are chestnut, tipped with a bar of black and a terminal one of white. The lower surface of the wing is pure white. The upper parts are transversely and minutely barred with brownish-black, on a reddish-brown ground, most of the feathers also having a patch of black. The primary quills, the alula, and most of the secondaries, are chocolate brown, the outer margins of the latter minutely mottled with reddish-brown, and the inner five like the feathers of the back. The two middle tail-feathers are like their coverts, the next two slightly barred, the rest greyish-brown, darker towards the end, the tips freckled. The tibial feathers are greyish-brown, those of the tarsi light grey mottled with brown, of the toes pale grey.

The following are the principal dimensions of several individuals.

Length to end of tail	$16\frac{5}{8}$	16	$15\frac{1}{2}$	16	$15\frac{1}{4}$
Extent of wings	$25\frac{1}{2}$	26	28	28	27
Wing from flexure	$8\frac{1}{2}$	$8\frac{3}{4}$	$8\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$
Tail	$4\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{3}{4}$	$4\frac{3}{4}$
Bill along the ridge	$\frac{9}{12}$	$\frac{3}{4}$	$\frac{10}{12}$	$\frac{3}{4}$	$\frac{3}{4}$
Edge of lower mandible	1	1	$1\frac{1}{8}$	1	1
Tarsus	$1\frac{6}{8}$	$1\frac{3}{4}$	$1\frac{6}{8}$	$1\frac{1}{2}$	$1\frac{1}{2}$
First toe	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{3}{12}$	$\frac{3}{12}$	$\frac{2}{12}$
Claw of first toe	$\frac{4}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{4}{12}$	$\frac{4}{12}$
Second toe	$\frac{7}{8}$	$\frac{10}{12}$	$\frac{8}{12}$	$\frac{10}{12}$	$\frac{3}{4}$
Claw of second toe	$\frac{7}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{7}{12}$	$\frac{6}{12}$
Third toe	$1\frac{3}{12}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{3}{12}$	$1\frac{1}{4}$
Claw of third toe	$\frac{7\frac{1}{2}}{8}$	$\frac{8}{12}$	$\frac{3}{4}$	$\frac{8}{12}$	$\frac{7\frac{1}{2}}{12}$
Fourth toe	$\frac{10}{12}$	1	$\frac{10}{12}$	$\frac{11}{12}$	$\frac{10}{12}$
Claw of fourth toe	$\frac{1}{2}$	$\frac{7}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{7}{12}$

Female.—The adult female is considerably smaller, and of a somewhat less robust aspect, than the male. The supraocular membrane is smaller, being seven-twelfths of an inch long, four-twelfths in height, and of a less vivid red. The bill, claws, and iris, are as in the male. The ground-colour of the plumage is of a yellowish brown tint, or of a lighter red than that of the male. The dark transverse markings are broader and more distinct, and the undulations are fewer on the back. The quills are of a lighter brown, more tinged with grey; the secondaries more undulated, but duller. The four middle feathers of the tail are like the back; the rest all barred with reddish except towards the tips, which are yellowish-grey. The breast is dull brownish red, barred with brownish-black; the lower wing-coverts white, some of them brown, and others barred. The whitish marks on the eyelids, and near the base of the bill are duller.

Length to end of tail $15\frac{1}{4}$ inches; extent of wings $25\frac{1}{4}$; wing from flexure $8\frac{1}{4}$; tail $4\frac{1}{4}$; bill along the ridge $\frac{8}{12}$; tarsus $1\frac{3}{4}$; middle toe and claw 2.

Variations.—Scarcely two males can be found with precisely the same markings. In some individuals, the whole under parts are nearly black, together with a large portion of the back, while in others there is a good deal of white on the belly. Sometimes the axillaries and lower wing-coverts are pure white; but the latter are frequently spotted and barred with brown. The differences, however, are not such as to alter in any material degree the general appearance. Birds from particular districts frequently exhibit a great similarity, those from one place being much darker than those from another. Individuals more or less spotted or patched with white are sometimes met with. I have seen others of a pale greyish-yellow colour, faintly mottled with dusky.

As the above descriptions refer to the colours of the winter plumage, it is necessary to describe the appearance assumed in summer. The change is very gradual, and young feathers are found at all seasons.

Male in Summer.—The bill, claws, and supraocular space undergo no change. The ground colour of the plumage remains nearly the same, being only a little lighter; but the head and neck, which in winter were nearly pure chocolate, are barred all over with brownish-black, as are the breast and sides. On the upper parts the reddish tints are lighter, and the tips of most of the feathers are yellowish. The quills and tail-feathers remain the same.

Female in Summer.—The changes which the female undergoes are similar. The ground colour of all the parts, especially of the neck and head, assuming a much yellower tint, and most of the feathers being tipped with yellowish white. The differences are not easily described, but are very perceptible in individuals killed in September and October, when patches of winter plumage are contrasted with that of summer.

Habits.—The Brown Ptarmigan, generally known by the name of Red Grouse, as compared with the Black Grouse, inhabits the heaths of Great Britain and Ireland, to which countries it is peculiar, it never having been found in any other part of the globe. It is especially abundant in Scotland, where it

is met with on all kinds of surface, provided it be covered with heath, whether Calluna vulgaris or Erica cinerea, from the level of the sea to the height of about two thousand feet. The low sandy heaths of the eastern counties of the middle division appear to be less favourable to it than the more moist peaty tracts of the western and northern districts, where the shrubs on which it feeds attain a greater size. In the central and desolate regions of the Grampians it is equally abundant as on the moors of the Hebrides; and on the hilly ranges of the south, the Pentlands, the Lammermuir, and the mountains of Peebles, Dumfries, and Selkirk, it is still plentiful. Yet it seems almost marvellous that a species which furnishes sport to so many of the idle, and supplies with healthy exercise so many of the industrious and enterprising, should continue to exist in such quantities in the country.

It is impossible to study the manners and habits of this bird in continuity, owing to its peculiar mode of skulking and concealing itself among the heath; but a person who has for years traversed the moors, started hundreds of individuals at all seasons, engaged in the exciting sport of grouse-shooting, and obtained specimens in spring and summer as well as in winter, may, by bringing together the results of his observations, contrive to furnish a tolerably correct history of it.

It is pleasant to hear the bold challenge of the Gor-cock at early dawn on the wild moor remote from human habitation, where, however, few ornithologists have ever listened to it. I remember with delight the cheering influence of its cry on a cold morning in September, when, wet to the knees, and with a sprained ancle, I had passed the night in a peat bog, in the midst of the Grampians, between the sources of the Tummel and the Dee. Many years ago, when I was of opinion, as I still am, that there is little pleasure in passing through life dry shod and ever comfortable, I was returning to Aberdeen from a botanical excursion through the Hebrides and the south of Scotland. "At Blair Atholl I was directed to a road that leads over the hill, and which I was informed was much shorter than the highway. By it I proceeded until I reached Blair Lodge, where I obtained some refreshment, of which I stood greatly

in need. The good-woman very benevolently exerted herself to persuade me to remain all night, the hills being, as she said, bleak and dreary, entirely destitute of every thing that could afford pleasure to a traveller, and even without human habitation, the nearest house being fifteen miles north. It was now six o'clock, and I was certain of being benighted; but I had promised to be at the source of the Dee by noon of next day, and all the dragons of darkness could not have prevented me from at least striving to fulfil my engagement. They had never heard of the spring in question, nor even of the river; no Cairngorm could be seen; and a woman just arrived from the Spey informed me that I should be under the necessity of going through Badenoch before I could get to it. I placed more confidence in my travelling map. All however shook their heads when I disclosed my plan, which was to proceed eastward, cross a stream, get to the summit of a ridge of mountains, and so forth, until I should reach the first burn of the Dee, where I expected to meet my friend Craigie. It was sunset when I got to the top of the first hill, whence I struck directly east, judging by the place where the sun disappeared behind the rugged and desolate mountains. After traversing a mile of boggy heath, I found myself put out of my course by a long deep rocky valley or ravine, which I was obliged to double; and before I had accomplished this night fell. I travelled on however about two miles farther, and coming upon another but smaller valley, in which I was apprehensive of breaking my neck if I should venture through it, I sat down by a rock, weary, and covered with perspiration. Rest is pleasant, even in such a place as this; and when I had experienced a little of its sweets, I resolved to take up my abode there for the night. So, thrusting my stick into the peat between me and the ravine below, I extended myself on the ground, and presently fell into a reverie, reviewed my life, gave vent to the sorrow of my soul in a thousand reflections on the folly of my conduct, and ended with resolving to amend! Around me were the black masses of the granite hills rising to heaven like the giant barriers of an enchanted land; above, the cloudless sky, spangled with stars; beneath, a cold bed of wet turf; within, a human spirit tor-

tured with wild imaginings and the pangs of a sprained foot. 'In such a place, at such a time,' and in such a mood, what are the vanities of the world, the pomp of power, the pride of renown, and even the pleasures of bird-nesting! Having in a short time become keenly sensible that a great portion of vital heat had oozed out of me, I looked out for a warmer situation; but, alas, with little success; for although I pulled some stunted heath and white moss, with which I covered my feet, and laid me down by another crag that afforded more shelter, I could not sleep. After a while, having experienced a fit of shivering, I got up to gather more heath, with which I formed a sort of bed, and lay down again. But even heath was not to be obtained in sufficient quantity, so that for a covering I was obliged to bury myself in moss and turf, with the soil adhering. At long, long length, the sky began to brighten in what I supposed to be the north-east, and I was anxiously looking for the approach of morn, when gradually the pale unwelcome moon rose over a distant hill. It was piercing cold, and I perceived that a strolling naturalist, however fervid his temperament, could hardly, if scantily clad, feel comfortable even among moss, in a bog of the Grampians. What a blessing a jug of hot water would have been to such a stomach as mine, aching with emptiness, and nothing, not even tripe-de-roche, to be got to thrust into it. However, morning actually came at last, and I started up to renew my journey. It was now that I got a view of my lodging, which was an amphitheatre formed of bare craggy hills, covered with fragments of stone and white moss, and separated by patches of peat bog. Not a house was to be seen, nor a sheep, nor even a tree, nor so much as a blade of green grass. Not a vestige of life can be found here, thought I; but I was reproved by a cry that startled me. The scarlet crest and bright eye of a moor-cock were suddenly protruded from a tuft of heather, and I heard with delight the well-known *kok*, *kok*, of the 'blessed bird,' as the Highlanders call him. It was a good omen; the night and dulness had fled, and I limped along as cheerily as I could. My half frozen blood soon regained its proper temperature; ere long I reached the base of the rocky ridge, and after passing some hills, traversing a long valley, and ascending a

mountain of considerable height, I took out my map, and looking eastward below me, saw, to my great satisfaction, a rivulet running for several miles directly in the course marked. I was assured that this stream, whether the source or not, ran into the Dee, as it proceeded eastward; and therefore I directed my steps toward it. But here too a scene occurred which gave me great pleasure. Some low croaking sounds came from among the stones around me, and presently after a splendid flock of Grey Ptarmigans, about fifty in number, rose into the air, and whirred past me, on their way to the opposite eminence. On the brow of the hill I found two large fountains, the sources of the stream below, of each of which I drank a mouthful, and proceeded. My friend, however, was not to be seen; but it was too early; and so to pass the time I explored another of the sources of the rivulet, that rose farther up in the glen. But at length, the scene became too dreary to be endured:—desolate mountains, on whose rugged sides lay patches of snow that the summers' suns had failed to melt; wild glens, scantily covered with coarse grass, heath, and lichens; dark brown streams, gushing among crags and blocks, unenlivened even by a clump of stunted willows;—and I followed the rivulet, judging that it would lead to the river, and the river to the sea. For seven long miles I trudged along, faint enough, as you may suppose, having obtained no refreshment for eighteen hours, excepting two mouthfuls of cold water; so that even the multitudes of grouse that sprung up around me, ceased to give much pleasure, although I had never before started so many, even with a dog, in a space of equal extent. At one o'clock, however, I came to a hut, tenanted by a person named MacHardy, who, expressing his concern at my having been out all night, treated me to a glass of whisky, and some bread and milk. At this place, Dubrach, stood three half-blasted firs, and about a mile and a half farther down I came upon a wood, the first that I had seen since I left Blair. The silver Dee now rolled pleasantly along the wooded valley, and in the evening I reached Castleton of Braemar, where, while seated in the inn, at a little round table, reading Zimmerman on Solitude, which, to my great joy I had found there, and sipping my tea, I heard a

rap at the door. 'Come in,' said I;"—it was my best friend, with whom I spent a happy evening, in which, I believe, little mention was made of Ptarmigans, grey or brown.

The latter bird feeds for the most part upon the tops of heath, Calluna vulgaris and Erica cinerea, and also picks the leaves and tender twigs of Vaccinium Myrtillus, and Empetrum nigrum, with the young heads of Eriophorum vaginatum, shoots of Galium saxatile, carices, grasses, willows, and other plants. It is also said to eat the berries of Empetrum nigrum, Vaccinium Myrtillus, and Vaccinium Vitis-idæa. In two instances, I have found its crop filled with oat-seeds, to which it is said to be very partial, although it rarely ventures upon cultivated land. While feeding, it walks among the heath, selecting the fresh tips of the twigs, which it breaks off nearly of a size, the largest pieces not exceeding half an inch in length. Along with these substances, fragments of white quartz, from one to two twelfths of an inch in diameter, are found in the crop and gizzard, being introduced for the purpose of aiding the action of the latter in comminuting the food. The process of assimilation is performed in the same manner as has already been described in the history of the Black Grouse. When the Brown Ptarmigans have filled their crops, they repose among the heath, or bask on a sunny bank, under the shelter of the shrubs or tufts of herbage.

On ordinary occasions, this species does not fly much, but keeps concealed among the heath, seldom choosing to rise unless its enemy comes very near. On the approach of danger, it lies close to the ground, when, being of a colour not contrasting strongly with that of the plants around, it is with difficulty perceived by rapacious birds, among which its principal enemies are the Golden Eagle, the Peregrine Falcon, the Common Buzzard, and the Hen Harrier. The quadrupeds which occasionally prey upon it are the Polecat, the Pine Martin, the Fox, and, in the wilder districts, sometimes the Domestic Cat. When traced by a dog, it either runs to some distance, or squats at once, and often remains thus concealed for a long time, or again runs and squats. I have seen them run in this manner four

or five hundred yards before they were put up. On such occasions, the male is generally the first to rise. He erects himself among the heath, stretches out his neck, utters a loud cackle, and flies off, followed by the female and young, affording by their straightforward, heavy, though strong, flight, an easy mark to a good shot. Some persons scarcely ever see these birds when squatted, while others can discover them without much difficulty. To do this it requires a sharp eye and considerable experience. In the Hebrides, I generally succeeded in shooting them on the ground, which, unsportsmanlike, I preferred to the ordinary method; but when the heath is high and close, it is impossible to discover them among it. Young birds often allow a person to come within a few yards or even feet before they fly off, and even the old males, unless previously harassed, rise within shooting distance.

In a district where there is choice of situation, the Brown Ptarmigans prefer the slopes of hills not exceeding two thousand feet high; but they are to be found on the lowest and most level peat-bogs, especially if there are large tufts of heath surrounded by banks. Those which in summer and autumn reside on the heights, usually descend in winter; but even during that season, individuals may be found in their highest range, which is bounded less by actual elevation than by the disappearance or scantiness of heath. When there is frost, and the snow lies heavily, they may be traced without a dog by their footmarks, or seen at a distance; but the sport of following them is by no means so easy as to entice one who regards his comfort. In the island of Harris, having gone to the moors during a snow storm, without stockings, my shoes having been so contracted by a previous day's wetting that I could not get them on in the usual manner, I had my ancles so cut by the ice that they afterwards inflamed, ulcerated, and were more than two months in healing.

The Brown Ptarmigan generally flies low and heavily, moving its wings rapidly, with a whirring noise, and proceeding in a direct course without undulations. Occasionally, when at full speed, and especially when descending parallel to a decli-

vity, it sails at intervals, that is, proceeds for a short time with expanded and apparently motionless wings. Its flight is strong, and often protracted to a considerable distance.

When disturbed while feeding, the male often boldly starts up and utters a loud cackle, which may be imitated by quickly repeating the syllable *kok*, with a deep voice. In spring and summer they are often heard uttering the same sound without being disturbed, whether as a call of defiance to their fellows, or of warning or protection to their mates or young. Early in the morning, as well as late in the evening, but also occasionally through the day, you may hear on the moors a loud cry, which is easily syllabled into *go, go, go, go, go-back, go-back*, although the Celts naturally imagining the moor-cock to speak Gaelic, interpret it as signifying *co, co, co, co, mo-chlaidh, mo-chlaidh*—that is, *who, who* (goes there?) my sword, my sword!

Mr. William Hogg, Stobo-hope, Peebles-shire, has kindly furnished me with the following observations relative to this species. "The Common Grouse is a hardy fowl, peculiar, as every body knows, to tracts covered with heath; that generous shrub affording it by its thick bushy growth shelter from storms, and by its brown colour concealing it from its numerous enemies, while its tender shoots supply the principal part of its food. Although these birds feed upon the spontaneous produce of the moors, they eat corn to excess if it be growing in the neighbourhood of their haunts, as I have had an opportunity of knowing from my own observation. Sir James Montgomery sowed a field which had recently been taken in from their original range. I think they did not visit it until after it was cut; but then, every morning until it was carried home, when all was quiet, groups of them were busy on the stooks, eating voraciously of the ripe grain. One of the shooting parties told me that the fowls which were shot in the neighbourhood of the field, were the plumpest and fattest of any which they killed. The field was immediately laid out to grass, and I am certain that the fowls which escaped and remained never ate corn after, as they had never done before. During the time of their incubation, the Carrion Crow makes dreadful havock among their eggs, and young broods. However impro-

bable it may appear, I am certain they carry the eggs from a great distance to their young, and a nourishing treat they no doubt are to them. No creature can be more diligent for the attainment of any object than these merciless plunderers are for the discovery of the moor-fowls' nests. They watch and listen on the heaths all the time the Grouse are hatching; for you must know that every now and then, especially about the time when the young perforate the shells, there is a tender or motherly chuckle emitted by the hen. This sound is a signal for a search near the place from whence the sound proceeded. Another leads them to the very point, when a desperate battle ensues. But two moor-fowls are not a match for a single crow, especially when stung with hunger herself, or when she knows her own young are clamorous at home for food; and when she gets the mastery, the scene is truly pitiable. The embryos swimming in their native fluid are torn out of the shells, and swallowed at a single gobble by the greedy hoddy, or carried off to her young. I have often relieved the poor moor-fowl, though I knew it was only to prolong her sufferings. The Carrion Crow no doubt persecutes and destroys the young grouse until grown, but when the latter gets fairly to the wing, it is no longer in danger. The Grouse sit very close among the heath in a den rounded by art, in which they certainly continue a long time, for often there will be a dozen of separate pieces of their excrement left, sometimes many more. When snow storms are on the hills, they congregate to the number of sixty or a hundred in a flock, but disperse as soon as the snow melts away. They live in great terror of the Goshawk (Peregrine Falcon), and indeed he is their most deadly enemy, scarcely living on anything else, and seldom missing his quarry after fixing on it. He either trusses it in the air, or drives it to the ground, and then kills it. I once saw this strong hawk carrying what I took to be a moor-fowl in his talons. A wing of the dead bird was hanging down. Some ravens and two or three hawks were diving at him in the air. Annoyed by them, he allowed the grouse to slip out of his grasp; but it had not descended many yards, when he dived after it with great rapidity, trussed it again far from the ground, and flew off with it. I have often

seen this hawk carrying a fowl through the air, holding it in its talons close up to the body."

The Brown Ptarmigan pairs early in spring. The male is not polygamous, as some assert, nor does he at any time desert his mate. When incubation is over, and the young run about, they are tended by both parents, the female manifesting great anxiety for their safety, and feigning lameness to induce a person who has approached them to follow her. Sometimes she falls a sacrifice to her solicitude, for I have known instances of herds and other persons killing her with a stick under such circumstances. When surprised on the nest, she flies with a low undecided flight to a short distance, and runs off among the heath. The young are soon able to fly, and the flock keeps together until the end of autumn, unless thinned and scattered by sportsmen and vagabonds. Towards the beginning of winter several flocks often unite and keep together, forming what are called packs. They are then generally more shy, and continue so until the beginning of spring, when they separate and pair, without manifesting any remarkable animosity, for although the cocks may occasionally fight, they have not those regular periodical battles described by authors as enacted by many species of the Grouse genus.

The diversion which "grouse-shooting" affords is well known, few persons residing in districts where the Brown Ptarmigan abounds not having to some extent engaged in it, in despite of game laws and other impediments. In my opinion, it is a pitiful and barbarous sport, as pursued by a regularly equipped and legally qualified slaughterer, who, even without the labour of charging his gun, still less of carrying home the produce of his idle industry, destroys as much game in one day as might serve for a dozen. But in a district where the birds are not very numerous, and where, to procure half-a-dozen braces, one is obliged to traverse a large extent of ground, he cannot fail to find enjoyment, who, starting early with his dog, accompanied by a friend, travels over mountain and moor, inhaling the balmy air of the heathery hills, and renovating his spirits by vigorous exercise, until the declining sun warns him to retrace his course, and he returns to his home, where the comforts of

social enjoyment are prepared for him. The pleasure experienced by the young sportsman, who, after much blundering perhaps, returns from a day's long excursion, with two or three braces of ptarmigan, and as many plovers, is scarcely attainable by the experienced wholesale slaughterer. Indeed, it is neither the quantity nor the quality of the game that affords pleasure; for I have been as much delighted with obtaining half-a-dozen thrushes, two or three water-ouzels, or a few wagtails, as an entire burden of large birds, such as rock pigeons, grouse, or wild geese.

The nest of the Brown Ptarmigan is found in the midst of the heath, in a shallow cavity, and formed of bits of twigs, grass, and sometimes a few of its own feathers, irregularly put together. The eggs are from eight to twelve, or even more, generally an inch and seven-twelfths in length, an inch and three-twelfths across, of a regular oval form, yellowish-white, pale yellowish-grey, or brownish-yellow, thickly clouded, blotched, and dotted with blackish and umber-brown. The young leave the nest soon after they are freed from the shell.

Young.—At first the young are covered with a fine close down of a pale greyish-yellow tint, mottled beneath with pale brown, patched above with deep brown, the top of the head chestnut, margined with darker brown. When about a month old, they are as follows:—The bill is brownish-black, the tip of the upper mandible whitish; the irides dark; the claws pale brown; the superciliary membrane pale red. The general colour of the upper parts is brownish-black, each feather edged and barred with yellowish-red; the outer webs of the quills and the tail pale greyish-brown irregularly edged and barred with pale reddish-yellow. The throat and fore-part and sides of the upper portion of the neck still downy, and greyish-yellow. The lower parts are yellowish-grey, barred with brownish-black; the tarsi yellowish-grey.

Young birds of both sexes, when fully fledged, are somewhat similar to the adult female, having the head and neck of a pale yellowish-red, barred with blackish-brown; the upper parts mottled and barred with brownish-black and pale yellow,

most of the feathers having a small whitish spot at the tip. The quills are greyish-brown, barred with greyish-yellow, as are the tail-feathers, which are tipped with whitish. The lower parts are paler. The eyelids and angles of the mouth are not marked with white.

Progress toward Maturity.—When the first moult is completed, which does not happen until the middle of winter, it being very gradual, the males are nearly as described in their adult winter plumage; but the head and upper part of the neck, which in old birds are nearly free of spots, are barred and spotted all over; the lower parts are mostly brownish-black, tinged with grey, and many of the feathers largely tipped with white; the legs brown, the tarsi and toes grey. The female has most of the feathers tipped with whitish, is of a lighter or more yellow colour than the adult, and has all the tail-feathers more or less barred. In very old males, the neck is pure chestnut, without spots. The summer plumage is lighter, and more mottled with yellow and whitish than that of winter.

Remarks.—This species, as has already been observed, is peculiar to the British islands, and is the only one of the Ptarmigan or lagopede group that does not become white in winter. At the same time, it is in all other essential respects precisely similar to the Willow Ptarmigan, Lagopus saliceti, of the north of Europe and America, which is the species that comes nearest to it, but which is easily distinguished by its larger bill, and by having its summer plumage of a light red colour, but with the quills, wing-coverts, and some other parts white. Next to Lagopus saliceti, the nearest species is the Grey Ptarmigan, which also occurs in Britain, and will presently be described.

The Brown Ptarmigan is capable of living in a state of domestication, and then feeds on grain, bread, potatoes, and other substances, although it always prefers its natural food. A few instances have been known of its breeding in captivity; but, from its habits, it does not seem probable that it could be trained in subjection, like the domestic fowl.

In the more remote parts of Scotland, it is considered a bird of good omen. By its crowing at dawn, the evil spirits of night are put to flight, or deprived of their power. But the poetry of superstition is gradually giving place to the prosaic sentiments of philosophy; and the highland lairds are so intent on making gain of their Grouse and Ptarmigan, that one might apprehend their total extinction in many districts at no distant period. Indeed, judging merely from the quantity seen in the markets of our principal towns, the number killed every year must be prodigious.

As an article of food, the Brown Ptarmigan is highly esteemed. The flesh is very dark-coloured, and has a peculiar somewhat bitter taste, which by some is considered as extremely pleasant, while others affect to relish it because it is fashionable to do so.

I have only to add, that a reason may here be assigned for altering the common name of this bird. The English name of Tetrao being Grouse, and that of Lagopus being Ptarmigan, it is obviously improper to bestow the appellation of Red Grouse on a species of the latter genus. But, it may be said, the distinctive "Red" ought to be retained. I think not. Lagopus saliceti is more properly red, Lagopus scoticus is more brown than red, Lagopus cinereus is grey in autumn, Lagopus rupestris yellow in summer, and Lagopus leucurus has a white tail, in which respect it differs from all the rest. Therefore I name these birds:—Lagopus saliceti, *Red Ptarmigan;* L. scoticus, *Brown Ptarmigan;* L. cinereus, *Grey Ptarmigan;* L. rupestris, *Yellow* or *Rock Ptarmigan;* and L. leucurus, *White-tailed Ptarmigan.* At the sametime, I am very doubtful respecting the existence of Lagopus rupestris as a species distinct from L. cinereus.

LAGOPUS CINEREUS. THE GREY PTARMIGAN.

PTARMIGAN. WHITE GAME. WHITE GROUSE. GREY PTARMIGAN. ROCK GROUSE. AN TARMACHAN.

Tetrao Lagopus. Linn. Syst. Nat. I. 274.
Tetrao Lagopus. Lath. Ind. Orn. II. 639.
Ptarmigan. Mont. Ornith. Dict.
Tetras Ptarmigan. Tetrao Lagopus. Temm. Man. d'Orn. II. 468.
Common Ptarmigan. Lagopus mutus. Selb. Illustr. I. 430.
Tetrao Lagopus. Common Ptarmigan. Jen. Brit. Vert. An. 170.

The male in winter white, with a black band from the bill to the eye, the tail-feathers greyish-black, based and tipped with white, the shafts of the primaries brown. Female in winter white, the feathers between the bill and the eye black at the base only, the tail-feathers brownish-black, based and tipped with white, the shafts of the primaries brown.

In spring, both sexes white, mottled with dark-grey and yellow feathers, which are barred with black; the wings, lower parts, and tail as in winter.

In summer the head, neck, upper parts and sides spotted and barred with yellow and brownish-black; the wings, lower parts, and tail as in winter.

In autumn, the plumage of the upper parts and sides finely barred with greyish-white and greyish-black; the head, neck, and sides retaining the yellow summer feathers longest; the wings, lower parts, and tail as in winter.

Young, spotted and barred with yellow and dark brown; wings white, the shafts of the primaries dusky; tail brownish-black, the middle feathers barred with yellow and dark-grey.

The Grey Ptarmigan resembles the Brown, as well as the Red, in external form and proportions, the body being full, the

wings rather short and broad, the neck of moderate length and rather slender, the head small and oblong, the feet short and rather strong. As this bird has never been described with sufficient accuracy, and as in its summer plumage it has been represented, and indeed generally admitted, as a species distinct from itself in autumn, I shall present a very detailed account of it, and trace the changes in its plumage, beginning with its full winter dress. In the first place then, I shall describe the species as represented by a male and a female shot in Sutherland in the end of December 1835, and received by me in the beginning of the following month. In this, as in every other instance, unless it be particularly stated to the contrary, I describe only entire birds, not skins.

Male in Winter.—The bill is short and strong; the upper mandible straight and slightly declinate to the nostrils, then arcuato-declinate, the ridge convex, the sides convex towards the end, the edges straight, and ascending to beyond the nostrils, where they are much inflected, then declinato-incurvate, sharp and overlapping, the tip compressed, rounded, and thin-edged; the lower mandible with the angle broad and rounded, the dorsal outline straight, the back broad and convex, the sides nearly erect and convex, the edges arched, thin, erect, the tip rounded.

The upper mandible is concave within, the lower deeply concave, with a central and two lateral grooves, separated by two ridges. The aperture of the posterior nares is oblong behind, linear before, with papillate edges. The tongue is short, broad, triangular, acute, notched and papillate behind. The mouth is narrow, measuring seven-twelfths of an inch across. The œsophagus is six inches and a quarter in length. It lies, as usual, to the right of the trachea, which passes at first directly along the middle of the neck, and at three and a half inches from the top opens by an aperture one inch long into the crop, which is a membranous sac capable of being dilated to the diameter of about three inches. The general diameter of the œsophagus is about three and a half twelfths; the proventricular portion is bulbiform, with a diameter of five-twelfths;

its glandules ovato-oblong, about two-twelfths long, with a narrow aperture. The stomach is a powerful gizzard of a roundish sublobate form. Its upper part is muscular, with transverse fibres, and forms a large lobe on the right side, from the lower part of which comes off the intestine. The lateral muscles are transverse, extremely thick, their outer fibres converging to form a large tendon on each side. The lower muscle is moderately strong, its tendinous fibres inserted under the lateral tendons. The strong dark-red muscular fibres of the large muscles pass across from the one tendon to the other, and are also inserted into the whole outer surface of the middle thick subcartilaginous coat, within which is the cuticular, thickened, with longitudinal rugæ opposite the bellies of the lateral muscles; the rugæ crossed by others on the sides opposite the tendons, the fundus, and the cardiac sac. The intestine is forty-seven inches long; a little below the pylorus enlarges to four-twelfths of an inch in diameter; six inches farther is only three-twelfths, continues varying from four to three twelfths, but enlarges a little towards the cœca. The rectum is five inches long, uniformly cylindrical, three-twelfths in diameter. The cœca are twenty-nine inches long; for four inches their diameter is about three-twelfths; they then gradually enlarge to eight-twelfths, and so continue to the end; the extremity a little narrowed, with a small mammilliform tip. The inner coat of the intestine is villous, with minute undulations in transverse series; for two inches above the cœca, it is covered with flattened papillæ, some of which are nearly one-twelfth long, disposed in longitudinal series, the lower larger, and forming a transverse flap or valve. The rectum is even and papillate within; the cœca are villous; in the whole extent of their dilated part, the inner coat is raised into from five to seven longitudinal white prominent lines.

The eyes are of moderate size; the eyelids feathered; over the upper is a semilunar papillate space, having its upper margin fringed and free. The nostrils are elliptical, two and a half twelfths long, margined and concealed by short feathers. The aperture of the ear is circular, two and a half twelfths in diameter, with a thick margin.

The legs are short and strong; the tarsus feathered, as are the toes on their upper part and sides, but not beneath as in Lagopus saliceti. The first toe is very short and elevated, the third much longer than the second, which is about the same length as the fourth. The anterior toes are webbed at the base, and have three terminal scutella; the hind toe has two series of scales or dimidiate scutella. The claws are rather long, arched, depressed, their sides sloping, the ridge narrow, the edges thin, the tip obtuse; that of the hind toe smaller and more curved.

The plumage is full, close, compact, imbricated. The feathers at the base of the bill are very small and slender; those on the head small and oblong. On the other parts of the body they are oblong, more than half downy, the plumule nearly as long, the tube short, subcylindrical, enlarged at the base. On the hypochondrial spaces and abdomen, the feathers are entirely downy. The wings are short, broad, and much rounded; the primary quills ten, decurved, narrow, rounded, the first six cut out from near the base, the fourth longest, the third little shorter, the second and fifth a little shorter, and nearly equal, the first two inches shorter than the fourth, and a little longer than the seventh. Secondary quills fifteen, decurved, slightly incurved, and rounded. Tail short, broad, slightly rounded, and retuse, of sixteen feathers, the two middle ones situated above the line of the rest. The tibiæ, tarsi, and toes are covered with feathers having disunited hair-like filaments; those on the tarsi and toes are shorter, with stiff shafts, and much worn behind.

The bill is blackish-brown; the supraocular membrane scarlet; the iris brown; the claws dark-brown, with horn-coloured edges and tips.

The general colour of the plumage is pure white. The feathers at the base of the bill, and between it and the eye, as well as a few behind it, are black. The tail-feathers are greyish-black, with a narrow terminal edging of white, that on the two middle feathers much larger; all the tail-feathers have more or less white at the base, and their shafts are of the same colour there, but in the rest of their extent black;

the two middle feathers are mottled with grey on part of their inner webs. The tail-coverts are white, and the two middle ones so long as almost to equal the two middle tail-feathers. The shafts of all the primary quills are dark-brown, excepting at the base. Some coloured feathers are interspersed among the rest, more especially on the neck and wings. Of these feathers those on the upper part of the neck are transversely barred with pale yellow and blackish-grey; the rest are brownish-grey minutely and undulatingly barred with blackish-grey. These coloured feathers have the extremity white; some have a coloured patch on one web only, others on both; on some the patches are very small, on others very large; but in all, the line of separation between the coloured and white part is distinct and abrupt, shewing that no gradual fading has taken place. The downy base of the feathers is more or less grey on all parts of the body.

Length to end of tail $15\frac{1}{2}$ inches; extent of wings 25; wing from flexure 8; tail $4\frac{3}{4}$; bill along the back $9\frac{1}{2}$ twelfths, along the edge of lower mandible $10\frac{1}{2}$ twelfths; tarsus $1\frac{1}{2}$; first toe $\frac{2}{12}$, its claw $4\frac{1}{2}$ twelfths; second toe $\frac{8}{12}$, its claw $6\frac{1}{2}$ twelfths; third toe 1, its claw $7\frac{1}{4}$ twelfths; fourth toe $8\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$.

Another individual examined several years ago at the same season, had the bill brownish-black, the claws dark-brown at the base, lighter towards the end; the supraocular membrane vermilion. The general colour of the plumage pure white; a broad line from the bill to the eye, and a shorter one beyond it, black; tail-feathers brownish black, the tips white, of the two middle to a larger extent; shafts of primaries deep brown. Length $15\frac{1}{2}$ inches; extent of wings 28; bill $\frac{9}{12}$; tarsus $1\frac{3}{8}$; middle toe and claw $1\frac{3}{4}$.

In many individuals I have found one of the upper middle tail-feathers white, the other partially so; in some others both the middle tail-feathers were entirely white.

Female in Winter.—The female is similar to the male, with slight differences. The general colour of the plumage is white. The bases of the feathers before the eyes are black, and those

of many on the head and neck are broadly barred with yellow and blackish-grey. The shafts of the primary quills are blackish-brown, and some small spots of the same are sprinkled on the webs in their vicinity. The tail-feathers are brownish-black, their tips white, their bases more or less mottled with white; the two middle feathers variegated with yellow disposed in transverse undulating bands on a deep brown ground.

The œsophagus is six inches long, its average diameter three-twelfths; the proventriculus bulbiform, its greatest diameter five-twelfths. The crop when dilated has a diameter of about three inches. The gizzard is an inch and ten-twelfths long, an inch and two-twelfths in breadth; one inch in thickness. The intestine is forty-two and a half inches long; the rectum being five and a half. The average diameter of the duodenal part of the intestine is five-twelfths; its smallest diameter near the cœca, one-fourth. The cœca, which are twenty-eight inches long, are about a fourth of an inch in diameter at their commencement, but in the rest of their extent eight-twelfths. They are marked internally with seven longitudinal rugæ or prominent lines. Internally the intestine is villous and even; but, about two inches above the cœca, covered with short flattened prominences. The rectum in its upper part is glandular, and its surface abundantly covered with mucus.

Length to end of tail $14\frac{3}{4}$ inches; extent of wings 23; wing from flexure $7\frac{1}{2}$; tail $4\frac{1}{2}$; bill along the back $\frac{3}{4}$, along the edge of lower mandible $\frac{9}{12}$; tarsus $1\frac{1}{2}$; first toe $\frac{2}{12}$, its claw $4\frac{1}{2}$ twelfths; second toe $\frac{8}{12}$, its claw $\frac{8}{12}$; third toe 1, its claw $7\frac{1}{2}$ twelfths; fourth toe $\frac{8}{12}$, its claw $\frac{5}{12}$.

Two remarkably beautiful females from Banffshire, examined on the 16th December, had the plumage white, most delicately tinted with rose-colour. In one, a few of the scapulars had some irregular dark marks; but the loral space was pure white. The shafts of the primary quills brown; the tail-feathers white at the base for one-third of their length, the rest of their extent black, excepting the tips, which were white; the two middle feathers minutely undulated and dotted with grey and reddish-brown.

In the other the colour was similar, but there were a few

black feathers on the loral space; the tail black, tipped with white, its basal third white, the two middle feathers entirely white. The bill of both black, the claws greyish-brown, the supraocular membrane very pale red.

Length to end of tail.....	of first	$14\frac{1}{2}$	of second	$14\frac{1}{2}$
Extent of wings.....	"	24	"	25
Wing from flexure.....	"	$7\frac{1}{12}$	"	$7\frac{7}{12}$
Tail.....	"	4	"	$4\frac{1}{12}$
Bill along the back.....	"	$\frac{7}{12}$	"	$\frac{7}{12}$
Tarsus.....	"	$1\frac{1}{2}$	"	$1\frac{1}{2}$
Middle toe and claw.....	"	$1\frac{1}{2}$	"	$1\frac{1}{2}$
Œsophagus.....	"	$6\frac{1}{2}$	"	$6\frac{1}{2}$
Stomach	"	$1\frac{8}{12}$	"	$1\frac{6}{12}$
Intestine.....	"	45	"	44
Rectum,.....	"	4	"	4
Cœca,.....	"	22	"	20

I never before observed the delicate and most beautiful blush so remarkable in these two birds, and resembling that of the lower parts of some Gulls and Terns, but it is probable that it occurs more or less in all individuals in their pure winter plumage. The soles are always bare, by which character this species is easily distinguished from Lagopus saliceti.

The winter plumage continues white until the middle of spring, when the head and neck first begin to assume the summer markings, that is, to be covered with feathers banded with yellow and black; and blackish feathers barred with greyish-white appear on the back. In the beginning of April, the bird is in what may be called its spring plumage. A specimen shot in Argyllshire about the 10th of April, and examined in Edinburgh on the 15th of that month, 1827, was as follows:—

Male in Spring.—The bill is brownish-black; the iris brown; the supraocular membrane vermilion; the claws brownish-black, pale towards the end. The breast, excepting its fore part, the belly, the sides, the quills, the wing-coverts, the lower tail-coverts, the feathers of the throat, cheeks, and forehead, pure

white. The feathers of the head and neck have alternate broader bands of brownish-black and narrower bands of reddish-yellow, and are slightly tipped with white. The lower part of the fore-neck, the upper part of the breast, and the sides, are deep brownish-black, with a few interrupted narrow irregular bars of reddish-yellow, and a white spot on the tip. The feathers of the back are irregularly and narrowly barred with brownish-black and reddish-yellow, their tips white. Some of them, however, have bluish-grey in place of yellow. The primaries and first alular quill have the shaft brownish-black, with a small portion of the webs on either side at the tip. The tail-feathers are brownish-black, excepting the two shorter central or superior, which are white.

Length 14½; extent of wings 26; wing from flexure 8; bill ⅝; tarsus 1⅜; middle toe and claw 1⅜.

Female in Spring.—The female is similar, the only remarkable difference being that the two middle tail-feathers are barred with yellow and black.

Length 14 inches; extent of wings 25.

Male in Summer.—A specimen examined in the end of May had the same parts white as described above. The head and neck were broadly barred with yellow and brownish-black; the upper parts, including the scapulars, some of the inner primaries and their coverts, minutely and undulatingly barred with the same colours; some of the feathers, however, barred with greyish-white in place of yellow. The two middle tail-feathers like the back, the rest brownish-black. The summer bars are much broader than those of autumn.

Female in Summer.—The female differed in nothing remarkable.

Male in Autumn.—The black and yellow summer plumage gradually disappears, and is substituted by mottled grey, as the autumn advances. In September the appearance is as follows:—The bill brownish-black; the iris brown; the supra-

ocular membrane vermilion; the claws dark brown at the base, yellowish-brown towards the end. The feathers of the head, and many of those of the neck and sides, are the same as in summer; but on the neck are numerous feathers barred with white and brownish-black. Those on the back and sides are for the most part minutely undulated with greyish-white and black, some of them having considerable patches of the latter in the central parts. The greater part of the breast, the abdomen, the legs, the quills excepting some of the inner, the primary and some of the secondary coverts, are white; the shafts of the primary quills dark brown. The tail-feathers are brownish-black, tipped with white, and by this time the two central feathers are often white.

Length to end of tail 15 inches; extent of wings 24; wing from flexure 8; tail $4\frac{1}{2}$; bill along the back $8\frac{1}{2}$ twelfths; along the edge $10\frac{1}{2}$ twelfths; tarsus $1\frac{4}{12}$; first toe $\frac{2}{12}$, its claw $\frac{4}{12}$; second toe $\frac{8}{12}$, its claw $\frac{7}{12}$; third toe 1, its claw $7\frac{1}{2}$ twelfths; fourth toe $8\frac{1}{2}$ twelfths, its claw $5\frac{1}{2}$ twelfths.

Female in Autumn.—The female differs in no essential respects from the male.

As the season advances, the yellow feathers gradually disappear, and the grey ones become substituted by others of a white colour. The white is first established on the flanks and wings, then on the neck, and finally on the back and rump. In a male examined on the 21st October 1831, the parts which still retained the autumnal plumage were the head, the neck, the whole of the back and rump, and part of the hypochondria. The wing-coverts, the breast, belly, lower tail-coverts and legs, white. The tail-feathers brownish-black tipped with white, the two middle ones white. The general tint of the mottled plumage very light bluish-grey, sprinkled and undulated with brownish-black, many of the feathers more or less tinged with reddish-yellow; those of the upper part of the head reddish-yellow, mottled with black and white.

Length 15 inches, extent of wings 26; bill along the back $\frac{5}{8}$, along the edge of lower mandible $\frac{9}{10}$; tarsus $1\frac{1}{2}$, middle toe and claw $1\frac{1}{2}$.

When much mottled with white the bird has a singular appearance, although it is not then nearly so beautiful as in the grey plumage of September and the beginning of October.

It appears to me that the moult takes place in the following manner: The quills and tail feathers are changed only once in the year, new ones beginning to appear about the middle of summer, and the growth of all being generally completed by the end of October. The middle tail-feathers are later than the rest. The smaller feathers are changed four times every year; for white in winter are substituted dark grey, and black on the greater part of the body, yellow and black on the head in spring; for these, yellow and black feathers in summer; then white and black, or the grey plumage, in autumn; and lastly pure white, completed by the end of December, and continuing until the beginning of spring. But at no period are the colours characteristic of the seasons to be found pure, excepting occasionally for a short time in winter, although even then it is very rare to find an individual without some coloured feathers interspersed among the white. The Grey Ptarmigan thus undergoes a perpetual moult, but so partial and gradual, that no part is ever denuded. The feet are not so thickly clothed in winter as some represent them; nor are they more so at any period than those of the Brown Ptarmigan or Red Grouse. The case, however, is different with the Willow or Red Ptarmigan, which has even the soles most densely covered in winter with bushy feathers. The notion of the coloured plumage of summer and autumn being changed to white, not by a substitution of feathers, but by a bleaching of those existing, is certainly untenable, not being in the least degree countenanced either by the appearances presented during the progress of change, or by analogy. Most of the white feathers that gradually spring up towards winter are found to be white to the base, even while still partially enclosed in their sheaths. The action of cold, then, in changing to white previously formed coloured feathers, does not apply to them; although it is very probable that cold produces the effect. Possibly the reason why birds inhabiting equally cold regions, do not become white in winter, is that they do not moult like the

Ptarmigan at that season; and it would be curious to try the effect of plucking the feathers of a bird, such as the Raven, and exposing it to cold while they were growing again. Moreover those feathers in the Ptarmigan which, springing in winter, are partially coloured, are found to have their coloured part, which is generally basal, defined by an abrupt line, usually darker even than the rest, which would not be the case were the cold gradually to whiten the coloured feathers. Still less can the alleged cause account for those feathers which in October are found having their basal half white, and their terminal half coloured.

Variations.—The changes which the plumage undergoes have already been detailed, so that it only remains here to be mentioned that adult individuals in all the stages of their coloured feathering differ considerably from each other, some being very finely banded or dotted, others more strongly, and some even patched or spotted with black. The oldest individuals, I believe, have the finest markings, and those which are of the lightest grey in autumn are probably older than those much tinged at that season with yellow or black. As to size, individuals differ greatly, as will readily be believed by those who have compared the variations of any well-known species, the Magpie or Blackbird for example, in that respect. The shortest male that I have measured was 13½ inches long, the longest 15½. But as the feathers of the tail are not fully developed until winter, measurements ought to be taken, for comparison with other species, real or supposed, at that season only.

Habits.—The Grey Ptarmigan inhabits the bare and weather-beaten summits of the higher mountains of the middle and northern divisions of Scotland. It is stated to have occurred formerly in Wales and the north of England; but there is no evidence that it has been seen there within the last forty years; and even in the transition range of the south of Scotland, many of the mountains of which, being more than two thousand feet high, seem well adapted for it, no individuals are ever met

with. I have frequently chased it on Ronaval and other mountains, in Harris; and it is said to occur on Eachdla in South Uist, on the Park and Uig hills in Lewis, on the Cuillin and Strath mountains in Skye, as well as in Mull and Jura. On all the elevated summits of the north of Scotland it is not uncommon; and on most of those of the Grampians, but especially the great granitic and slaty masses from which issue the sources of the Dee, the Spey, and the Tay, it may be said to be even abundant. Great numbers are annually killed, but as the haunts of this Ptarmigan are not so easily accessible as those of the brown species, it is not at all likely to be exterminated.

To observe the manners of this interesting bird, let the student betake himself to Castleton in Braemar, whence he is ready to start early on a fine autumnal day;—or if he is unwilling to ascend one of those distant masses of rock, let him accompany me in idea, which is by far the most comfortable mode of travelling. Fording the Dee above the entrance of the stream which passes the village, one day in September 1820, I lingered a while on a small island, to gather the berries of Rubus saxatilis, which I found to be of a somewhat acid taste, and rather agreeable. On reaching the bank, I obtained a fine view of the valley of the Dee, with its ancient castle, its cultivated patches, its scattered habitations, its beautiful river, and its rounded hills covered with pine and birch. In one of these woods I started a small covey of Black Grouse, which at the time, being a novice, I mistook for the Capercailzie, and proceeding northward, came to a deep ravine or "den," in which were some native trees of Pyrus aucuparia, Populus tremula, and Betula alba. Following this stream for several miles up a heathy valley, I entered a decayed forest of white birch. Few objects present a more melancholy picture of the ruin of a primeval world than those blasted trunks, some prostrate and crumbling into fragments, others scattered along the hills like an army of giants, suddenly scathed by the wrath of heaven. On emerging from among those ruins, I amused myself for a while with picking the berries of Vaccinium Myrtillus, Vaccinium Vitis-idæa, and Empetrum nigrum, the latter of which were much larger than they are usually found in the lower districts. But

now, having reached the head of this long dull valley, I beheld straight before me the great mountain which had attracted my attention the day before, and to ascend which was the object of my present excursion. Crossing a small stream, by which grew in abundance Gnaphalium supinum, Galium saxatile, and the beautiful though very common Digitalis purpurea, I sat down to consider what might be the best route, and reconnoitre the face of the huge rounded mass, which I divided into three portions:—first, a plain or platform, rising gently at the farther end, and forming a pretty steep acclivity, terminating about a third up; secondly, the middle part, consisting of fragments of rock, stones, and gravel, intermixed with a little vegetation; thirdly, the remaining part, three or four hundred feet high, similar to the last, but more sterile. If one traces his proposed route in this manner, he finds it in general easy enough to ascend a hill without a guide, whereas if he proceeds at random, he is very liable to become involved among difficulties. Hitherto the sky had been clear, but now clouds began to gather around the summits of the mountains, although that before me was still unshrouded. As I ascended, I saw to the west the remains of a natural forest of pine, scattered along the sides of a valley, and on entering the second region, found the heath and other plants greatly diminished in size, while various species occurred that indicated an approach to what in botany is called an alpine station. Near the summit of a projecting mass of rock, in this region, I sat down among the crumbling blocks of granite to compare the Aira flexuosa, which grew in tufts, with its characters in Smith's Compendium; and when I rose, a large covey of Ptarmigans sprung from among the stones about a hundred and fifty yards beneath me.

These beautiful birds while feeding, run and walk among the weather-beaten and lichen-crusted fragments of rock, from which it is very difficult to distinguish them when they remain motionless, as they invariably do should a person be in sight. Indeed, unless you are directed to a particular spot by their strange low croaking cry, which has been compared to the harsh scream of the missel-thrush, but which seems to me much more like the

cry of a frog, you may pass through a flock of ptarmigans without observing a single individual, although some of them may not be ten yards distant. When squatted, however, they utter no sound, their object being to conceal themselves; and if you discover the one from which the cry has proceeded, you generally find him on the top of a stone, ready to spring off the moment you shew an indication of hostility. If you throw a stone at him, he rises, utters his call, and is immediately joined by all the individuals around, which, to your surprise, if it be your first rencontre, you see spring up one by one from the bare ground. They generally fly off in a loose body, with a direct and moderately rapid flight, resembling, but lighter than, that of the Brown Ptarmigan, and settle on a distant part of the mountain, or betake themselves to one of the neighbouring summits, perhaps more than a mile distant.

On reaching the top of the hill, near which I observed a solitary specimen, still in flower, of Statice Armeria, I found it to be a long, broad, rounded ridge, covered with stones, gradually sloping to the west, but on the eastern side suddenly terminated by a magnificent precipice, several hundred feet high, and at least half a mile in length. The scene that now presented itself to my view was the most splendid that I had then seen. All around rose mountains beyond mountains, whose granitic ridges, rugged and tempest-beaten, furrowed by deep ravines worn by the torrents, gradually became dimmer as they receded, until at length on the verge of the horizon they were blended with the clouds, or stood abrupt against the clear sky. A solemn stillness pervaded all nature; no living creature was to be seen; the dusky wreaths of vapour rolled majestically over the dark valleys, and clung to the craggy summits of the everlasting hills. A melancholy, pleasing, incomprehensible feeling creeps over the soul when the lone wanderer contemplates the vast, the solemn, the solitary scene, over which savage grandeur and sterility preside. How glorious to live in those vast solitudes, a hunter of the red deer and the forest boar, in the times of old, when the pine woods covered all those long and winding valleys, now strewn with decayed trunks, or bare as the hill-tops around.

The summits of the loftier mountains; Cairngorm on the one hand, Ben-na-muic-dui, and Benvrotan, on the other, and Loch-na-gar in the south, were covered with mist; but the clouds had rolled westward from Ben-na-buird, on which I stood, leaving its summit entirely free. The beams of the setting sun burst in masses of light here and there through the openings between the clouds, which exhibited a hundred varying shades. There, over the ridges of yon brown and torrent-worn mountain, hangs a vast mass of livid vapour, gorgeously glowing with deep crimson along all its lower fringed margin. Here, the white shroud that clings to the peaked summits, assumes on its western side a delicate hue like that of the petals of the pale red-rose. Far away to the north, glooms a murky cloud, in which the spirits of the storm are mustering their strength, and preparing the forked lightnings, which at midnight they will fling over the valley of the Spey.

From a small lake, in a rocky corry, at the distance of five or six miles, a white streamlet rushes down an alpine valley bounded by precipitous rocks. To the west and north-west, the mountains recede, range beyond range, apparently undiminished in grandeur, but toward the east, their ridges rapidly fall. The summits of those around are flat or rounded, composed of crumbling stones, with cairns of granitic rock protruding here and there. They are furrowed in many places by persons who, some years ago, gained a subsistence by gathering the rock-crystals and other minerals which are occasionally found among the disintegrated fragments. Many of them present vast precipices, and corries, or great cavities surrounded by rocks, in which is sometimes found a blue lake of unfathomed depth.

Descending from the highest part of the summit, I proceeded eastward for about half a mile, until I came to a corry facing the south, down a rapid slope, about the centre of which I descended with all possible speed, the sun having by this time sunk behind Benvrotan. Having got to the bottom of the slope, I began to run, and coming unexpectedly upon a flock of Brown Ptarmigans that had settled in their night's quarters, started them, to my own momentary alarm. A little farther

down I saw two does, and as I approached the stream already mentioned was somewhat alarmed by a succession of short brays or grunts, which increased in loudness and frequency, so as at length to become really frightful. It was now quite dark, so that I could see nothing distinctly at the distance of twenty yards; and whether the sounds proceeded from a rambling stag, or a water kelpie, I have never been able to learn. Crossing the stream, and ascending a low ridge, I fell in with a kind of footpath, which I followed, until I arrived over a deep glen, which I recognised. About a mile farther, finding that I was too high, I with difficulty descended the side of the glen about a quarter of a mile, until I came upon another footpath much more distinct than the upper, which led me to the place where I had seen the mountain-ash, poplar, and birch, by the stream. At length, after walking two hours in darkness, I gained the valley of the Dee, when the moon began to throw an obscure light over the shoulder of a hill, and I forded the river without accident, and reached the inn at half-past nine. Now, although after all my labour, I had only obtained half a dozen plants that were new to me, and observed the flight of a flock of Ptarmigans, I conceived myself amply recompensed.

Two nights after this, having ascended Glen Dee in the afternoon, I found myself at sunset in a valley bounded by very lofty and rugged mountains, and terminating on the side of a vast mass towering above the rest. Before I reached the head of this magnificent but desolate valley, night fell, and I was left to grope my way in the dark, among blocks of granite, by the side of one of the sources of the Dee, ten miles at least from human habitation, and with no better cheer in my wallet than a quarter of a cake of barley and a few crumbs of cheese which a shepherd had given me. Before I resolved to halt for the night, I had unfortunately proceeded so far up the glen that I had left behind me the region of heath, so that I could not procure enough for a bed. Pulling some grass and moss, however, I spread it in a sheltered place, and, after some time succeeded in falling into a sort of slumber. About midnight I looked up on the moon and stars that were at times covered by the masses of vapour that rolled along the summits of the

mountains, which, with their tremendous precipices, completely surrounded the hollow in which I cowered, like a Ptarmigan in the hill-corry. Behind me, in the west, and at the head of the glen, was a lofty mass enveloped in clouds; on the right a pyramidal rock, and beside it a peak of less elevation; on the left a ridge from the great mountain, terminating below in a dark conical prominence; and straight before me, in the east, at the distance apparently of a mile, another vast mass. Finding myself cold, although the weather was mild, I got up and made me a couch of large stones, grass, and a little short heath, unloosed my pack, covered one of my extremities with a night-cap, and thrust a pair of dry stockings on the other, ate a portion of my scanty store, drank two or three glasses of water from a neighbouring rill, placed myself in an easy posture, and fell asleep. About sunrise I awoke, fresh, but feeble, ascended the glen, passed through a magnificent corry, composed of vast rocks of granite, ascended the steep with great difficulty, and at length gained the summit of the mountain, which was covered with light grey mist that rolled rapidly along the ridges. As the clouds cleared away at intervals, and the sun shone upon the scene, I obtained a view of the glen in which I had passed the night, the corry, the opposite hills, and a blue lake before me. The stream which I had followed I traced to two large fountains, from each of which I took a glassful, which I quaffed to the health of my best friends. Near these wells I met with a covey of Grey Ptarmigans, and a Titling. These species are undoubtedly those which occupy the highest station in Britain as their ordinary residence; but although the latter, Anthus pratensis, is occasionally found on the very summits of Ben-na-muic-dui and Ben Nevis, it is more frequently met with on the sea-shore, and in all the intermediate country, but especially the hilly pastures. Silene acaulis was still in flower, and the whole summit was covered with Salix herbacea, both of which are eaten by the Ptarmigan.

Descending from this summit, I wandered over a high moor, came upon the brink of rocks that bounded a deep valley, in which was a black lake, proceeded over the unknown region of alternate bogs and crags, raised several flocks of Grey Ptar-

migans, and at length, by following a ravine, entered one of the valleys of the Spey, near the mouth of which I saw a Water Ouzel. It was not until noon that I reached a hut, in which I procured some milk. In the evening, at Kingussie, I examined the ample store of plants that I had collected in crossing the Grampians, and refreshed myself with a long sleep in a more comfortable bed than one of granite slabs with a little grass and heather spread over them.

It is delightful to wander far away from the haunts, and even the solitary huts of men, and ascending the steep mountain, seat one's self on the ruinous cairn that crowns its summit, where, amid the grey stones, the Ptarmigan gleans its alpine food. There, communing with his own heart, in the wilderness, the lover of nature cannot fail to look up to nature's God. I believe it in fact impossible, in such a situation, on the height of Ben-na-muic-dui or Ben Nevis, for example, not to be sensible, not merely of the existence, but also of the presence of a Divinity. In that sacred temple, of which the everlasting hills are the pillars, and the blue vault of heaven the dome, he must be a fiend indeed who could harbour an unholy thought. But, to know himself, one must go there alone. Accompanied by his fellows, he may see all of external nature that he could see in solitude, but the hidden things of his own heart will not be brought to light. To me the ascent of a lofty mountain has always induced a frame of mind similar to that inspired by entering a temple; and I cannot but look upon it as a gross profanation to enact in the midst of the sublimities of creation a convivial scene, such as is usually got up by parties from our large towns, who seem to have no higher aim in climbing to the top of Benlomond or Benledi than to feast there upon cold chicken and "mountain dew," and toss as many stones as they can find over the precipices.

I have scarcely ever visited the summit of any of those mountains without meeting with a covey or a pack of Grey Ptarmigans. These birds gather into large flocks at an earlier period than the brown species; even by the end of July. From the beginning of spring to the close of autumn, they reside on the summits or rocky slopes of the hills, seldom or never

entering the region of heath; but in winter, during snow-storms, they shift their residence, and betake themselves for a while to a somewhat lower station. Their food consists of various plants, chiefly of a shrubby nature. Thus, in the crops of the individuals first described above, was contained a large quantity of fresh green twigs of Calluna vulgaris, Vaccinium Myrtillus, and Empetrum nigrum, the largest fragments not exceeding five-twelfths of an inch in length. Leaves and twigs of Vaccinium Vitis-idæa, Salix herbacea, seeds of various Junceæ and Cyperaceæ, and other plants, with berries in autumn, also form part of their food; which is thus, in fact, for the most part the same as that of the Brown Ptarmigan.

It is a remarkable fact that all the Grouse and Ptarmigans which I have examined invariably select small fragments of white or hyaline quartz to aid the trituration of their food in the gizzard. Indeed, most of the phytiphagous birds do the same, although I have also found in the gizzards of many of them fragments of felspar, and in those of some even bits of coal and other substances. The process of digestion and assimilation is performed in the Grey Ptarmigan in the same manner as in the Brown species and the Black Grouse; but as persons who enter into anatomical details have been accused of neglecting physiological explanations, I may be permitted to state the progressive changes which the food undergoes.

The fauces and œsophagus, which are smooth and even, are profusely covered with a mucous fluid, which is more abundant at the aperture of the crop. This organ is extremely thin and but slightly bedewed. The proventricular glands exude a very copious viscid juice. The inner surface of the intestine is villous, even, and constantly moist; towards the entrance of the cœca, its mucous coat is covered with flattened tapering projections directed upwards. The rectum is smooth and even within, but in its upper part glandular and plentifully supplied with mucus. The cœca are internally villous; and excepting at the commencement, have their inner coat raised into about seven longitudinal white prominent lines, which are thick, villous, and appear externally through the muscular and peritoneal coats. The walls of the intestine seem thick at the upper

part, and gradually become thinner; but this appearance arises from the deposition of the chyle upon the inner surface.

By means of the short, strong, sharp-edged bill, the bird breaks off small portions of the fresh twigs of Erica cinerea, Calluna vulgaris, Vaccinium Myrtillus, willows and other shrubs, with which and occasionally spikes of Eriophora, carices and junci, berries and other vegetable substances, it gradually fills its crop, which is capable of containing a mass upwards of three inches in diameter. These twigs are all cut to the length of from one to five twelfths of an inch, arrive in the crop slightly moistened, and there appear to undergo no maceration, it being merely a recipient. A quantity passes into the gizzard, a powerful muscular apparatus, in which are lodged numerous fragments of quartz, that is a mineral substance harder than glass, with which it is mixed; and being compressed by the action of the lateral muscles, is pounded into a kind of dryish pulp, the herbaceous tissue being comminuted, and the woody fibres broken and torn. In this pulpy state, the mass passes into the upper lobe of the stomach, and enters the duodenum by the pylorus, which rejects the mineral particles. It is then diluted, and has a yellowish-green colour. Beyond the entrance of the biliary ducts, it becomes of a greenish-brown tint, and towards the cœca is more dry. The chyle adheres copiously to the walls of the upper part of the intestine. The contents of the cœca are a uniform pultaceous mass of a dull yellowish-brown colour, in which vegetable fibres can scarcely be distinguished by the naked eye. In the rectum, on the contrary, the fibres are easily perceived, some of them being from one to two twelfths of an inch long. It would thus appear that the coarser parts pass directly along from the intestine into the rectum, and that the more comminuted only enter the cœca. The fœces in the rectum are comparatively dry, and form a continuous cylinder, in which state, mixed with the urine they are voided, forming a small heap of cylindrical fragments, having a dull greenish-yellow colour, mixed with white.

The Grey Ptarmigan, then, is a bird which, feeding on vegetable substances containing comparatively little nourishment,

introduces a large quantity at a time, like a ruminating quadruped, and gradually digests it while reposing. In feeding, it walks about among the shrubs and herbage, where it is little liable to be interrupted, so that it has time to select fragments of the proper size and quality. The food is collected in the crop, gradually pounded in the gizzard, where it is mixed with the solvent juice of the proventriculus, farther diluted in the duodenum, and deposits the chyle along the intestine, whence it is carried off by the lacteals. As, perhaps on account of its being less nutritious than animal or farinaceous matter, it requires to pass rapidly along, the parts that have not been assimilated undergo a further elaboration and absorption in the very large cœca, which are appendages to the intestine, performing the same office as they, but into which the coarser fibres do not enter, being carried directly into the rectum.

Early in spring the Ptarmigans separate and pair. The nest is a slight hollow, scantily strewn with a few twigs and stalks or blades of grass. The eggs are of a regular oval form, about an inch and seven twelfths in length, an inch and from one to two twelfths across, of a white, yellowish-white, or reddish colour, blotched and spotted with dark brown, the markings larger than those of the Brown Ptarmigan. The young run about immediately after leaving the shell, and from the commencement are so nimble and expert at concealing themselves, that a person who has accidentally fallen in with a flock very seldom succeeds in capturing one. On the summit of one of the Harris mountains, I once happened to stroll into the midst of a covey of very young Ptarmigans, which instantly scattered, and in a few seconds disappeared among the stones, while the mother ran about within a few yards of me, manifesting the most intense anxiety, and pretending to be unable to fly. She succeeded so effectually in drawing my attention to herself, that when I at length began to search for the young, not one of them could be found, although the place was so bare that one might have supposed it impossible for them to escape detection. It seems wonderful, after all, how a young bird, such as a Lapwing or Snipe, sitting motionless on the ground, which it always does,

unless it thinks it has been observed, should generally elude the most diligent search.

Young.—The young are at first covered with a light yellowish-grey down, patched on the back with brown, and having on the top of the head a light chestnut mark, edged with darker. When fledged, they are very similar to the young of the Brown Ptarmigan, but banded and spotted with brighter reddish-yellow. This plumage soon changes, so that in the beginning of August many of the yellow and brown feathers of the back are exchanged for others spotted and barred with pale grey and brown, and the under parts are white, as well as the wings.

Progress toward Maturity.—Young birds become white the first winter like older ones; but their spots and bars are at first larger, and continue so in a less degree the second summer. In old birds the dark markings are reduced to very slender undulated lines, or even to series of dots.

Remarks.—It has been made apparent by the preceding description that the Grey Ptarmigan exhibits very considerable differences in the tints and markings of its coloured plumage, and also that it varies in size, like the Red Ptarmigan and the Partridge, probably from some difference in its food, or in the abundance in which it may be procured. In the next place, I have to remark that a dissimilarity as to size, in birds otherwise similar, in recent specimens, and still more in individuals represented by skins stuffed according to the varying tastes of preservers of natural objects, is not a sufficient ground on which to found the assertion of such birds being of different species. Thirdly, Ptarmigans obtained in summer will be somewhat smaller than others of the same species obtained in autumn and winter, because they will in the former season be more or less in moult, and their tail-feathers do not attain their full length until the end of November. These things are obvious, and cannot be denied.

Now, if we consider the descriptions given by authors of their Rock Ptarmigan or Grouse, *Lagopus* or *Tetrao rupestris*

we shall find that that species differs in nothing of the least importance from the Grey Ptarmigan as above described. Captain Sabine, who first pointed out the differences which he considered sufficient to distinguish the Rock Grouse from the Ptarmigan of Scotland, states that "the distribution of the coloured plumage of the Rock Grouse corresponds both in the male and female with the Ptarmigan, the same parts of both species remaining white; but there is much difference in the colour itself, the upper plumage of the Ptarmigan is cinereous, with undulating and narrow black lines and minute spots; whereas in the Rock Grouse each feather is black, cut by transverse broad lines or bars of a reddish-yellow, which do not reach the shaft, and have spaces of black between them broader than themselves; the feathers are tipped, in the male, with a light colour, that approaches to white in the female." Now, as the parts that remain white in summer are the same in both, and as both are equally white in winter, these two circumstances tend to induce us to consider the two species as the same. Secondly, the coloured summer plumage above described corresponds with that of young birds of the Grey Ptarmigan, which differ greatly from old birds in the breadth of their markings; and the feathers being tipped with a light colour or with white, is an additional proof that Captain Sabine's Rock Grouse in summer is merely the young Grey Ptarmigan. Further, by the statements of both Captain Sabine and Dr. Richardson, the difference as to the length of the birds is not greater than what occurs in undoubted specimens of the Grey Ptarmigan, of which I have seen a male not exceeding 13½ inches, while the longest was two inches more. And if the measurements be taken in summer, it must be remembered that the tail does not attain its full length until November. In the Fauna Boreali-Americana, the length of a female killed in summer, and which had the white tips of the tail-feathers worn off, was yet 14 inches, only half an inch shorter than female Scottish Ptarmigans in winter, with complete plumage, not in the least worn. Finally, I have examined the birds from which Dr. Richardson's descriptions in the appendix to Captain Parry's second voyage were taken, and I have not found one individual

presenting any characters different from those which I have found in individuals of the Grey Ptarmigan killed in Scotland. As to a difference in size observed by persons visiting museums, I have only to remark, what every collector must know, that two birds of equal size prepared either as skins or as stuffed specimens by two individuals, may differ exceedingly in size. I knew a bird-stuffer who in preparing Grouse, crammed them to the utmost, to make them look fine large birds; and a person who has collected about a hundred skins of British birds for me, has almost invariably made them much too short.

It may further be mentioned that the soles of both are bare, and that what Latham states of the Rock Ptarmigan, "rupibus insidens collo porrecto stertentis hominis sonum frequenter emittit," is equally applicable to the Grey Ptarmigan. Therefore, considering all circumstances, having examined a multitude of Scottish Ptarmigans in all states, and having inspected several so-called Rock Ptarmigans from North America, and one or two considered as such and killed in Scotland, I am almost persuaded that the *Lagopus mutus* and *Lagopus rupestris* of North America, are merely the species which I have, to avoid confusion, named the Grey Ptarmigan, *Lagopus cinereus*. At the same time, I have not seen American specimens of any kind that exhibited the beautiful pale grey colour of our Scottish Ptarmigans. As to those from the continent which I have examined, I have found in them nothing but the great breadth of the yellow and black bars that indicated any remarkable difference. *Lagopus leucurus*, from its small size and white tail, is very probably a true species.

Finally, I object to the specific name *mutus*, given to the Grey Ptarmigan, that the bird is not mute; and to *albus*, that the Willow Ptarmigan is equally white in winter. The latter species is in summer the only one of the three that is red; and therefore I would name it the Red Ptarmigan; while the species commonly called the Red Grouse, being less red than that just mentioned, and presenting a brown mottled appearance, might be named the Brown Ptarmigan; and the present species, being the only one that is at any time grey, ought therefore to be called the Grey Ptarmigan.

PERDIX. PARTRIDGE.

Although the Partridges bear a great resemblance to the Ptarmigans, and many species of Grouse, they differ from them in having the tarsi always bare, and sometimes furnished with a tubercle behind, and in generally having a bare space behind or about the eye, while they want the superciliary membranes. There are other points of difference, which may be observed on comparing birds of these genera, or on perusing the following generic characters. The genus Perdix of Temminck, which he merely divides into three sections, the Francolins, Partridges, and Quails, is now generally formed into a number of genera, bearing the names of *Francolinus*, *Perdix*, *Ortyx*, and *Coturnix*, the first composed of birds of which the males have spurs, and often present a marked affinity to species of the pheasant family; the second of those destitute of spurs, and having a bare space near the eye; the third of the thick-billed American species; and the fourth of the smaller species, of which the head is entirely feathered. Of the Francolins no species occur in Britain. The Partridges, of which we have two, one naturalized in some counties of England, the other indigenous, present the following characters.

Bill short, strong, slightly curved. Upper mandible having its dorsal outline arcuato-declinate, the ridge broad and convex, the sides convex, the edges straight and ascending to beyond the nostrils, where they are inflected, then declinato-arcuate, sharp and overlapping, the tip rounded and thin-edged. Lower mandible narrower, its angle broad and rounded, the dorsal outline convex, the back broadly convex, the sides also convex, the edges erect or slightly involute and sharp, the tip rounded.

Mouth rather narrow; upper mandible concave internally,

but with a prominent convex soft central part; lower mandible concave, with a broad central groove, and two prominent lines. Palate flat, with two slightly papillate soft ridges, from which a papillate line proceeds to the middle of the nasal aperture, and another curves behind it. Aperture of the posterior nares oblong behind, anteriorly linear, its edges papillate, as is the space on either side. Tongue short, triangular, flat above, papillate at the base, fleshy, horny beneath at the end, acute. Two masses of large mucous crypts in the angle of the lower jaw; also a series on the lower side of the tongue on each side, and a great number in the space between the root of the tongue and the aperture of the glottis, which is defended behind by two transverse flaps of pointed papillæ.

Œsophagus narrow, but enlarged or opening into a crop of great size, lying over the fore part of the neck and thorax. In its whole extent it is abundantly supplied with mucous follicles, as is the crop for a short space around its aperture. The proventriculus is somewhat bulbiform, its glands large, oblong, and placed rather obliquely. Stomach a powerful gizzard, of a roundish, subrhomboidal form, with the two lateral muscles somewhat oblique, the lower distinct, its tendinous fibres passing under those of the rest; the inner coat or epithelium strong, hard, and longitudinally rugous. The cardiac orifice is situated in a transverse depression, between the slight cardiac lobe and the upper edge of the lateral muscle, and has no valvular apparatus. Intestine long, rather wide, of nearly uniform diameter. Cœca very long, narrow at the commencement, enlarged and somewhat oblong, being of much greater diameter than the intestine. Rectum long, cylindrical. The intestine within is marked with regular series of minute depressions; towards the cœca are numerous roundish soft papillæ; there is a slight circular margin at the commencement of the rectum; and the cloaca is small and separated by a circular valve.

Nostrils basal, lateral, circular behind, linear before, covered above with an exposed oblong horny operculum; the nasal groove very broad and feathered. Eyes rather small; eyelids covered with very small feathers, their margin crenate; a narrow space beneath the lower, and a larger space behind the

eye and over the ear, bare and generally coloured. External ear small, circular.

Head small, ovate or oblong; forehead rounded. Neck short. Body full and large. Legs generally short, especially the tarsus, which is rather stout, moderately compressed, covered anteriorly with two series of scutella, laterally with small scales, behind with two series of large scales. Frequently the males have a flattened knob on the tarsus behind. Toes rather stout, covered above with numerous transverse scutella, beneath rounded, padded, and covered with round flattened granules; the first toe very short and elevated, the third much longer than the lateral, of which the inner is considerably shorter than the outer; the anterior toes webbed at the base. The claws are stout, short, flat or a little concave beneath, with a convex ridge, sloping sides, and blunt point, that of the hind toe very small and curved.

Plumage full, generally soft and blended, but various. The feathers oblong and rounded, broader on the upper parts, with a large tufty plumule more than half their length. The wings are very short, broad, curved, and rounded; the primary quills ten, narrow, rounded, the first six cut out on the inner web from near the base, so that when the wing is extended, intervals are left between them; the fourth and fifth longest, the first about the length of the seventh; secondary quills fifteen, decurved, rounded, the first or outer very short. Tail short, rounded, generally of sixteen feathers, which are nearly straight and moderately strong, the two middle ones situated above the line of the rest.

The Partridges are generally distributed in the temperate and warmer parts of the old continent, occurring not only in cultivated fields, but in pastures, on hilly and mountainous tracts, and even in thickets and sometimes woods. They live upon vegetable substances, seeds as well as buds, and the herbaceous parts of plants. The food is collected in the crop, and undergoes the same changes as have been described in the Grouse and Ptarmigans. The species have a strong, whirring flight, performed by a fluttering motion of the wings, or by regularly and quickly repeated beats. They run with great

speed, conceal themselves from danger by skulking among the herbage and shrubs, and emit a harsh or creaking cry. The nest is slight, in a hollow scraped in the soil; the eggs are numerous, generally unspotted; the young are at first covered with down, and run about immediately after exclusion, their parents leading them with great tenderness, and feigning lameness to draw their enemies from them.

The largest of our two species is properly speaking a native of France and other countries of Europe, but has been introduced into the south of England, in some parts of which it is not so uncommon as not to merit a place here as a naturalized bird.

PERDIX RUBRA. THE RED PARTRIDGE.

RED-LEGGED PARTRIDGE. GUERNSEY PARTRIDGE. FRENCH PARTRIDGE.

FIG. 47.

Perdix Rufa, β. Lath. Ind. Orn. II. 647.
Guernsey Partridge. Mont. Orn. Dict.
Perdrix Rouge. Perdix Rubra. Temm. Man. d'Orn. II. 485.
Perdix Rubra. Red-Legged Partridge. Jen. Brit. Vert. An. 172.

The bill and feet bright red; upper parts reddish brown tinged with grey; forehead ash-grey; throat and cheeks white; a black band from the bill to the eye, and thence down the neck, becoming broader on its fore part, which is spotted with the same colour; lower parts ash-grey and light red; sides transversely banded with ash-grey, white, black, and red; tarsus of the male with a large flat tubercle.

MALE.—This beautiful species is somewhat larger and more robust than the Common Partridge, which it resembles in form and proportions, the body being full, the neck rather short, the bill stout, as are the feet. On the fore part of the tarsus are two series of broad scales, each composed of twelve, and on its hind part the scales are obliterated by a large oblong flattened tubercle placed about the middle. On the first toe are five, on

the second sixteen, on the third twenty-two, and on the fourth eighteen narrow scutella. The plumage is soft and blended. The wings, which are very short, have seven of the primaries cut out on the outer web, the second, third, and fourth nearly equal and longest, the first almost as long as the sixth. The tail is short, and much rounded, of sixteen straight rounded feathers.

The bill, naked space about the eye, and feet, are bright red, the claws a little dusky; the irides red. The upper part of the head and the hind-neck are reddish-brown, the forehead ash-grey. The back, wings, upper tail-coverts, and four middle tail-feathers are reddish-brown tinged with grey. A portion of the outer web of all the primaries except the first, and of seven of the outer secondaries is ochre-yellow. The six lateral tail-feathers on each side brownish-red. The throat and cheeks are white tinged with grey; a band of black from the bill to the eye, and thence down the side of the neck, becoming broader and meeting its fellow on the fore part, where it expands. Sides and fore part of neck greyish-white, tinged with brown, and spotted with black. This part is margined below with greyish-brown, succeeded by a broad band of ash-grey. The middle of the breast, abdomen, lower tail-coverts, and tibial feathers are light red; the feathers of the sides with a broad band of light red, succeeded by another of ash-grey, then two narrow bands, one white, the other black, and a terminal band of red.

Length to end of tail 14 inches; extent of wings about 21; wing from flexure $6\frac{1}{2}$; tail $4\frac{1}{4}$; bill along the ridge $8\frac{1}{2}$ twelfths, along the edge of lower mandible $\frac{11}{12}$; tarsus $1\frac{7}{12}$; hind toe $\frac{4}{12}$, its claw $\frac{3}{12}$; second toe 1, its claw $4\frac{1}{2}$ twelfths; third $1\frac{1}{2}$, its claw $\frac{5}{12}$; fourth 1 inch $1\frac{1}{2}$ twelfth, its claw $\frac{4}{12}$.

Female.—The female is somewhat less, wants the knob on the tarsus, and has the colours as in the male, but a little fainter. The black crescent on the neck is narrower, and the spots of the same colour on its lower part are much smaller.

Length to end of tail 13 inches; wing from flexure $6\frac{2}{12}$; bill along the ridge $7\frac{1}{2}$ twelfths; tarsus $1\frac{7}{12}$; middle toe and claw $1\frac{3}{4}$.

Manners.—As I cannot speak from observation of the habits of the Red Partridge, of which the specimens above described were skins of birds shot in the south of England, I may be excused from entering largely upon its history. It is said to occur in various parts of Asia and Africa, and to be plentiful in Spain, Portugal, Italy, and the south of France, where it inhabits the low grounds, feeding on seeds, grain, and insects. It has also been found, though rarely, in Austria and Bohemia, as well as Switzerland. In England, where it is now not uncommon in some places, it is said to prefer waste heathy ground to corn fields, and to afford less sport than the common species, as it runs before the dogs, the individuals composing a covey dispersing, and rising one after another. It is accused moreover of driving off the Common Partridge, which it is feared may in time be extirpated by it, as the Black Rat has been by the larger and more mischievous brown species.

Remarks.—M. Temminck states that there are eighteen feathers in the tail, which is also the number he allots to the Common Partridge; but I have not succeeded in finding more than sixteen in either. Mr. Jenyns also counts eighteen in that of the latter bird. However, I must hold to the truth, which I am pleased to find has in this case been held by Montagu to be as I have represented it.

PERDIX CINEREA. THE GREY PARTRIDGE.

COMMON PARTRIDGE. CEARC-THOMAIN.

FIG. 48.

Tetrao Perdix. Linn. Syst. Nat. I. 276.
Perdix cinerea. Lath. Ind. Orn. II. 645.
Common Partridge. Mont. Orn. Dict.
Perdrix Grise. Perdix cinerea. Temm. Man. d'Orn. II. 488.
Common Partridge. Perdix cinerea. Selb. Illustr. I. 433.
Perdix cinerea. Common Partridge. Jen. Brit. Vert. An. 172.

Male with the bill and feet greyish-blue; upper parts minutely barred with ash-grey, yellowish-brown, brownish-black, and brownish-red; scapulars and wing-coverts darker, with longitudinal whitish streaks; forehead, cheeks, and throat light red; neck ash-grey, minutely undulated with black; sides broadly banded with brownish-red, of which there is a large patch on the breast. Female similarly coloured, but with the upper parts more brown, their markings larger, the top of the head streaked with yellowish, and the spot on the breast smaller.

IT might be judged unnecessary to describe a bird so common as the Partridge; and I should not dissent from this opinion, were I not aware that many familiar objects are apt to receive less notice than those which, although not more beautiful, nor of greater utility, are more difficult to be procured, and persuaded that the species under consideration is as worthy of regard as any other of its family. Though neither elegant in

form, nor gaudily attired, its neatness, and the curiously intricate markings of its plumage, entitle it to be considered as a beautiful bird, and its use as an article of food recommends it in an economical point of view. Ornithologically considered, it presents a marked affinity to the Ptarmigans, and in particular to the Brown species, or "Red Grouse."

Male.—The Grey Partridge is proportioned pretty much like the bird just named, having the body full, the neck short, the head small and oblong, the wings and tail very short, and the feet short and rather strong. Its bill is short and stout; the upper mandible with its outline considerably curved, its sharp edges overlapping, and its rounded but thin-edged tip extending beyond that of the lower mandible. The salivary or mucous glandules below the tongue are very large and distinct; the tongue seven and a half twelfths of an inch long, triangular, pointed, flat above, emarginate and papillate at the base. The space on either side of the palatal slit is marked with transverse papillate ridges. The œsophagus, measured from the fauces to the stomach, is six and a half inches long, its diameter four twelfths as far as the crop, which is globular, two inches and three fourths in diameter, membranous, but with very numerous mucous crypts around its aperture, which is eight twelfths long, and four and a half inches from the tongue. The œsophagus then contracts to three twelfths, and in its intrathoracic course has its inner coat slightly raised into longitudinal rugæ, and abundantly covered with mucus from its glandules. The proventriculus is elliptical, three fourths of an inch long, and having large ovato-oblong slightly lobulated glandules. The gizzard is obliquely transverse, sub-elliptical, compressed, its greatest diameter an inch and eight twelfths, its left muscle much larger than the right, the former eight twelfths in thickness, the latter seven twelfths, so that the cavity of the organ is reduced to a small cylindrical space, lined with the rather thin, but very tough longitudinally rugous epithelium. The intestine, from the pylorus to its extremity, is twenty-seven inches long. Its duodenal portion varies in diameter from five twelfths to half an inch; the rest gradually

diminishing to three twelfths, as far as the cœca, the rectum a little enlarged. The cœca, which are seven inches long, with a diameter at first of three, and afterwards of four and a half twelfths, and marked internally with about seven longitudinal villous ridges, come off at the distance of three and a half inches from the anus.

The eyes are of moderate size; the eyelids feathered, but the lower having at its base a curved bare space. The nostrils are roundish with an anterior narrow slit, and covered by an oblong operculum, which together with a small portion of the cere, is bare. The external aperture of the ear is circular and small, measuring only one eighth of an inch across.

The tarsus, which is short, has anteriorly twelve transverse scutella in each of the two series, and about ten smaller in each of the posterior series, the sides scaly. On the hind toe, which is very small, are five, on the second fifteen, on the third twenty, and on the fourth fifteen scutella. The claws are rather short, stout, and blunt. In young birds however they are longer and more pointed.

The plumage is rather blended, soft, and full, the feathers ovate or oblong, and rounded; those of the rump and sides proportionally much longer. There is a bare space of a bright red colour behind the eye. The wings are very short, concave, and much rounded; the primary quills strong, narrowed, and obtuse, the fourth longest, the third scarcely shorter, the fifth about the same length, the first and seventh nearly equal; the secondary quills fifteen, the first very short, all rounded and decurved. The tail is very short, straight, rounded, of sixteen broadly rounded feathers.

The bill and opercula of the nostrils are light greyish-blue; the irides hazel; the feet pale greyish-blue tinged with yellow; the claws dusky. The forehead, a broad band over the eye, the cheeks, and the throat, are light yellowish-red, that colour being narrowly edged behind with ash-grey. Between the nostrils is a scarcely observable bandlet of minute black feathers. The upper part of the head is greyish-brown, with slender yellowish shaft-lines. The upper parts are minutely banded with dots of brownish-black, lines of brownish-yellow and grey, with

bars of brownish red, which latter become broader towards the tail; the shafts yellowish. The scapulars, wing-coverts, and secondary quills are darker, and more strongly marked, besides being conspicuously streaked with yellowish-white, there being a line of that colour along the centre of each feather. The primary quills, their coverts, and the alula, are greyish-brown, widely banded with greyish-yellow. The tail is brownish-red, the two middle feathers and the edges of the next pair marked like the back, the tips of all reddish-white. The neck, sides, and breast are ash-grey, minutely undulated with blackish-brown; the feathers of the flanks with a broad subterminal band of brownish-red, and white shaft-streaks; those of the sides of the rump dull yellowish-brown, also longitudinally streaked, and transversely undulated with dusky. On the breast is a large, recurved patch of brownish-red or chestnut, margined with yellowish-white. The feathers of the abdomen, the lower tail-coverts, and the inner sides of the legs pale yellowish-grey or whitish.

Length to end of tail $12\frac{1}{2}$ inches; extent of wings 20; wing from flexure $6\frac{1}{2}$; tail 3; bill along the ridge $\frac{8}{12}$, along the edge of lower mandible $10\frac{1}{2}$ twelfths; tarsus 1 inch $5\frac{1}{2}$ twelfths; first toe $\frac{5}{12}$, its claw $\frac{2}{12}$; second toe $\frac{10}{12}$, its claw $\frac{4}{12}$; third toe 1 inch $3\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$; fourth toe $\frac{11}{12}$, its claw $3\frac{1}{2}$ twelfths.

Female.—The female is a little smaller than the male, and is similarly coloured, with the following differences. The yellowish-red of the face and throat is lighter; the crown of the head is marked with small oblong yellowish-white streaks; the upper parts are darker, their bands larger, and their longitudinal yellowish-white streaks broader; the red patch on the breast is not so large, and sometimes is reduced to a few spots in the midst of a greyish-white space; but frequently it does not differ much from that of the male.

Length to end of tail 12 inches; extent of wings 19; wing along the edge $6\frac{1}{4}$; tail 3; bill along the ridge $\frac{8}{12}$; tarsus $1\frac{5}{12}$; middle toe and claw $1\frac{8}{12}$.

Variations.—Both males and females exhibit considerable

variations in the tints and breadth of the markings, the older birds having them lighter and finer. Individuals white or cream-coloured, or with numerous white feathers, or with the tints much faded, are occasionally met with. The variety named the Mountain Partridge, *Perdix montana*, which is yellowish-red, variegated with yellowish, does not, I believe, occur in Britain. Although the red spot on the breast is sometimes quite as large in the female as in the male, and therefore is no criterion, the sexes can be distinguished by the characters given in the description of the female.

Habits.—The Grey Partridge is generally distributed, being found in all the lower parts of England and Scotland, with the exception of some districts in the latter country, such as the whole range of the Outer Hebrides. Although not peculiar to cultivated land, it thrives best in those parts that are most extensively covered with crops, among which it finds comparative security during a considerable part of the year. It is of rare occurrence in the narrow valleys of the moorlands, and on the heaths is seldom seen unless in the immediate vicinity of corn fields. At the same time however, it is fond of rambling into waste or pasture grounds, which are covered with long grass, furze, or broom; but it does not often enter woods, and never perches on trees. It runs with surprising speed, when alarmed or in pursuit of its companions, although in general, it squats under the apprehension of danger, or when nearly approached takes flight. Its mode of flying is similar to that of the Brown Ptarmigan; it rises obliquely to some height, and then flies off in a direct course, rapidly flapping its wings, which produce a whirring sound.

The food of this species consists of tender blades of grass or corn, grain of all the kinds cultivated in this country, pease, even field beans, seeds of polygona and other small weeds, as well as of wild gramineæ, together with insects, pupæ, and larvæ. These substances are ground in the powerful gizzard, with the aid of numerous small particles of white quartz, which seldom exceed the eighth of an inch in diameter. A second elaboration takes place in the cœca; but as the food of the partridges is more nutri-

tious than that of the Grouse, these organs are much smaller in the former birds. They feed principally in the morning and towards night, betake themselves during the middle of the day to places covered with shrubs or ferns, or bask under the hedges, having, like other Gallinaceous birds, a propensity to flutter and sun themselves in dry sheltered places. In the evening, before betaking themselves to rest, they are often heard in the fields uttering their harsh, sharp cry, apparently for the purpose of apprising each other of their position, so that the stragglers may come up, or the male join his mate. They repose at night on the ground, generally in an open and comparatively bare place.

During winter the Partridges keep together in coveys, seeking their food among the stubble; but early in spring they separate, and by the beginning of March are generally paired, although the eggs are not laid until June. The place which they select for their nest is various, it being found in corn and grass fields, in pastures, among shrubs, by hedges, sometimes even by road-sides. It is merely a slight hollow scraped in the soil, with a few straws, and ultimately contains from ten to fifteen eggs, of a pale greenish-brown colour, smooth, thick-shelled ovato-pyriform, averaging an inch and a half in length, and an inch and a twelfth in their greatest breadth. The cry of the male is frequent in spring, and at that season he is very pugnacious, driving off intruders from his territory, and guarding his mate. Although he takes no part in incubation, he remains in the neighbourhood of the nest, and on apprehension of danger to it comes up and endeavours to entice from it the person who may have approached too near for its safety.

The young are led about by both parents, who manifest the greatest anxiety for their safety, and have recourse to the expedients usual among birds of this order and many of the Grallatores to withdraw the attention of intruders from them. So great is the affection of the partridge for its young that in the very cold and wet summer of 1836, as I have been informed by my friend Mr. Weir of Boghead, several pairs were found dead in the fields near Bathgate, with their broods under their wings, they having perished under the influence of cold and hunger

rather than expose their tender charge to the inclemency of the weather. Mr. Selby relates that two partridges, to protect their young brood from a Carrion Crow, gave battle to the ravenous bird, and actually held him until he was seized and taken from them by a person who happened to be engaged in a field in the neighbourhood. The principal food of the young is insects and larvæ, and especially those of ants; at least almost all authors so allege, and I am unable to confirm or contradict the statement, not having dissected them at this early stage. During autumn and winter the brood remain with their parents, and towards the commencement of the latter season, several families sometimes unite into a pack.

Partridge-shooting is a favourite and exciting diversion, which, in districts abounding in this kind of game, is liberally engaged in. But, notwithstanding the vast numbers annually destroyed, these birds seem to be rather increasing than diminishing in number, so that, as an article of food, they are not beyond the reach of the middle classes of society, the average price of a pair being half-a-crown.

Young.—At first, the bill is greyish-brown, the tip of the upper mandible yellowish. The general colour of the down is light greyish-yellow; the forehead, sides of the head and neck, back, sides and wings, marked with black spots; the top of the head chestnut-brown, patched with brownish-black; the wings and rump clouded with brown; the feet yellowish-brown. The young of the Brown Ptarmigan are very similar, but have the top of the head darker, the fore-neck more brown, and are always easily distinguished by having the tarsi and toes covered with down.

When fledged, they have the bill and feet greyish-brown, the face and throat pale yellowish-red, the upper parts greyish-brown, barred with brownish-black, the wings and scapulars patched with brownish-red.

Progress toward Maturity.—After their first moult they resemble the old birds, but are darker above, with larger markings; the red patch on the breast is smaller, in the females

generally wanting; and the four middle tail-feathers are barred.

Remarks.—The Partridge thrives in a state of captivity when properly fed, but refuses to breed in that condition. It is said by authors to be very extensively distributed in Europe and Africa; and, although a permanent resident in some countries, to be migratory in others. As might be expected in a bird apparently so dependent upon the labours of man for shelter and subsistence, the Partridge varies considerably in size, it being found that in the valleys of the hilly and little cultivated districts it usually attains a smaller size than in the rich plains, where it finds an abundant supply of nutritious food. Even birds and quadrupeds which do not approach the haunts of man exhibit considerable diversity in this respect, according to the scarcity or abundance of food in the districts inhabited by them; but it is chiefly, I believe, in the phytophagous tribes that this takes place. Slight differences as to size in Ptarmigans can no more be accounted specific distinctions than in Partridges, and the dimensions of the latter vary just as much as those of the former.

ORTYX. COLIN.

The Colins, which are peculiar to the American Continent, form a group, distinguished from the Quails and Partridges more especially by the greater thickness and depth of their bills. They resemble the former in having the tarsi destitute of spurs or tubercles, but differ from them in having a rather strong, rounded, straight tail, a bare space behind the eyes, and rounded wings. Their principal characters are as follows:

Bill very short, remarkably stout, rather broad at the base, high, compressed towards the end. Upper mandible with its dorsal outline arched from the base, where the ridge is narrow but convex, the sides sloping and a little convex, the edges direct and overlapping, the tip rounded. Lower mandible with the angle broad and rounded, the dorsal outline slightly convex, the back broad and convex, the edges involute. The gape-line nearly straight and ascending for two-thirds of its length, then decurved.

Nostrils linear, covered above by a bare horny oblong operculum. Eyes of moderate size; eyelids feathered; but with a bare space behind. External ears of moderate size, round.

Head ovate, a little compressed. Body compact, full. Legs short and stout; tarsi short, stout, compressed behind, anteriorly covered with two series of scutella, about fourteen in each, posteriorly with two series of scales meeting so as to form a sharp edge, and without spur or tubercle. Toes rather long and stout; first very small and elevated, second and fourth equal, third much longer. Claws of moderate length, compressed, slightly arched, rather blunt.

Plumage blended or compact, the feathers ovate, those on the upper part of the head generally elongated. Wings short,

broad, concave, much rounded; primary quills incurved, the third, fourth, fifth, and sixth longest; secondary quills decurved, rounded, the inner long. Tail of moderate length, much rounded.

The Colins are intermediate between the Partridges and Quails, from both which groups they are readily distinguished by the form of their bill, although at first sight one can scarcely perceive much difference in their general appearance. They are migratory birds, having habits similar to those of the Partridges, frequenting bushy places, breeding on the ground, and feeding on seeds and other parts of vegetables. Their pugnacity at least equals that of the other groups, and they are not less gregarious. One species, Ortyx borealis, the Virginian Colin, has been reared in several preserves in England, and is said to be naturalized in Sussex, so that it has nearly an equal claim to our consideration as the Red Partridge.

ORTYX VIRGINIANA. THE VIRGINIAN COLIN.

VIRGINIAN PARTRIDGE. NORTHERN COLIN.

Tetrao Virginianus. Linn. Syst. Nat. I. 277.
Perdix Virginiana. Lath. Ind. Orn. II. 650.
Quail or Partridge. Perdix Virginiana. Wils. Amer. Orn. VI. 21.
Virginian Partridge. Perdix Virginiana. Audub. Orn. Biog. I. 388.
Perdix Virginiana. Virginian Partridge. Jen. Brit. Vert. An. 173.

Male with the upper parts brownish-red, variegated with black; throat and a broad band over the eye white, loral space, and a broad band passing down the neck and crossing it in front, black; lower parts greyish-white, undulated with black. Female with lighter tints, the throat and a band over the eye light yellowish-red.

The Virginian Colin is considerably larger than the Common Quail, and presents the general proportions of the Grey Partridge, but with the bill stouter. The markings on its neck resemble those of the Red Partridge.

Male.—The plumage is soft and rather glossy, the feathers generally ovate and rounded; those on the upper part of the head longish, forming an erectile tuft; those on the sides elongated. The quills are twenty-three, and the tail-feathers twelve. The wings are short and much rounded, the fourth quill longest, the fifth next, the third and seventh about equal. The tail is short and much rounded.

The bill is black; the feet bluish-grey tinged with brown, the claws dusky. The fore part of the head is black, of which colour a band passes over the eye, between which and it is a broad band of white, extending from the bill to halfway down the neck. A black band from beneath and behind the eye, down the neck, enlarging, and meeting its fellow in front, the

throat above it being white. Top of the head chestnut red, the central part of the feathers black; hind part and sides of neck variegated with chestnut, black, and white. The upper parts are light brownish-red, slightly barred with black, of which colour chiefly are the feathers on the middle of the back; those on the rump having a central band or streak of the same. The quills are greyish-brown, the inner secondaries variegated like the back. Tail greyish-blue, undulated towards the end with yellowish-red. The lower part of the fore-neck and the breast are greyish-white, transversely undulated with black; the feathers on the sides bright brownish-red, with lateral sinuous black lines and white marginal spots. Lower tail-coverts light yellowish-red, with central dusky streaks and whitish tips.

Length to end of tail $9\frac{1}{2}$ inches; bill along the ridge $7\frac{1}{2}$ twelfths, along the edge of lower mandible $\frac{8}{12}$; wing from flexure $4\frac{8}{12}$; tail $2\frac{1}{2}$; tarsus $1\frac{72}{12}$; hind toe $\frac{4}{12}$, its claw $2\frac{1}{2}$ twelfths; second toe $\frac{9}{12}$, its claw $\frac{5}{12}$; third toe 1 inch $2\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; fourth toe $10\frac{1}{2}$ twelfths; its claw $3\frac{1}{2}$ twelfths.

Female.—The female is somewhat smaller, and differs considerably in colouring. The throat and sides of the head, with the band over the eye, being light yellowish-brown; the former margined with black, brown and yellowish-red spots. The upper parts are paler than in the male, the tail more undulated with red and greyish-white. The lower part of the fore-neck and the breast light red; the rest of the lower parts nearly as in the male.

Length to end of tail 9 inches; bill along the back $6\frac{1}{2}$ twelfths; wing from flexure $5\frac{1}{2}$; tarsus $1\frac{2}{12}$; middle toe and claw $1\frac{9}{12}$.

Remarks.—With the habits of this species, as observed in Britain, I am not acquainted; and as its description in this respect belongs peculiarly to the authors of the Faunas of its native country, I must refer the reader to Mr. Audubon's Ornithological Biography, where he will find a very interest-

ing account of it. Judging from his and Wilson's accounts, it seems very probable that the species would thrive in all parts of Britain. The above descriptions I have been obliged to take from American skins, not having been able to procure English specimens, which it seems are not easily obtained, as Mr. Jenyns, who resides nearer their head-quarters, states that his account is copied from Temminck. Mr. Audubon states that it " has been introduced into various parts of Europe, but is not much liked there, being of such pugnacious habits as to drive off the common Grey Partridge, which is considered a better bird for the table."

COTURNIX. QUAIL.

The Quails are birds, generally of small size, which by the older writers were considered as forming part of their genus Perdix, but which have been by recent ornithologists not improperly formed into a distinct genus, of which the characters are as follows.

Bill very short, moderately stout, rather compressed. Upper mandible with its dorsal outline sloping at the base, then arcuato-declinate, the ridge narrowed at the base by the nasal membranes, towards the end narrow, but convex, the sides convex, the edges direct, the tip narrow. Lower mandible with the angle short and rounded, the dorsal outline straight, the back convex, the edges involute.

Nostrils linear, covered above by a bare horny oblong operculum. Eyes of moderate size; eyelids feathered. External ears of moderate size, roundish.

Head oblong, small, the forehead rather flattened. Body ovate, compact. Legs short and moderately stout; tarsi short, compressed, stout, anteriorly covered with two series of square scutella, about twelve in each, posteriorly with two series of scales meeting so as to form a sharp edge; and without spur or tubercle. Toes slender; first very small and elevated, second considerably shorter than fourth; third a good deal longer than the latter.

Plumage generally compact, the feathers ovate. Wings short, broad, slightly convex; primary quills incurved, broad, but at the end tapering, the three outer nearly equal, the rest slowly graduated; secondary quills rounded, about twenty. Tail very short, much rounded, of twelve feeble, decurved, rounded feathers, concealed by the coverts.

The Quails differ from the Partridges chiefly in having the head entirely feathered; the wings straighter and more pointed, with the secondary quills shorter; the tail much smaller, so as to be concealed by the neighbouring feathers, and decurved; and the feet weaker, without any knob or tubercle on the tarsus. They are extensively distributed on the old continent, and some of them at least are migratory. The males are said to be polygamous, and extremely pugnacious. In most other respects these birds resemble the Partridges, living on seeds of gramineæ and other plants, herbaceous substances, and insects, and residing in grassy pastures, cultivated fields, and shrubby wastes. Only one species occurs in Britain, where it is merely a summer visitant, although occasionally individuals have been met with in winter.

COTURNIX DACTYLISONANS. THE COMMON QUAIL.

Tetrao Coturnix. Linn. Syst. Nat. I. 278.
Perdix Coturnix. Lath. Ind. Orn. II. 651.
La Caille. Perdix Coturnix. Temm. Man. d'Orn. II. 491.
Perdix Coturnix. Common Quail. Jen. Brit. Vert. An. 174.

Upper parts variegated with reddish, grey, and brownish-black, and marked with whitish longitudinal pointed streaks, of which are three bands on the head. Male with the throat dark brown, and a double interrupted black band on the fore-neck. Female with the throat yellowish-grey.

Male.—This beautiful bird, the smallest of its order found in Britain, being inferior in size to the Corn Crake, has its colours disposed in so intricate a manner that it is difficult to describe them. The plumage is soft and rather glossy, the feathers generally ovate on the upper parts, and oblong on the lower. The quills are twenty, and the tail-feathers fourteen. The first three primaries are of almost equal length, but the second is the longest; the second and third slightly cut out on the outer web near the end, the first with a slight sinus on the inner edge.

The bill is greyish-brown above, greyish-blue beneath, the tips yellowish. The feet and claws greyish-yellow. The upper part of the head and hind-neck is black, the feathers edged with brown; a narrow band of yellowish-white, formed by central marks on the feathers, occupies the middle of the head; and a broader band of feathers of the same colour passes over each eye and down the side of the neck. The upper parts are variegated with brownish-black, light red, and yellowish-grey, and on the back and scapulars are four longitudinal bands of yellowish-white pointed streaks. The wings are wood-

brown, banded on the outer webs with pale red, the first quill with its outer edge white. The tail dark brown, centrally marked and transversely barred with whitish. There is a longitudinal band of dusky brown on the throat, of which the sides are light reddish-brown mottled with whitish; the loral space and a double crescent on the fore-neck brownish-black. The sides of the neck and the fore part of the breast are light yellowish-brown or reddish, the former spotted with black and yellowish-white, the latter marked with whitish shaft-lines. The middle of the breast, abdomen, and lower tail-coverts are of a paler tint approaching to whitish; the sides light brownish-red, each feather with a central band of white, edged with brownish-black.

Length to end of tail 8 inches; extent of wings 14; wing from flexure $4\frac{1}{4}$; tail $1\frac{3}{4}$; bill along the ridge $\frac{5}{12}$; tarsus $1\frac{1}{12}$; middle toe $\frac{10}{12}$, its claw $3\frac{1}{2}$ twelfths.

Female.—The female is similarly coloured above, but with the longitudinal streaks shorter and tinged with yellowish-red. The throat is reddish-white, without crescentic dark bands; the sides and fore part of the neck, and the fore part of the breast are light yellowish-red, spotted with brownish-black.

Length to end of tail $7\frac{1}{2}$ inches; wing from flexure $4\frac{1}{4}$; tarsus 1; middle toe and claw $1\frac{1}{12}$.

Variations.—In old individuals the tints are brighter and deeper than in younger ones; but the variations are not otherwise very remarkable. Individuals occasionally occur in countries where this bird is common, of a pure or yellowish-white colour, sometimes dusky all over, or spotted with white; but with us variations of this kind must be very rare, as I have not met with any in the museums.

Habits.—The Common Quail is, according to authors, generally distributed over Europe, and a great part of Asia and Africa. In the former region it is migratory, arriving in the beginning of summer, and departing in September, generally in vast straggling flocks. In the countries on the Mediter-

ranean, their arrival is watched with anxiety, and prodigious slaughter is made among them, by means of nets and guns, the greater part of the male population being on the alert, and a kind of jubilee kept, similar to that described by Wilson, Audubon, and Cooper, as held in America, when the migratory Pigeons extend their dense masses over the country. According to an eye-witness, "enviable is the lot of the idle apprentice, who, with a borrowed old musket or pistol, no matter how unsafe, has gained possession of the farthest accessible rock, where there is but room for himself and his dog, which he has fed with bread only all the year round for these delightful days, and which sits in as happy expectation as himself for the arrival of the Quails." They perform their flights in the evening, or by moonlight, or early in the morning, and rest during the day, when it is necessary for them to procure food. As they advance northward, some remain in all the districts over which they pass, until at length they are all dispersed, when they commence the important arrangements for rearing their broods. The males are extremely pugnacious, and indeed are in some countries trained for fighting, so that when they meet each other in their haunts they engage in desperate combats; and it is asserted that they are of a roving disposition, and in fact polygamous, which however seems doubtful, for during the breeding season each female seems to have a mate, who, although he leaves her to incubate, yet joins her when she leads forth her young, of which he assists in taking charge. The food of the Quail consists of seeds, herbage, and occasionally insects; and its haunts are chiefly the cultivated fields and pastures, where it continues during the season, never entering the woods or perching. The nest is a slight hollow scraped in the loose soil, with some dry blades, on which it deposits its numerous eggs, which sometimes amount to twenty. They are of a regular oval form, having a ground-colour varying from yellowish-white to reddish-yellow or greenish, and marked all over with brown spots and blotches, in which respect they more resemble those of the Grouse than of the Partridges. The males utter a loud shrill cry, composed of several notes, which have been considered as constituting a kind of song, in consequence of which these birds

are often kept in cages on the continent. Quails are caught in various ways, usually by nets or traps, into which they are led by imitating their cries; and in autumn are shot like other field game.

Their arrival in England takes place about the middle of May. They never appear with us in great numbers, but coming quietly, like the Corn Crake, spread over the country unobserved, and are pretty generally distributed, although nowhere plentiful, and in the northern counties very rare. It is seldom that they are now met with in Scotland; yet even there the species is not to be considered as one of the very rarest birds, as specimens now and then come into the hands of the bird-stuffers. I have heard of its occurring in Morayshire; but the most northern locality known to me with certainty is the parish of Towie in Aberdeenshire, whence my friend Mr. Craigie sent me twelve eggs that were found in a grass field by a mower. They are from an inch and a twelfth to an inch and two-twelfths long, their greatest transverse diameter ten-twelfths or a little more, reddish-white tinged with green, dotted and spotted all over with dark brown.

The Quail is the smallest and the last in order of our Rasores. In appearance and habits it shews some affinity to a few of our Huskers, especially the Corn Bunting, as well as to the Lark, and more especially the Corn Crake, which belong to different orders.

PRACTICAL ORNITHOLOGY.

FIRST LESSON.

FLIGHT OF BIRDS. DISTINCTION OF SPECIES INTO PERMANENT, MIGRATORY, AND ACCIDENTAL VISITANTS. CHARACTER OF AN ORNITHOLOGIST. CRITICAL REMARKS ON FANCIFUL AFFINITIES. COMMON BIRDS.

However interesting it may be to examine the structure of birds, compare the diversified forms which they present, and collect from the writings of authors whatever has reference to the species with which we are desirous of being intimately acquainted, our task cannot be satisfactorily completed until we go forth and study their characters for ourselves, as they are exhibited by the living objects pursuing their ordinary avocations. Wherefore, good Pupil, having prepared you for observing the animals to which we purpose to devote our attention for a time, by entering upon considerations relative to their organization, classification, and nomenclature, and by giving in detail the history of an entire group, I believe we cannot do better than equip ourselves for a walk, which I hope will be a pleasant one, the day being fine, and this, the end of October, the very season of all best adapted for an ornithological ramble.

With all my heart. I suppose I need no preparation, as I am no shot, and will be content with witnessing your exploits. So let us start.

This Newington is a pleasant place. You are here ready to step into the fields whenever you please. The city is behind, and the hills lie before us. You perceive Libberton Kirk on the height, the Braid Hills to the right, Craigmillar to the left, extensive fields now bared by the sickle, and some patches of wood, in which we may find objects to interest us. In the

meantime you observe the flocks of Sparrows that harbour in the hedges, now keeping up an incessant chatter, and presently all mute. They have a merry time of it: the fields afford them an abundant store of wheat and oat seeds. See how they drop one by one, now in groups, among the stubble. Let us go near.

There they rise, and fly back to the hedge. But is it not a foolish thing to chase sparrows?

The folly of chasing sparrows depends upon the object you have in view. If the divine wisdom and power have been exercised in creating them, and the good providence of God displayed in caring for them, it cannot be foolish in us to study their habits, provided we look upon them with relation to the author of their being. However, let us go on: they have flown, and you see that they move about in flocks, that is, are gregarious at this season, as many species of small birds are in winter, the Lark, for example, Linnets, and Buntings. Before us are some birds in the hedge, Chaffinches, which, as you observe, fly in a manner somewhat different from that of the Sparrows. Then, the Rooks, which you see high in the air, moving steadily and sedately along, with regularly-timed beats of their expanded wings, and now, as if seized with some sudden panic, or impelled by some frolicsome propensity, dashing down headlong, crossing each other, whirling and undulating: how different is their flight from that of those Wood Pigeons, which advance with rapidity, moving their wings with quick strokes, and making the air whistle as they glide along; while the two white Gulls, with their outstretched, long, arched wings, float buoyantly in the clear sky, bending gently to either side, as they advance from the sea.

There certainly is a striking difference. I never thought of comparing the flights of birds.

In time you will be able to distinguish by their modes of flying, small birds so distant that you cannot perceive even the general tints of their plumage. Birds might be classed by their flight, and an arrangement having that faculty for its basis, would, I believe, prove as useful as one founded on the form of the feet, or of any other organ. But there goes a Wren. See

what a right forward, short, whirring flight the little thing has; how it flits along the fence, perches on a stump, jerks up its tail, chirps its small sharp notes, nods and becks, and is off. There too a Hedge-Sparrow, which some call Shufflewing, from a habit of slightly raising and shaking its wings; it hops away very quietly but nimbly, gets among the roots, shifts along, and flies in under the brambles, where it conceives itself secure.

Well, all this is very amusing, but of what use? What is the amusement of school-boys cannot with propriety be the sober pursuit of men.

We are all school-boys, or at least scholars, and when we forget that we are so, we become fools. If we go to the school of Nature, and study God's providence, we can be better employed only when in the school of revelation we study God's grace. Let us ever retain our school-boy feelings, so long as they are innocent. There is a freshness of heart manifest in every real lover of nature,—a delightful feeling, gratifying not to one's self only, but to his companions. When it is gone, and the frost of worldly wisdom has chilled the affections, the naturalist becomes a pompous, pedantic, stiff-necked, cold-blooded thing, from which you shrink back unwittingly. I have the pleasure of being familiar with an ornithologist who has spent thirty years in study; who has ransacked the steaming swamps of Louisiana, traversed the tangled and trackless woods of the Missouri, ascended the flowery heights of the Alleghanies, and clambered among the desolate crags of cold and misty Labrador; who has observed, and shot, and drawn, and described the birds of half a continent. Well, what then? Has this man the grave and solemn croak of that carrion-crow, or the pertness and impudence of that pilfering jackdaw. No, I have seen him chasing tom-tits with all the glee of a truant school-boy, and have heard him communicate his knowledge with the fervour and feeling of a warm-hearted soul, as he is. Why, the man of all men for a naturalist, is he who watches larks in the fields, pursues dippers by the brooks, wades into bogs after snipes, climbs trees to get at crows' eggs, thinks nothing of fording the Esk in the midst of a snow-storm, or of scouring Guillon Sands in the dog-days. After all, tempera-

ment, education, and rank, must modify the vivacity of the individual. Wilson, the Scotch ornithologist of America, was grave and distant and discontented; yet he was a true lover of nature;—Buffon, vain and affable, and self-satisfied; and he too was a distinguished naturalist;—Linnæus, hasty, vindictive, and egregiously conceited; and yet his merits were such, that all the outcries of his numerous detractors will never drown the clear bold notes of praise that have been raised to him by those who could best estimate his faculties.

It is indeed difficult to judge of character, and impossible to determine motives, unless in certain cases, where there are manifest indications. But there goes a Magpie: run, and have a shot at him.

It is needless to pursue: a magpie chase is generally as fruitless as a wild-goose one. It is a cunning bird, sly, and sagacious; a wag too, if we may judge by its tail; a genuine chatterer, though not a Bohemian. Here is a flight of small birds drifting over the trees. Ah, there—a Sparrow-Hawk.

You have hit. Down he comes whirling through the air. He has got on his back, the fierce little fellow! How he clutches the cane, and screams. Shall I kill him?

Do:—he is doomed, and it is well to terminate his woes at once. Hit him on the back of the head. By the by, there are several ways of killing a wounded bird. One is to take it by the body and knock its head against the gun, which is not always effectual, for I have seen birds so stunned revive a long time after. Another is to press the ribs against the heart with your finger and thumb, and this is an excellent method. But the best of all, because the quickest and surest, is to thrust a pin between the occipital bone and first cervical vertebra, and cut the spinal cord, which extinguishes life in an instant.

It is a barbarous business this practical ornithology of yours, and one not well adapted for benevolent persons.

Say not so; a surgeon is not necessarily a savage. Ladies indeed cannot become practical ornithologists, although they make no scruple in spitting insects; nor, I believe Quakers, who, although they will not kill cows, yet eat beef. I cannot account for these inconsistencies. Botany is the best study for

ladies and other gentle beings; and geology for the stout-hearted rough-shod gentlemen who do not choose to stick beetles on pieces of cork, or fumble among piles of paper for dry blades. For my part, I have tried them all, but the study of Birds and Quadrupeds, with the aid of powder and shot, is that which I prefer; and I know few occupations more delightful than that of poring over the entrails of a rare bird until you have satisfied yourself as to some minute point of structure.

De gustibus nil, as the saying is. Let us go on. It is a lovely day. The few remaining leaves of the poplars have assumed a bright yellow tint, and the red foliage of the beeches rustles like a corn-field in an autumnal breeze. Few flowers are now to be seen.

Not many: there is the purple knapweed; the white dead-nettle by the hedge; the ragwort in the field; plenty of wild mint, chickweed, and groundsel among the stubble. Were it summer, we should find several beautiful plants on these clinkstone rocks; the delicate Dianthus deltoides, the glowing Lychnis viscaria, the rare Potentilla argentea. This is Blackford Hill, which they are fast demolishing for road-metal. The hills on the other side are of claystone.

What bird is that in the field? It stands, runs forward, hops a little way, stops, falls a picking at the ground, swallows something, stands again, and hops along. There are several. One utters a hoarse scream, and they are all off.

By your description I should readily know the birds. They are Missel Thrushes, the largest of the family. They too, you observe, have a peculiar flight, somewhat like that of a Sparrow-Hawk, but with intermissions of the beats of the wing at regular intervals. They are shy enough now, but very bold in the breeding season, so as to drive off the prowling Magpie, and even attack the smaller birds of prey. See, far off in the field, a flock of birds, darker, but having similar habits. They are Fieldfares, winter visitants, which appear in flocks about the end of October, and leave us in April or May. Such birds are termed migratory, and we have some that arrive in spring, breed here, and return southward in autumn, as the Wheatear, Corn Crake, Cuckoo, and Quail; and some that spend the winter

in Britain and other temperate countries, arriving in autumn, and leaving us in spring for the northern regions, in which they rear their young. The Woodcock, the Fieldfare, the Redwing, and the Snow Bunting, are of this latter kind. Again, there are birds that make their appearance in flocks, or solitarily, at uncertain periods, or once in many years, and these are called stragglers, or rare visitants. Those birds, on the other hand, such as the Rook, the Sparrow, and the Partridge, that remain with us all the year round, are said to be permanent residents. The birds of all kinds that occur in Britain in a wild state amount to nearly three hundred species.

Hark! what a singular cry that stout little bird on the top-twig utters.

Yes, an Orcadian naturalist called it a *skirl*, some one else a *reessle*. It is the Corn Bunting. You perceive that its legs dangle, or rather hang, for some time, as it flies off, at first with a straight whirring flight; but now it speeds away, rising and falling. The best sample of an undulating flight, however, you have in that Wagtail, high over head, that shoots past like an arrow, ascends with a rapid motion of its wings, closes them, and darts along, then descends, and mounts again, describing Hogarth's line of grace, or the curve of gently-heaving billows. These Partridges fly in quite a different style:—whirr, up, away, right forward, their short concave wings flapping smartly; then a short sail, with stiff-stretched pinions,—and again whirr. Most of the Gallinaceous birds fly in the same manner. The sportsman coming up behind the fence will have a shot presently.

Is it not cruel after all to shoot birds, especially for mere sport?

Perhaps it is. Some kill birds for food; and I suppose they do right. Others slaughter them to make money; and possibly they too are blameless. Some shoot for study, and some to supply the naturalists and the museums with specimens. Consider what would become of us if we had no skins. All the binary, ternary, and quinary arrangements; the rank and file extensions; the circular, inosculant, anastomosing, normal, and aberrant delineations would never have existed had there been no skins to arrange on the carpet. Without skins for

comparison, how could the marvellous discovery have been made, that the snout of a Nasua, and the "Avocetta," were "as like as it is possible, considering that one is a quadruped and the other a bird." The proboscis of an Elephant you could hardly conceive to be the counterpart of a Snipe's bill; nor the horn of a Highland Bullock that of a Game-Cock's spur; nor can I comprehend how a heavy short-winged Black Grouse should "represent in its own circle" the light, aërial, long-pinioned swallow, merely because both have a forked tail. But a real systematist thinks no more of swallowing a palpable absurdity than a Boa Constrictor does of engulphing a curly-headed "nigger"—poor fellow. As to the persons who shoot birds for mere sport, all I can say of them is that they are mere sportsmen. I have known very good men among them, and bad ones too.

But, in good earnest, do you say that in your classifications a Cow's horn is equivalent to a Cock's spur.

In the classification of some, certainly not in mine. "These appendages," says a writer whose book, just come out, I have put into my pocket, having found it so interesting that I thought a passage or two from it might amuse you, "are analogous, and perform the same functions as the horns of the ruminating quadrupeds, which represent this order in the circle of the mammalia. It is very curious, indeed, to trace the numberless points of analogy between these two groups, and to see how nature herself, in despite of their different forms, makes them to represent each other. Rasorial birds and ungulated quadrupeds (ungulata) are the only vertebrated animals which defend themselves by *kicking* their enemies."

You surprise me; but are you not in jest?

There: Read for yourself. The singularity of a fact is no proof of its want of authenticity. But, for my part, I can perceive no analogy between a spur and a horn, further than that they are both somewhat similar in form and structure. The horn of an Ox is a bony excrescence covered with a horny sheath, and so is the spur of a Cock; but the latter is the analogue of the first toe of a quadruped, and so is placed on the foot; while the former, being situated on the head, can scarcely

represent a toe. But our business is to study nature. The sun shines brightly, yet we miss the merry Lark that was wont to cheer us in spring and summer, as it clomb to heaven singing its most pleasant song. Indeed almost all the songsters are mute now, at least have ceased to emit their modulated notes, which, although not peculiar to the love-season, are certainly not continued all the year round, as some assert, when the weather is fine, and the birds are in good health. Blackbirds and Thrushes are in prime condition now, and yet their songs are not heard in the grove or on the hill. From this summit we see the Pentlands. A white mist covers the highest, and shoots out into the free space; but although it ever advances it makes no progress. It is what meteorologists have named a parasitic cloud, and is very common in mountainous countries. I have often seen it stretch for half a mile from the brow of Ben Capval, an isolated hill in the Hebrides. The aqueous particles dissolve in the air when they have advanced to a certain distance.

Let us descend and enter Braid Wood, where, I believe, some rare birds are to be found.

Not rare, but curious. The Gold-crested Wren, the Creeper, sometimes an Owl, and not unfrequently a Dipper by the brook. There, a Pheasant has sprung from among the grass, and flies to the wood with a heavy direct flight, its neck and tail stretched out. We are not qualified to shoot game, and therefore do not interfere with the rights of others.

There is a flock of very small birds scattered among the fir trees, so busily occupied that they pay no attention to us although we are beneath them. They search among the twigs, for insects I suppose, hang in various attitudes, and utter a feeble and shrill cheep, somewhat resembling that of a mouse.

These are the Gold-crested Wrens of which I spoke. There, two of them are shot. See what diminutive things, and with what a glowing crest of yellow and orange silky feathers. There are also Black Tits, and a few Blue among them. These birds pick up the insects and pupæ that have found refuge among the leaves and on the twigs; while that equally small bird, which you see running up the trunk of that oak,

searches the bark, commencing at the bottom and ascending to the twigs, then flies off, and alights near the base of another tree. The activity of these tiny creatures is astonishing, for you may watch them for hours without observing the least intermission in their labour, if labour it may be called. Let us now cross the hill in the direction of Gilmerton. Some larks spring up from among the grass, with a peculiar flittering and undulating motion, and the pipits which you hear emitting their sharp notes, fly as if hesitating which way to direct themselves.

A full corn-yard is a very pleasant sight. These stacks are neatly built, and doubtless a judicious plan it is to support them on cast-iron props. Here is a small stream. Do you see that white spot by the burn? It moves. Is it foam?

No, the Dipper, or, as it is here called, the Water Crow; a pleasant, active, little bird, ever found by streams, but by no means by burns or brooks only, being as often seen on our largest rivers, as the Tay and the Tweed. It feeds upon aquatic mollusca and insects, for which, although not web-footed, it dives. There, it shoots past with a rapid, bouncing, direct flight, very like that of a humble bee. It follows the stream, and now it perches on a stone. Stay here, and I shall procure it. I know it well, and can circumvent it.

Let me see it:—a very beautiful little fellow; black, with a white throat, and reddish-brown breast. What a number of holes in the bank!

These are the burrows of the Water Rat, *Arvicola amphibius*, which is most easily procured in the evening, or early. One moves the water among the bur-reeds. No, it is a Water Hen. Observe how lightly it swims, jerking up its tail, and shewing the white spot beneath it. Here, take a shot, and be a field naturalist in earnest. Well done! you have it. Now, let us go across the fields. * * *

We have arrived at the Gilmerton limestone. The quarries, you observe, have been excavated along a continuous line, and there you see the bed has been followed to a great depth, pillars being left to support it. Here among the fragments are remains of encrinites, terebratulæ, and other organic productions. The same limestone, after passing under the valley of the Esk,

rises to the surface at the Roman Camp, and extends over a portion of East Lothian. Let us seat ourselves on this green mound, in sight of Arthur's Seat, and all those pleasant knolls and hollows. Here is a whole thicket of Dog and Downy-leaved Roses, all in fruit. When the hard weather comes, these scarlet heps will afford a temporary supply to the small birds and thrushes. Do you see the large flock of Gulls hovering over the ploughed field?

I do. Is it not uncommon to see Gulls so far inland?

Not in winter. But they are off. Let us get across the fields to Craigmillar Castle, not regarding game-keepers, of whom I seldom fall in with more than one in a year, or steel-traps and spring-guns, of which I have never met with any, although the notices would have us believe there are scores of them in every wood. You see there is a considerable number of birds in this district. First, let us count those that may occur along the lane:—the Sparrow, the Chaffinch, the Yellow Bunting, the Blackbird, the Thrush. We have already seen the Rook, the common Gull, the Wren, the Hedge Sparrow, the Magpie, the Sparrow-Hawk, the Missel Thrush, the Fieldfare, the Corn Bunting, the Golden-crested Wren, the Black Tit, the Blue Tit, the Creeper, the Lark, the Common Pipit, the Dipper, and the Water Hen. Most of these you might easily procure in a single day. There is the old castle; but see, on that very large field, where the ploughs are going, two flocks of birds,—Gulls and Lapwings. What a glorious sight! three hundred at least, beautiful, pure white-breasted gulls—a sure sign, the farmers say, of bad weather, when they fly over the land in this manner. They are all up; they wheel round, and are off over the trees. I always regret that these lovely birds should have so vulgar a name as Gulls. Why a stupid fellow among ourselves, easily cheated, should be called a gull, is perhaps because that bird may often be caught with a small fish on a hook. But see, another most splendid flock of Lapwings, with their large, broad, black wings, and glancing white sides. I believe there are several hundreds; but there is no chance of a shot.

The ruins of Craigmillar Castle, once a favourite residence of

royalty, now a habitation for Owls and Jackdaws. What a beautiful view! Arthur's Seat, with its green and craggy slopes; Duddingston, and its quiet lake edged with reeds; the grounds and mansion of Sir Robert Dick; the village of Newington; Edinburgh, with its magnificent castle-rock; the Braid Hills, and all the intervening fields and woods.

It is a delightful district for a naturalist to live in. The numerous eminences afford a great variety of trap or igneous rocks, while the low tracts are composed of the coal formation, having beds of sandstone, shale, ironstone, and limestone, which are easily studied in the numerous quarries, and in the natural sections along the streams. Various interesting organic remains have been found in the strata: huge trees in Craigleith Quarry, teeth and scales of fishes in the Burdie House limestone, and abundance of shells in that of Gilmerton. All these the student may have the advantage of having demonstrated by the celebrated Professor of Natural History, who is a field naturalist too. Then, there could not be a better district for plants, the science that refers to which finds many keen cultivators under the guidance of its eminent Professor, as well as several not less active teachers. Of animals too, especially birds, there is good store, although I am not acquainted with a single bona fide shooting, dissecting, and collecting ornithologist in the district. In the city there are a few tolerable libraries, two good museums of natural history and comparative anatomy; plenty of societies; and, I believe, many excellent people of all classes, although I am not much acquainted with them, nor they with me.

Let us now cross the fields to gain the highway, return to our homes, continue our investigations, and, living as much as possible at peace with all men, endeavour to confer, and be ready to receive that mutual solace and aid, of which we all have need in this uncertain and eventful stage of our existence.

Although a single walk does not make a naturalist, yet the student may learn more of the habits of birds in a day in the fields, provided he take note of every occurrence, and ponder upon it, than he could in a week in his closet. But in studying ornitho-

logy it is necessary to have recourse to books and preparations as well as to the objects, alive or recently killed, themselves. Access to a museum will greatly facilitate one's progress, and it is indispensable to have a collection of skins. Every one cannot keep a large series of preparations in spirits; but a few skeletons, and skulls of all the common birds may easily be procured. Some of course make greater progress than others, and while one prefers the habits of birds, another attaches himself more especially to their external distinctive characters, and a third to their anatomy; a fourth perhaps studies more particularly their nidification, and confines his collection to eggs. But whatever be their progress, whether they be convinced they have discovered the order of nature, as some have imagined they have discovered the perpetual motion, or have humbler views of their own powers and faculties, there is no necessity for indulging in contemptuous language towards each other, as has too often been done by naturalists of all classes. Nor is it in the least becoming that one whose opinions or assertions are questioned or contradicted, should, in the pride of a spirit that ill brooks to be thwarted, consider as an indication of personal hostility the animadversions that may be dictated by a sincere regard to truth. For my own part, I have resolved never to pass over a serious error when it comes in my way, and never to seek it out merely for the purpose of exposing it. If there be men so egregiously puffed up with their own importance as to believe themselves beyond the criticism of the humblest conscientious cultivator of science, they would do well to keep their pride on spare diet. In accordance with these principles I shall always be pleased to have my errors corrected, although certainly it shall be my endeavour to leave as few as possible for correction. The great object of ambition ought to be the attainment of truth, not the support of a favourite theory; and although I have selected the digestive organs as preëminently worthy of attention, I have not done so because I have supposed them capable of affording a key to the natural system, but because the nature of the food determines not only the form and structure of the bird, but also the greater part of its daily occupations.

II. GEMITORES. COOERS.

OR PIGEONS.

THE peculiar characters of this order are those of the single family of the COLUMBINÆ, of which, in so far as is known, it is exclusively composed.

COLUMBINÆ.

PIGEONS OR DOVES.

THE beautiful, very extensive, and generally distributed family of birds commonly known by the names of Pigeons, Doves, and Turtle-Doves, appears to form an order of itself, separated by well-defined limits, but yet, as in other cases, presenting modifications of form indicative of its affinity to conterminous groups. The peculiar shape of the head and bill, more than any other external feature, serves to render the different species readily cognizable as belonging to a single tribe; for, whatever may be the size, colour, or even shape of a pigeon, it cannot be mistaken. But the relations of the family, it would appear, are not so readily perceived, some of our most approved systematists having associated them with the Passerine, others with the Gallinaceous birds, while a few consider them as constituting a distinct group. Linnæus included them all under the single genus Columba, which has merely been sectioned by M. Temminck, and from which M. Vieillot has only separated two genera under the names of Treron and Lophyrus, while

Mr. Swainson and other ornithologists have converted it into several generic groups, such as Vinago, including the thick-billed species; Ptilonopus, Columba, Turtur, Ectopistes, Peristera, and others, characterized by differences in the wings and tail, and Lophyrus, formed by Vieillot of the Great Crowned Pigeon. The latter seems to connect this family with the Cracinæ, which belong to the Gallinaceous order, while other groups manifest an affinity to the Partridges and allied genera.

The Pigeons vary much in form, some having the body full, others slender, while the tail is very short, moderate, or greatly elongated. In all however, the head, Figs. 52, 53, 54, is small, oblong, compressed, with the forehead rounded, a circumstance depending partly upon the form of the skull, and partly upon the absence of feathers at the base of the bill. The latter organ is characterized more especially by having the nasal membrane bare, generally scurfy, fleshy and tumid, with the narrow longitudinal nostrils placed under its anterior margin. It varies in size, but the upper mandible has its ridge always obliterated at the base by the encroachment of the nasal membranes, and its extremity horny, arched or convex, more or less compressed, with a blunt thin-edged point. The tongue is fleshy, tapering to a point, and triangular in its transverse section. The throat is very narrow. The œsophagus, Pl. VII, Fig. 1, *a*, *b*, *c*, *d*, *e*, *f*, *g*, is of moderate width, but expanded, or opening into a large crop, *c*, *d*, *e*, *f*, placed on the lower part of the neck and the fore part of the breast, and terminates below in an oblong proventriculus, *g*, completely surrounded with large oblong glandules. The stomach, *h*, *i*, *j*, *k*, *l*, is a powerful gizzard of a somewhat rhomboidal form, and furnished with two very thick lateral muscles, *i*, *j*, inserted into two tendinous centres, *l*, with an inferior thinner muscle, *k*, inserted into the same tendons. The middle coat is thick and somewhat cartilaginous; the inner or cuticular with two thick elliptical, transversely rugous plates, the parts opposite the edges of the organ thinner and also rugous. The intestine, *m*, *n*, *o*, *p*, *q*, *r*, is long and slender; the cœca, Fig. 4, *c*, *d*, very small and cylindrical; the rectum, *b*, *c*, very short, and but slightly enlarged.

The tarsi are generally short and stout, either scutellate or feathered. The foot, Figs. 50, 51, is of that kind equally adapted

for walking and perching, having three toes before and one behind; the middle toe considerably longer than the two lateral, which are nearly equal, and the hind toe directed backwards and shorter than the lateral. They are covered above with numerous short scutella, laterally margined, beneath flat and papillate. The claws are short, compressed, moderately arched, rather blunt.

The plumage is various, so that no general character can be derived from it, further than that the feathers have the tube very short, the shaft commonly thick, and are entirely destitute of the accessory plumule, which is largely developed in the Gallinaceous birds. The wings are for the most part large, more or less pointed, with the second, third, and fourth quills longest; but the primary quills vary in form, and present several very curious modifications. The tail is even, rounded, cuneate or graduated.

The skeleton of the Pigeons differs very materially from that of the Gallinaceous birds. The skull is small, oblong, compressed; the jaws slender, the lower considerably bent, and without an aperture or vacant space in its ramus. It bears a great resemblance to that of the Common Plover, Lapwing, and other Cursores. The intermaxillary bone is extremely slender, the nasal bones, which are joined to it on either side, remarkably small, and the nasal fossa long and slender. There are generally twelve cervical, seven dorsal, twelve united lumbar and sacral, and seven coccygeal or caudal vertebræ. The middle three dorsal vertebræ are commonly anchylosed. There are seven flat ribs, the first incomplete, and, with the last, destitute of the thin broad process, with which the rest are furnished. The sternum, Fig. 49, is very large. On comparing it with that of a Gallinaceous bird, Fig. 43, the differences and points of agreement will at once be seen. In the Pigeons, Fig. 49, the body, *b*, *c*, *d*, *e*, *g*, has the appearance of being broader, which is owing to the union of the posterior lateral processes, seen distinct in Fig. 43, *g*, which, however, are only partially united, an aperture, Fig. 49, *g*, being still left. The anterior processes, *f*, remain free, as in the Gallinaceous birds. The crest, *a*, *e*, is proportionally large and of great length; nor is it obliquely truncate at its anterior part, as in the Rasores.

There is a similar, but smaller, crest-like process, *b*, between the coracoid bones. These latter, *h*, *h*, are rather stout, but spread little. The furcula, *i*, is very slender, narrow, in the form of the letter U, and wants the flattened triangular process seen at the point of union of its crura in the Gallinaceous birds. The scapulæ, *j*, *j*, are long, linear, and slightly deflected at the end. The humerus is very short and strong, its crests very large ; the cubitus a fourth longer, the ulna curved outwards ; there are two distinct carpal bones ; the hand is longer than the cubitus ; the two metacarpal bones are united at the ends, the inner curved and very slender; the first phalanx united, broad, and thin-edged ; the last phalanx long, tapering, with a thin edge ; the pollex trigonal and pointed. The bones of the pelvis are very thin, and the limits of the sacrum are generally perceptible; the pubic bone is linear and distinct, an elongated narrow space being left between it and the ischium. The obturator foramen is complete, and the sciatic far removed from the margin. The femur is nearly straight, cylindrical, and short ; the tibia rather long, the fibula about a third of its length ; the tarsal bone is flattened transversely. The first toe has a distinct metatarsal bone, and two phalanges, the second toe three, the third four, the fourth five phalanges.

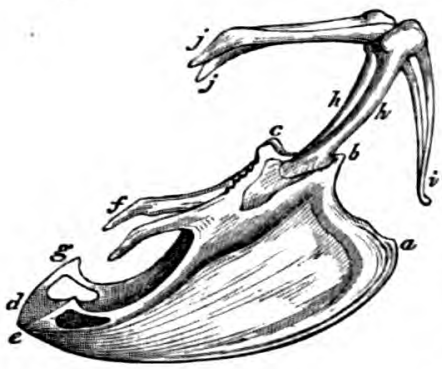


Fig. 49.

The Columbinæ feed on vegetable substances, some chiefly on soft fruits, others on nuts, seeds of grasses and other plants, some on the herbaceous parts of plants. The process of assimilation seems to take place in the following manner. The bird gradually fills its crop with seeds or other vegetable substances, which scarcely undergo any change there, it being to appearance merely a receptacle. A portion being introduced into the stomach, where it is mixed with numerous particles of quartz, is there squeezed by the action of the powerful muscles, aided by the rough and dense cuticular lining, and mixed with the mucous fluid of the proventricular glands. It is then

forced out by the pylorus, and in the duodenum is reduced to a thin pulp. In this part of the intestine it seems to undergo the process of digestion properly so called. Being then farther diluted by the biliary and pancreatic fluids, it deposits the chyle in the rest of its course, which is gradually absorbed, the residuum becoming thicker, until in the rectum it assumes a more or less concrete cylindrical form, in which state it is voided along with the urine. The intestine is about double the length of that of a rapacious bird of the same size, a circumstance probably owing to the greater difficulty of assimilating vegetable matter. It is also much longer than that of a Gallinaceous bird; but in the latter the difference is made up by the great development of the cœca, which in the Pigeons are merely rudimentary, that is, extremely small, and secreting a mucous fluid only.

A great difference between Pigeons and Gallinaceous birds therefore is found in the structure of the intestine. The œsophagus, crop, and gizzard, are similar in the two orders, as well as to a certain extent in the thick-billed granivorous birds.

Although their legs are short, Pigeons walk with great ease, and even celerity. Their flight is very unlike that of the Gallinaceous birds, being strong, rapid, and protracted. Their nests are generally placed on the branches of trees or bushes, sometimes in holes, and even on the ground. They are formed of a broad basis of twigs, often without any lining, but also often lined with various soft substances, and for the most part flat. The eggs are generally two, elliptical, and pure white; but some of the species that reside chiefly on the ground are said to lay several or numerous eggs. The young are at first scantily covered with soft down, and are fed with farinaceous or pulpy substances which have undergone some degree of maceration in the crop of the parent bird, from the mouth of which they receive it by introducing their bill sidewise. In this respect also the Pigeons differ greatly from the Gallinaceous birds. In their mode of drinking also a remarkable difference is observed; for while they immerse their bill to the base in the water and drink continuously, the Gallinaceous birds take a mouthful, elevate their head to enable them to swallow it with ease, and repeat the action until satisfied. The young

remain in the nest until able to fly, soon after which they are left to shift for themselves; whereas the young Rasores follow their mother abroad immediately after birth, and are never fed from her mouth, but pick up the substances which she points out to them.

The Pigeons, like many other birds, are fond of basking in the sun, and of rubbing themselves in the dust or sand, and scattering it over them. Their cry is a querulous or plaintive murmuring sound, more or less resembling the syllables *coo*, *roo*, and popularly termed cooing. It is chiefly uttered by the male during the breeding season.

These birds are found in all the warm and temperate parts of the globe, but are much more abundant, and exhibit the most beautiful tints, in the former, often rivalling the Parrots in the splendour of their plumage. Only four species occur in Britain, three of which are resident, the fourth, the Ringed Turtle-Dove, migratory, remaining in the south of England during the summer months. They may be briefly characterized as follows:—

GENUS I. COLUMBA. DOVE.

Bill rather short, and slender; upper mandible tumid and scurfy at the base, horny, arcuato-declinate, convex above, compressed, thin-edged, towards the end. Wings long, broad, rather acute, the second and third quills longest. Tail of moderate length, or rather long, straight, even or slightly rounded, of twelve broad feathers.

1. *Columba Palumbus. Ringed Dove* or *Cushat.* Blue, with two white spots on the neck, a white patch on the wings, the breast vinaceous.

2. *Columba Livia. White-backed* or *Rock Dove.* Blue, with two black bars on the wing, the hind part of the back white, the breast pale blue.

3. *Columba Œnas. Blue-backed Dove.* Blue, with two black bars on the wing, the back blue, the breast vinaceous.

4. *Columba Turtur. Turtle Dove.* Brownish above, with two black spots, of which the feathers are tipped with white, on the neck.

COLUMBA. DOVE.

The species of which the genus Columba is composed, although very numerous, extensively distributed over the globe, and presenting considerable differences in the texture of their plumage, agree in possessing the following general characters.

Bill shortish, rather slender, straight, compressed. Upper mandible furnished at the base with two soft tumid, bare substances, placed over the nostrils, the dorsal outline straight for one-half of its length, arcuato-declinate towards the end, the sides convex, the edges nearly straight and soft for two-thirds of their length, then decurved, direct, and sharp, the tip obtuse and edged. Lower mandible at its base wider than the upper, its crura slender and elastic, the angle long, obtuse, the dorsal outline short and slightly convex, the sides at the base erect, towards the end convex, the edges soft at the base, towards the end hard, sharp and slightly inflected, the tip obtuse but edged.

Mouth narrow; mandibles internally concave. Palate narrow, with two longitudinal ridges of skin diverging backwards, the space exterior to them ascending. Posterior aperture of the nares linear-oblong, smooth-edged, its anterior slit papillate on the edges, and with a series of small blunt papillæ on each side. No transverse flaps on the palate. Tongue sagittate, narrow, tapering to a point, triangular in its transverse section, with a medial groove above, papillate at the base, horny beneath towards the end. There are two masses of mucous crypts in the angle of the lower jaw; also a series on the lower side of the tongue on each side towards the base. Aperture of the glottis defended by acute papillæ.

Œsophagus, Pl. VII, Fig. 1, *a*, *b*, *c*, immediately dilated,

and anterior to the thorax enlarged into a crop, *c*, *d*, *e*, *f*, of great size, projecting equally on both sides, membranous, and destitute of glandules. The intrathoracic part of the œsophagus, *f*, *h*, narrow, its inner membrane raised into longitudinal rugæ, covered with mucous follicles. The proventriculus, *g*, with large but short four-sided glandules. Stomach, *i*, *j*, *k*, *l*, a powerful gizzard of a subrhomboidal form, with the two lateral muscles, *i*, *j*, transverse, the lower, *k*, thin, its fibres inserted in the central tendons, *l*, under the rest, the upper fibres, *h*, obliquely circular. The middle coat rather thick and tough; the inner or cuticular with rather regular longitudinal rugæ on both sides. The cardiac orifice is situated in a transverse depression, between the slight upper lobe and the lateral muscle, and has no valvular apparatus. Intestine, *m*, *n*, *o*, *p*, *q*, *r*, long, slender, wider in its duodenal fold, *m*, *n*, *o*, the rest doubled in the greater part of its length. Cœca, Fig. 4, *c*, *d*, very small, cylindrical. Rectum, *b*, *c*, very short, slightly enlarged. The duodenum within is smooth, the rest of the small intestine villous, the rectum granulated.

Nostrils linear, direct, in the lower and fore part of the nasal membrane, which, as already mentioned, is thick, fleshy, vaulted, and scurfy. Eyes of moderate size; eyelids generally bare, destitute of ciliæ. External ears of moderate size, roundish, the tube funnel-shaped.

Fig. 50.

Fig. 51.

Head oblong, small, compressed, the forehead prominent. Neck rather short. Body ovate, compact. Legs short, rather strong; tarsi very short, roundish, anteriorly covered with one or two series of scutella, behind scurfy. Toes of moderate size; the first on the same level as the rest, directed backwards, about half the length of the third; the second and fourth intermediate and nearly equal, the outer being very little longer; all covered above with numerous short scutella,

beneath flattened and covered with roundish depressed papillæ, the margins rounded and papillate, without basal webs. Claws short, arched, compressed, rather acute until worn.

Plumage various, the feathers generally ovate or oblong, compact, unglossed in the British species, excepting on the neck. Exotic species however differ in some of the characters of the plumage; but all that I have examined agree in the following respects:—The feathers have extremely short tubes; thick, internally spongy shafts; their downy part extended to near the end, and the plumule or subsidiary downy feather wanting. The wings are long, broad, rather pointed, the second quill longest, the first little shorter; the quills about twenty-five; the primaries somewhat narrowed towards the end, a few of the outer with obscure indications of a sinus on the edge of their inner web; the secondaries broad and obliquely rounded. The tail is generally of moderate length, even or rounded in various degrees, and composed of twelve broad feathers.

The genus Columba, as above defined, is composed of birds varying in size from that of a Crow, Corvus Corone, to that of a Thrush, Turdus musicus. It has representatives in almost every habitable part of the globe; and the species are remarkable for elegance of form and beauty of colouring. Their flight is rapid, as might be inferred from the structure of the wings. They reside in woods, thickets, and rocks, nestling in elevated places, but usually feeding in the open country. Their food, consisting of seeds of gramina and other plants, nuts, fruits of various kinds, with roots, and other parts of vegetables, is first deposited in the crop, then pounded in the gizzard, reduced to a pulpy state in the duodenum, deprived of its nutritious parts in the small intestine, which is longer than in the Gallinaceous birds, and its refuse passed in a more or less concrete cylindrical form. They differ from the birds just mentioned in having the cœca undeveloped, in being destitute of gall-bladder, and in many other important circumstances mentioned in the character of the family.

The flight of the Pigeons affords a beautiful example of that peculiar kind which is direct, rapid, light, and steady. By

direct, I mean performed in a straight course without undulations; by rapid, ordinarily swift, and capable on occasion of being urged to great celerity; by light and steady, a kind of buoyancy, intermediate between the laboured flight of heavy birds, and the wavering motion of those which have very long wings and a short tail. The flaps of a pigeon's wing are smart, and the interval occupied in raising and extending the wing is greater than the time of its downward and inward action. On this subject I shall take occasion to speak elsewhere, it being one of great interest. Birds might be classed by their modes of flight so as to form natural groups, and at least twenty distinct kinds of flight are presented by the species which inhabit our own country.

Four species of this genus are found in Britain. Of these, three, the Ringed Dove, the Blue-backed Dove, and the Rock Dove, are permanently resident, while the fourth, the Turtle Dove, is a summer visitant. They agree in forming a rude flat nest, in having two elliptical, smooth, white eggs, in rearing more than one brood in the year, in uttering a plaintive murmuring note, in feeding in open places, and in being more or less gregarious, even in the breeding season.

COLUMBA PALUMBUS. THE RINGED DOVE, OR CUSHAT.

RING DOVE. WOOD PIGEON. CUSHAT. QUEST. CUSHIE DOO. CALMAN-CHOILLE.

FIG. 52.

Columba Palumbus. Linn. Syst. Nat. I. 282.
Columba Palumbus. Lath. Ind. Orn. II. 601.
Ring Dove. Mont. Orn. Dict.
Colombe Ramier. Columba Palumbus. Temm. Man. d'Orn. I. 444.
Ring-Dove or Cushat. Columba Palumbus. Selb. Illustr. I. 406.
Columba Palumbus. Ring-Dove. Jen. Brit. Vert. An. 161.

Plumage of the upper parts greyish-blue; wings and scapulars tinged with brown; hind part and sides of the neck bright green and purplish-red, with two cream-coloured patches; fore part of neck and breast light reddish-purple; a white patch on the wings, including the four outer secondary coverts.

MALE.—The Ringed Dove, Wood Pigeon, or Cushat, which is the largest of our native species, is perhaps not remarkable for elegance of form or beauty of colouring, when compared with other birds of this extensive family, although it is by no means deficient in either quality. It is a strong bird of its size, having the body large and full, the neck rather short, the head small, the feet short and strong, the wings and tail rather long.

The bill is of moderate length, rather slender, straight; the tumid basal membrane irregularly granulated, the dorsal outline of the upper mandible towards the end arcuato-declinate, the sides convex, the edges straight and soft for two-thirds of their length, then decurved, direct, horny, the tip obtuse and edged; the lower mandible with the angle long, narrow and rounded, the dorsal outline slightly convex, the edges sharp and decurved towards the tip, which is rather acute.

Both mandibles are internally concave, the upper with a central ridge. The palate is flattened in the central space, and externally of the two soft diverging ridges slopes upwards. Parallel to the anterior slit, which is papillate on the margins, on each side is a single series of small papillæ. The œsophagus, which is seven inches and a quarter long, measured from the base of the tongue to the stomach, dilates immediately, and continues enlarging, until it is suddenly expanded into a membranous sac, or crop, two inches and a quarter in length, three inches and a quarter in breadth, and lying across the neck and fore part of the thorax. On entering the latter, the œsophagus gradually contracts to half an inch. The transverse muscular fibres are conspicuous, the inner coat smooth until at the lower aperture of the crop, when it is raised into seven longitudinal rugæ, three inches long, converging downwards, and terminating near the proventriculus. These rugæ are covered with mucous crypts. The proventriculus is one inch long; its glands ovate and large. The gizzard is an inch and three-fourths in length, an inch and a half in breadth, and three-fourths in thickness. Its muscular coat is composed of two thick lateral muscles, a lower thin muscle over the fundus, and a series of circular fibres at the upper part. The middle coat, which is continuous with the inner membrane of the œsophagus, is thick and tough. The inner or cuticular coat is marked with regular longitudinal rugæ on the transversely elliptical spaces opposite the thickest parts of the muscles.

The pylorus is situated in a fissure between a small bulging and the upper edge of the right muscle, and is destitute of any valvular apparatus. The intestine is six feet six inches long. The first fold incloses the pancreas as usual, which is two inches

and a half in length; it continues upwards beneath the right lobe of the liver, receiving the biliary ducts, then curves downwards on the right side, is convoluted on the mesentery, being for the greater part of its length doubled, the descending portion distinguishable from the ascending by its lighter colour. The rectum is two inches long; the cœca four-twelfths of an inch in length, cylindrical, rather pointed, one-twelfth in diameter. The inner surface of the duodenal portion is smooth, of the rest villous, of the rectum granulated and glandular. The diameter of the intestine is four-twelfths in its upper part, three-twelfths in the lower; that of the rectum is four-twelfths and a half.

The eyes are rather small; the eyelids bare, and without ciliary bristles, their aperture four and a half twelfths. The nostrils are linear, wider at the fore part, three-twelths long. The aperture of the ear is roundish, of moderate size, three-twelfths in diameter, the tube funnel-shaped.

The feet are short and rather strong; the tarsi very short, feathered anteriorly nearly half-way down, with five large scutella, the hind part with flat granules. The first toe, which is shortest and thickest, has eight, the second eleven, the third sixteen, the fourth fifteen scutella. The claws are small, arched, compressed, and rather acute.

The plumage is of ordinary texture above, rather blended beneath. The feathers are generally ovato-oblong; those of the head short, of the sides and hind part of the neck imbricated, with flattened shining filaments. The wings are long and broad. The primary quills ten, broad, obliquely rounded; the second and third longest, the first nearly as long as the fourth. The secondaries twelve, broad, rounded, the inner short. The tail is long, very ample, slightly rounded, of twelve very broad, rather abruptly rounded feathers.

The bill is horn-coloured, or greyish-yellow, at the end, its soft basal parts deep red, the tumid portion whitish. The iris is pale yellow, the eyelids flesh-coloured, the bare skin in their vicinity blue. The tarsi and toes are anteriorly carmine-purple, posteriorly flesh-coloured; the claws dark-brown.

The head and upper part of the neck are greyish-blue; the

imbricated feathers of the neck bright green, some of the lateral on each side cream-coloured; under them is a broad zone of purplish. The fore part of the back and the upper surface of the wings are greyish-blue, tinged with brown. The alula, primary coverts and primary quills, are greyish-black, the outer edges of the latter white. There is a large patch of white on the wing, extending from the flexure to the four outer secondary coverts. The middle and hind part of the back light greyish-blue, the tail-coverts darker. The tail is dull greyish-blue at the base, lighter in the middle, greyish-black at the end; its lower surface is greyish-black, with a medial band of bluish-grey. The lower part of the neck anteriorly is brownish-purple, that colour on the breast and sides gradually fading into light greyish-blue, which is the colour of the feathers on the legs and under the tail, as well as of the lower wing-coverts and axillaries. The downy part of the plumage is greyish-white.

Length to end of tail $17\frac{1}{2}$ inches; extent of wings 30; wing from flexure $10\frac{1}{2}$; tail 7; bill along the back 1, along the edge of lower mandible $1\frac{2}{12}$; tarsus $1\frac{2}{12}$; first toe $\frac{8}{12}$, its claw $\frac{5}{12}$; second toe $\frac{11}{12}$, its claw $\frac{5}{12}$; third toe $1\frac{4}{12}$, its claw $\frac{6}{12}$; fourth toe $\frac{11}{12}$, its claw $4\frac{1}{2}$ twelfths.

The dimensions of another individual were:—Length to end of tail 18 inches; extent of wings 31; wing from flexure 10; longest quill $7\frac{3}{4}$; tail $6\frac{1}{4}$; bill along the back $\frac{11}{12}$, along the edge of lower mandible $1\frac{1}{12}$; tarsus $1\frac{3}{8}$; middle toe and claw $1\frac{3}{4}$. Œsophagus 6 inches long; gizzard 2; intestine 7 feet, the two small cœca 2 inches from the extremity.

Female.—The female differs very little from the male in external appearance, the colours being merely a little duller, the quills and dark parts of the tail tinged with brown. Length $17\frac{1}{4}$ inches, extent of wings 30.

Variations.—I have not met with any remarkable variations of colouring in this species. The tints of the plumage undergo little change from the period of the moult, until it drops off. New feathers may be seen on this bird at all seasons, excepting in the middle of winter, shewing that in it, as in the grouse

and ptarmigans, the shedding of the plumage is a very gradual operation.

Habits.—The Ringed Dove reposes on the larger branches of tall trees, especially beech, ash, and pine, in hedge-rows, avenues, or plantations, whence it issues at sunrise, to search the open fields for its food, which consists of seeds of the cultivated cereal grasses,—wheat, barley, and oats; as well as of leguminous plants,—beans and pease; and of the field mustard and charlock. In spring it also feeds on the leaves of the turnip, and picks the young blades of the red and the white clovers. At this season, I have several times found its crop distended with the farinaceous roots of Potentilla anserina, obtained in the ploughed fields. This root is highly nutritious, and formerly, in seasons of scarcity, was collected in the West Highlands and Hebrides as an article of food, and eaten either boiled, or roasted in the peat ashes. In summer they eat grasses and other vegetable substances; in autumn grain, beech mast, acorns, and leguminous seeds. The beech-nuts and acorns they swallow entire, their bill not being sufficiently strong to break them up.

The species is generally distributed, being found in all the more or less wooded districts of England and Scotland; but it prefers cultivated tracts, avoiding those which are bare and rocky; and as it does not repose at night on rocks, it is not met with in the unwooded isles of the north. In winter it appears in large flocks, sometimes amounting to many hundreds, when the individuals of a district congregate in some favourable locality, although in ordinary circumstances it is not so decidedly gregarious as the Rock Dove. It has a strong and rapid flight, performed by quick beats of the half-extended wings, with occasional intermissions, its pinions sounding as it glides along; and when on an excursion to a distant part, it flies high above the trees, whereas the species just mentioned generally proceeds at a small elevation. When it has espied a place likely to afford a supply of food, it alights abruptly, and usually stands for a short time to look about, after which it commences its search. On the ground its position is a little declined, the tail nearly touching the surface; and, when feeding, owing

to the shortness of its legs, its breast is but slightly elevated. It walks in the manner of the Domestic Pigeon, that is, with short and quick steps, moving its head gently backwards and forwards. The flock disperses and spreads over the field, it being seldom that two or three individuals keep close together, and they generally take care not to approach the enclosing walls or hedges, so that it is difficult to shoot them on the ground. In the time of snow or hard frost, they frequent turnip fields, and are more easily approached; but in general they are very suspicious and vigilant, ever ready to fly off on the slightest appearance of danger. Even by clear moonlight, when I have tried to shoot them on their roosts, they perceive their enemy before he can discover them. Frequently, however, in the woods, more especially in the breeding season, one may surprise them within shooting distance; and, by waiting for their arrival at their roosting places in winter, considerable execution may occasionally be done among them. As the flesh of this pigeon affords a sufficiently palatable article of food, it is abundant in our markets in winter and spring, but generally brings a low price, from sixpence to a shilling.

The Cushats betake themselves to their roosting places in the woods soon after sunset, and before settling, usually wheel round the spot selected. Should they be disturbed, they fly off to a short distance, and return; but if repeatedly molested, they betake themselves to a distant station. In severe weather they sometimes perform partial migrations, but in general are stationary, not finding it necessary to extend their range in the cultivated and sheltered districts, where turnips may always be had during the winter.

In fine weather they bask in the sun, on dry banks, or in the open fields, rubbing themselves, and as it were burrowing, in the sand or soil, and throwing it up with their wings, as if washing in water, which they also do, like most birds. In drinking, they immerse the bill to the base, and take a long draught, a circumstance in which, as I have already remarked, the Pigeons differ from the Gallinaceous birds. Nor does the Cushat scrape up the earth with its feet, when searching for food.

Early in spring the flocks break up, and by the beginning of March the individuals of which they were composed have paired. Their courtship is conducted much in the same manner as that of the Domestic Pigeon, the male strutting with elevated head, protruded breast, and quick step, round the female, or, if on a branch, performing various movements and often turning round, as he utters his murmuring love-notes. At times, he rises in the air, produces a smart noise by striking the points of his wings against each other, descends, rises again, and thus continues to gambol in the presence of his mate. The cooing of this species may be imitated by pronouncing the syllables *coo*, *roo*, *coo*, *coo*, the two last protracted. It is softer, deeper, and more plaintive than that of the Rock Dove.

The nests are to be found in woods and plantations, being placed on a branch or in the fork of an oak, beech, fir, or other suitable tree, more especially a fir or pine; and in the latter case often only a few feet from the ground. Sometimes a nest may be seen in a holly or hawthorn bush, or in a hedge, but in general a thick wood is preferred. It is composed of twigs loosely put together, in a circular form, flat above, and varying in thickness from two to four inches. The eggs are always two, of a regular oval or sometimes elliptical form, pure white, glossy, an inch and seven-twelfths in length, one and two-twelfths in breadth, the narrowest being a twelfth less. It would appear that two or even three broods are reared in the year. The first young are abroad by the beginning of May, the second in the end of July; but I am not assured that in ordinary circumstances, that is, when it is not robbed of its eggs or young, this bird breeds more than twice in the year. I have however seen unfledged young so late as October, and I have before me a pair with down tips to their feathers obtained in the Edinburgh market on the 26th of that month.

Young.—The young are at first rather scantily covered with a yellowish down, and when fledged are of the same colours as the adult, but duller and tinged with brown, the white spots on the neck and the changing tints of that part being wanting.

Birds that require a powerful flight, and find it necessary to betake themselves to the open country, have their first plumage nearly as strong as the second; and this is the case with the present species, as well as the Rock Dove.

Progress toward Maturity.—At the first moult, the colours are perfected, the only change that they afterwards undergo being to a somewhat deeper and purer tint.

Remarks.—According to authors, the Ringed Dove is generally distributed over Europe, but is more abundant in the southern parts. The domestication of this species has often been attempted, but almost always without success; for although individuals become perfectly tame in confinement, they embrace the first opportunity to regain their freedom. "We have been at considerable pains," says Montagu, "to endeavour to domesticate this bird; and though we have tamed them within doors, so as to be exceedingly troublesome, yet we never could produce a breed, either by themselves, or with the tame pigeon. Two were bred up together with a male pigeon, and were so tame as to eat out of the hand; but as they shewed no signs of prolificacy in the spring, they were suffered to take their liberty in the month of June, by opening the window of the room in which they were confined, thinking the pigeon might induce them to return to their usual place of abode, either for food or to roost; but they instantly took to their natural habits, and we saw no more of them, although the pigeon continued to return."

Mr. Neville Wood however is of a contrary opinion. In a paper on the habits of this bird, inserted in the third number of the *Naturalist*, p. 130, he has the following paragraph:—"The impossibility of taming this bird and of domesticating it, in the manner of the Rock Pigeon, has often been mentioned, but I should imagine this statement has either been copied from other authorities, or the experiment has not been properly tried. Two years ago I reared a male Ring Pigeon from the time when it would have left the nest, always supplying it with green peas, beans, &c., until it was able to feed itself. When full grown, I turned it out and fed it with my other

dovecot Pigeons, with which it constantly remained several months, except on one occasion, when it flew off to a considerable distance, but returned, to my surprise, after an absence of a few hours. It found some difficulty in keeping up, on the wing, with the tame pigeons, several of which were tumblers, as wild pigeons are not accustomed to turn rapidly and frequently in the air. This bird sickened and died after I had possessed it six months, and I have not since had an opportunity of renewing the experiment; but doubt not it would succeed with common care."

COLUMBA LIVIA. THE WHITE-BACKED, OR ROCK DOVE.

WILD PIGEON. ROCK PIGEON. WILD DOVE. ROCK DOVE. DOO. CALMAN FIADHAICH.

FIG. 53.

Colombe Biset. Columba Livia. Temm. Man. d'Orn. II. 447.
Rock Dove. Columba Livia. Selb. Illustr. I. 410.
Columba Livia. Rock Dove. Jen. Brit. Vert. An. 162.

Plumage of the male light greyish-blue; the neck splendent with green and purplish-red; the middle of the back and the lower wing-coverts white; two black bands on the wing, one on the six inner secondary quills, the other on the secondary coverts; bill brownish-black. Female similar, the green and purple of the neck less extended.

MALE.—The Rock Dove, which is the original of our domestic pigeons, is a very beautiful bird, although its style of colouring is less gaudy than that of many exotic species. It is of a compact form, the body being rather full, the neck rather short, the head small, the feet short and strong, the wings rather long, the tail of moderate length.

The bill is short, slender, and straight; the tumid basal membrane scurfy, the dorsal outline of the upper mandible straight for half its length, then arched and declinate, the edges soft at the base, the tip compressed, with the edges inflected; the lower mandible weak at the base, its sides nearly erect, the

edges towards the end sharp and inflected, the tip obtuse, the angle small. Both mandibles are deeply concave internally. The mouth is only four-twelfths of an inch across. The tongue is very slender, seven and a half twelfths in length, emarginate at the base, horny towards the end, and pointed.

The eyes are rather small; the eyelids bare, and having in their vicinity a bare space of considerable extent. The nostrils are linear, wider anteriorly, two and a half twelfths long. The aperture of the ear is roundish or obliquely oblong, a line and a half in diameter.

The tarsi, which are very short, and feathered anteriorly one-third down, have five entire and two lower divided scutella, their hind part soft, without scales, but scurfy. The first toe has six, the second eight, the third fourteen, the fourth eleven scutella. The claws are arched in the third of a circle, compressed, rather acute, the dilated inner margin of that of the third toe usually broken near the tip, and undulated.

The plumage is generally compact, short, and imbricated; on the abdomen downy and blended. The feathers are mostly ovate and rounded, those of the lower part of the neck all round have their filaments flattened and shining. The wings are rather long and acute; the primaries tapering, the second longest, the first almost equal, the third considerably shorter; the secondaries twelve, short, obliquely truncate. The tail is straight, slightly rounded, the feathers broad and abruptly rounded.

The horny part of the bill is brownish-black, as is the anterior half of its tumid portion, of which the rest is white. The iris is bright yellowish-red; the bare space around the eye flesh-coloured. The tarsi and toes are carmine-purple; the claws dark greyish-brown or black.

The general colour of the plumage is light greyish-blue, the lower parts being as deeply coloured as the upper. The middle of the neck all round is splendent with green, its lower part with purplish-red. The back and the upper part of the sides, from near the shoulders to near the tail, are pure white, as are the lower wing-coverts and axillaries. The primaries and their coverts are brownish-grey on the outer web, the former

dusky towards the end, as are the outer secondaries. There are two broad bars of black on the wing, one extending over the six inner secondary quills, the other over the secondary coverts, the outer two excepted. The tail has a broad terminal band of black, and the outer web of the lateral feather is white. The downy part of the feathers is greyish-white, excepting on the white part of the back, where it is pure white.

Length to end of tail 14 inches, to end of wings when closed $12\frac{3}{4}$; extent of wings 27; wing from flexure $9\frac{3}{4}$; tail 5; bill along the back $\frac{10}{12}$, along the edge of lower mandible 1; tarsus $1\frac{2}{12}$; first toe $\frac{1}{2}$, its claw $\frac{4}{12}$; second toe $\frac{10}{12}$, its claw $\frac{5}{12}$; third toe $1\frac{2}{12}$, its claw $5\frac{1}{2}$ twelfths; fourth toe $\frac{11}{12}$, its claw $4\frac{1}{2}$ twelfths.

Female.—The only external differences which the female presents consist of her being a little smaller, and having the shining colours on the neck less extended. The scutella on the tarsus of an individual were eight, on the first toe six, the second nine, the third thirteen, the fourth eleven.

Length to end of tail $13\frac{1}{2}$ inches; extent of wings $26\frac{1}{2}$; wing from flexure $9\frac{1}{2}$; tail $4\frac{3}{4}$; bill along the back $\frac{10}{12}$, along the edge of lower mandible 1; tarsus $1\frac{3}{12}$; first toe $\frac{1}{2}$, its claw $\frac{4}{12}$; second toe $\frac{10}{12}$, its claw $\frac{5}{12}$; third toe $1\frac{2}{12}$, its claw $5\frac{1}{2}$ twelfths; fourth toe $\frac{11}{12}$, its claw $4\frac{1}{2}$ twelfths.

Variations.—Among the vast numbers of undoubtedly wild birds of this species which I have seen, I have not observed any remarkable variations of form or colour. The dark-coloured, purple, and white individuals, which are occasionally seen consorting with the wild doves, or residing in maritime caves or rocks, are in all probability domestic birds that have betaken themselves to the original mode of life of the species. As the moulting season approaches, the blue tint becomes much paler, especially on the wings. The outer primary quills are often tinged with brown, in consequence of the bird's striking the ground with its wings when commencing its flight, and the bill is frequently more or less crusted with earth or mud, which, however, is the case with many other birds, as the Rook, the Blackbird, the Common Thrush, and the Field

Lark. Individuals vary in length from 13 to 14 inches, and in the extent of their wings from 24 to 27.

Habits.—At the western extremity of Ben Capval, a promontory of one of the remote Hebrides, is a vast mass of rock, broken by gaps and fissures into projecting crags and sloping shelves, and looking as if originally produced by the separation of a portion of the mountain which had sunk into the depths of the ocean that heaves its billows against the rugged shores. At the summit is an aggregation of angular fragments, the termination of an elevated ridge, and midway down is a green slope, horizontally traversed by several paths formed by the sheep, which at all seasons, but especially in spring, are fond of rambling among the crags, in search of fresh pasturage. The declivity terminates on the sinuous and angular edge of precipices several hundred feet in height, near the upper part of which a pair of White-tailed Eagles have fixed their abode, while the crevices are here and there peopled by starlings. The shelves of those rocks are totally inaccessible by ordinary means, although an adventurous shepherd or farmer sometimes descends on a rope held by half a dozen people above, to destroy an eagle's nest, or rescue a sheep which has leaped upon some grassy spot, and is unable to reascend; but on one side, by a steep and slippery descent in a fissure, one may penetrate to the base, where he discovers a hole in the rock barely large enough to admit him on his hands and knees. This hole is the entrance of a narrow passage in a crevice roofed with fallen blocks. On one hand is a recess, in which a person might recline at full length, and which was actually employed as a bed by Mr. Macleod of Berneray after the battle of Culloden; and a few yards farther, the crevice opens into an irregular cave communicating seaward with the open air, and formed by a rent in the rock, filled above with large blocks that seem ready to fall. The heavy surges of the Atlantic continually dash against a heap of stones, which partially block up the mouth of the cave. On this heap the Crested Cormorants nightly repose, and in summer rear their young. The little shelves and angular recesses of the roof and upper

parts of the cavern are tenanted by pigeons, the light blue of whose plumage has a beautiful appearance, relieved as they are by the dark ground of the moist rocks, and the soft murmur of whose notes comes upon the ear with a pleasing though melancholy effect. There, and in other places of a similar nature, have I watched these beautiful birds, until I rendered myself in some measure familiar with their habits; and amid such wild and desolate scenes have I loved to wander and indulge in the not less wild imaginings of a spirit that desired to hold converse with the unseen but ever present Spirit of the universe.

At early dawn the pigeons may be seen issuing from these retreats in straggling parties, which soon take a determinate direction, and meeting with others by the way, proceed in a loose body along the shores until they reach the cultivated parts of the country, where they settle in large flocks, diligently seeking for grains of barley and oats, pods of the charlock, seeds of the wild mustard, polygona, and other plants, together with several species of small shell-snails, especially Helix ericetorum and Bulimus acutus, which abound in the sandy pastures. When they have young, they necessarily make several trips in the course of the day; but from the end of autumn to the beginning of summer they continue all day in the fields. In winter they collect into flocks, sometimes composed of several hundred individuals; and, as at this season they are anxious to make the best use of the short period of day-light, they may easily be approached by a person acquainted with the useful art of creeping and skulking. In general however they are rather shy, and very seldom allow a person to advance openly within sixty or seventy yards. It is not uncommon to kill four or five at a shot; and on this subject I have heard many marvellous tales in the Hebrides; but as I intend to confine my relation to my own experience, I can only state, that, during a snow-storm, when the pigeons had assembled in a corn-yard remote from houses, I once killed twenty-three at three successive shots; that is, nine for the first, eight for the next, and six for the third. Two or three wounded made their escape to the rocks in the immediate neighbourhood.

The manners of the Rock Doves are similar to those of our domestic pigeons, which are evidently descended from individuals of this species. When searching for food, they walk about with great celerity, moving the head backwards and forwards at each step, the tail sloping towards the ground, and the tips of the wings tucked up over it. In windy weather they usually move in a direction more or less opposite to the blast, and keep their body nearer to the ground than when it is calm, the whole flock going together. When startled, they rise suddenly, and by striking the ground with their wings produce a crackling noise. When at full speed they fly with great celerity, the air whistling against their pinions. Their flight is very similar to that of the Ringed and Golden Plovers, birds which in form approach very nearly to the Pigeons, as may be seen more especially on comparing their skeletons; and as this affinity has not been observed by any other person, I would direct the attention of ornithologists to it. They usually alight abruptly when the place is open and clear, and if very hungry immediately commence their search; although on alighting they frequently stand and look around them for a few moments. On other occasions however, they fly over the field in circles, descending gradually. When flying from the rocks to the places where they procure their food, and when returning in the evening, they do not mount high in the air; and when passing over an eminence they fly so low as almost to touch it. When the wind is very high, and their course is against it, they fly in the same manner, taking advantage of the shelter. It used to afford me much pleasure, and probably would be interesting to most people, to observe from one of the wild headlands of Harris, the pigeons flying swiftly and silently towards their homes, along the cliffs, while every now and then a string of cormorants, gannets, or guillemots would come up, and a straggling flock of gulls pursue their route in a desultory manner.

The notes of the Rock Dove resemble the syllables *coo-roo-coo* quickly repeated, the last prolonged. It is monogamous, as I apprehend all wild birds, even the Gallinaceous, are, and its nuptials are celebrated with much cooing and circumambu-

lation on the part of the male. A love-scene among the rocks is really an interesting sight. Concealed in a crevice or behind a projecting cliff, you see a pigeon alight beside you, and stand quietly for some time, when the whistling of pinions is heard, and the male bird shoots past like an arrow, and is already beside his mate. Scarcely has he made a rapid survey of the place, when directing his attention to the only beautiful object which he sees, he approaches her, erecting his head, swelling out his breast by inflating his crop, and spreading his tail, at the same time uttering the well known *coo-roo-coo*, the soft and somewhat mournful sounds of which echo among the cliffs. The female, shy and timorous, sits close to the rock, shifting her position a little as the male advances, and sometimes stretching out her neck, as if to repel him by blows. The male continues his strutting and cooing, until the female, inadvertently coming upon the edge of the shelf, flies off to the dark recesses of the neighbouring cave, where she has scarcely alighted when her lover is again by her side.

Matters go on in this manner, and in the meantime a nest is gradually formed, which consists of withered stalks and blades of grass or other plants, not very neatly arranged, but disposed so as to answer the intended purpose. Two beautiful white eggs, of an elliptical form, one an inch and four twelfths in length, an inch and one twelfth in breadth, the other a little shorter, are then deposited, and in due time the young make their appearance. During incubation the male supplies his mate with food, which she picks from his throat as he forces it up from the crop. Even at other times the female often goes up to the male, introduces her bill on one side into his mouth, and obtains a grain of barley or a morsel of other food. In about three weeks, the young come abroad, and after being fed and instructed by their parents for some days, are left to shift for themselves.

The old birds soon repair their nest, and rear another brood. I cannot speak with certainty as to the precise number of broods raised in the course of a season, but I know that there are at least two. The first eggs are laid about the middle of April, and the latest young are seen about the end of September. It appears to me probable, from circumstances which have come

under my observation, that the same nest is used for different broods; and it is commonly believed, and not improbable, that these birds pair for life. The young are fed by their parents, who applying their open mouth to that of the nestling, the mandibles of which enter the pharynx, force up the food from their crop so as to be within reach of the bill of the young, which all the while flaps its wings, and utters a low cheeping note, indicative of its eagerness to have its wants supplied.

There can be no reasonable doubt that the Rock Dove is the original of our domestic pigeons, in fact the true Stock Dove, although that name has been given to another species. Individuals of the domesticated race which cannot be distinguished from those of the wild, are of common occurrence; and, however highly varieties may be prized, the blue, white-backed race is certainly the most beautiful. I have seen in the Hebrides a few house pigeons which had deserted and lived among the wild doves. In various places along the east coast of Scotland, as at the Cove near Aberdeen, at Dunottar Castle near Stonehaven, and the Bass Rock in the Frith of Forth, I have observed wild pigeons among the rocks. Some of them presented the pure unvarying tints of the Rock Dove, while others were of different shades of blue or purple. These were in all probability domestic pigeons that had run wild, and their descendants. Two individuals, shot by Mr. De Jersey, in May 1824, on the Bass, were so precisely similar to the Rock Doves of the Hebrides, that I believed them to be of the genuine stock; but the best places for studying the habits of the species, or for procuring specimens, are the islands of Lewis, Harris, Uist, Barray, Skye, the northern coasts of Scotland, the Shetland and Orkney Islands. I have also received specimens from the Mull of Cantyre, which were presented to me by Dr. Macdonald of Ballysher.

The boys in the Outer Hebrides often attempt to rear young doves, but their cares are seldom continued long enough. They introduce the food, dry barley grain, by the side of the mouth, which occasions inflammation and swelling of the basal margins of the mandibles. When a boy, I had a young Rock Dove, which I fed for some time in this manner, until the bill

became tumid and sore, when, in consequence of advice from a friend, I took a mouthful of barley and water, and introduced the pigeon's bill, when the bird soon satisfied itself, flapping its wings gently and uttering a low cry all the while. It grew up vigorously, shed the yellow down-tips of its feathers, and began to fly about. Towards the middle of autumn it renewed its plumage, and assumed the bright and beautiful tints of the adult male. Whenever I escaped from the detested pages of Virgil and Horace, the pigeon was sure to fly to me, and sometimes alighted on my head or shoulder, directing its bill towards my mouth, and flapping its wings. Nor did it ever fly off with the wild pigeons, which almost every day fed near the house, although it had no companions of its own species. At length some fatal whim induced it to make an excursion to a village about a mile distant, when it alighted on the roof of a hut, and the boys pelted it dead with stones. Long and true was my sorrow for my lost companion, the remembrance of which will probably continue as long as life. I have since mourned the loss of a far dearer dove. They were gentle and lovely beings; but while the one has been blended with the elements, the other remains "hid with Christ in God," and for it I "mourn not as those who have no hope."

The domestic varieties of the Rock Dove are very numerous. The most beautiful, in my estimation, is the most common, the blue, white-backed pigeon, which is in all respects similar to the wild stock, only in general a good deal larger. The first remarkable change is when the white of the back is substituted by blue. Then there are dark-blue, purple, spotted blue and purple, pale red, white, and variously coloured pigeons, all without much change of form, and all therefore esteemed vulgar. Some of the breeds are of great size, without much difference of form, as the Roman and Maltese. Others exhibit various distortions and disfigurations, which are highly esteemed by pigeon-fanciers. Thus the Jacobine has a ruff of incurved feathers about the neck; the Tumbler, a remarkable increase in number of the tail-feathers, which are kept spread like a fan; the Turkish or Carrier pigeon has a kind of wattles about the eyes and the base of the bill; and the Cropper

is deformed by a vast inflated crop, which is sometimes double, forces the bird to draw back its head, and gives its body an unnatural degree of obliquity. These monstrosities, like double flowers, please persons of monstrous tastes, but are inconsistent with true beauty, and as much inferior to their originals in grace as a huge city dame, bloated and covered with flounces, frills, and ribbons, is to a rustic maiden clad in simple attire, and glowing with the ruddy hue of pure and uncontaminated blood.

Young.—The young, which at first are covered with loose yellow down, are when fledged of the same colour as the old birds, the head and neck however being of a dull purplish-blue, without the bright green and purple tints of the old, and the wings tinged with brown. At the first moult, they acquire their full colouring, only that a little brown remains on the edge of the wings.

Since the above was written, I have received matter for a continuation to this article, which I trust will thereby be greatly increased in interest. Being very desirous of obtaining a fresh specimen or two of this interesting bird for dissection, I intimated my wish to Dr. Th. J. Aitkin, Lecturer on Physiology, Materia Medica, and Botany, in Edinburgh, who kindly undertook to procure some from Shetland. Accordingly, I have been favoured with two specimens accompanied with the following satisfactory account drawn up by James Barclay, Esq., and communicated in a letter to Dr. Aitkin.

"Although we cannot boast in Shetland of having such numerous flocks of Pigeons as those which Mr. Audubon mentions having seen in America, yet in most of our islands they are met with in considerable numbers. Their chief places of resort are the most rocky of our shores, where there are natural caves, in which they can shelter from the storm, and find convenient and safe retreats to build in. In the parishes of Sandwick and Dunrossness these birds are more numerous than anywhere else in Shetland, except perhaps Fetlar; and this may be accounted for by these places being by far the most extensively cultivated, and the most fertile grain parishes in these islands.

"In Dunrossness flocks of many hundreds are frequently seen feeding on the fields, and many of these flocks in sight at the same time. A gentleman lately killed at one shot twenty-seven, besides wounding many that escaped. It takes a heavy shot to kill Pigeons, and so tenacious are they of life that the sportsman frequently observes them flying off so desperately wounded that their entrails are hanging through the wound.

"These birds appear to be regulated with regard to their time of breeding, according to the scarcity or abundance of food which the seasons supply. In spring, when they have plenty of corn to pick from the newly sown fields, they begin to get fat, and pair; and again, in harvest, when the corn is cut down. They flock twice in the year, first in August or September, and again in winter. That their breeding depends much on their having plenty of food to fatten them, seems, I think, evident from the circumstance that, when tamed, which they easily are, they are observed to breed in every month of the year. I do not mean that the same pair will breed every month; but some in the flock, if well fed, will breed at any season. It is a popular notion that Pigeons breed every month but February; but this is an error. The same pair when tamed generally breed four times; and so great is their fecundity that they are frequently seen sitting on eggs long before the former brood is able to leave the nest, so that the parent bird has at the sametime young birds and eggs to take care of. The male and female sit alternately, relieving each other, and shewing equal marks of tenderness and affection. They sit for three weeks, and lay only two eggs. Hence the old Scottish saying, 'a doo's cleckin,' for a family of only two children, a boy and a girl.

"These interesting birds are much noted for their fidelity in conjugal love. They are said to be very constant, and never to change their partners till death puts a period to the connection, or accident or old age prevents the female from breeding. In the event of death, or any final separation, the widowed bird is seen to feel his bereavement with all the sorrow of a better creature. He shews by every movement, and every tone of voice, that some inward perturbation is distracting him;

and, although he cannot express his grief in words, yet his language of woe is equally intelligible. The melancholy and plaintive sound of his cooing, the dull and ruffled appearance of his whole frame, his disordered feathers, and listless step, are sufficient evidences of the sincerity of his attachment, and the keenness of his sufferings. I am told that instances have occurred when the bird has actually perished from grief; but this I cannot credit;—at all events, it is long before he can again persuade himself to attach himself to another female.

"It is very difficult to speak with any degree of accuracy respecting the probable length of the lives of these birds. I have never known an instance where any of them have been found dead from poverty or any disease, except from accident or wounds. From many circumstances I should think they live to a considerable old age. Mr. Andrew Duncan, sheriff-substitute of Shetland, mentioned to me that he had seen one tamed which lived in that state fully twenty years. It lost a wing several years previous to its death; and this, no doubt, might accelerate its end.

"Our Rock Pigeon seems to possess the same instinct which the Carrier has, namely that of conveying intelligence from place to place, or rather of finding its way back to the place which it has been taught to regard as its home. Mr. Duncan tells me he had one tamed some years ago in Lerwick; and after keeping it about the house for some time it became so pert and troublesome that he resolved to send it to the country. It was accordingly put into a close basket, and sent off to its future place of destination, which was at least ten miles from town; but, to Mr. Duncan's astonishment, next morning it was found sitting above the door of his house in town, having returned the instant it was let loose.

"It is easy to distinguish the male from the female by the size and plumage. The male is considerably larger, and has a brilliant metallic lustre around his neck, which the female has not in the same degree. Her appearance is altogether more subdued than his, her size smaller, and her plumage of a dunner colour. The pair now sent, I am told by those whom I consider judges, are the best specimens of these birds that it is

possible to procure. They are both old birds, more especially the male. I have only to add that their eggs are exactly similar to those of the domestic pigeons, whose first parents the Rock Pigeons probably are."

"Lerwick, Shetland, 4th January 1837."

The individuals sent proved to be, as Mr. Barclay had conjectured, the one an old male, the other a young female.

Male.—The bill black, as is the fore part of the tumid nasal membrane, of which the basal portion is white. Feet carmine, claws black. The general colour of the plumage is light greyish-blue, deeper on the lower parts, and much paler on the wings and fore part of the back. The neck is splendent with bright green and carmine-purple, there being a band of the latter beneath the broader band of the former. The middle of the back, and a part of the sides are pure white, as are the axillar feathers and the lower wing-coverts. The quills are greyish-blue, the inner webs lighter, the outer tinged with dusky; the whole outer web of the first, a great part of that of the second, and the extremity of all, greyish-black. There are besides two black bars on the wing, one extending over the secondary coverts, except the four outer, the other over six of the inner secondaries. Tail greyish-blue, with a terminal band of black, averaging an inch, but broader in the middle; the outer web of the lateral feathers white from the base to the black band.

The œsophagus, Pl. VII, Fig. 1, *a*, *b*, *c*, *f*, *g*, is six inches and a half long, and is immediately dilated to the diameter of an inch and a quarter, enlarges to an inch and a half, *b*, *c*, at the distance of two inches from the commencement, then contracts a little, *c*, and suddenly expands into an enormous crop, *c*, *d*, *e*, *f*, of a transversely oblong form, its greatest diameter three inches and a quarter. The crop is quite membranous, without any appearance of glandules, excepting around the mouth, and curves round the neck so as nearly to meet behind. The œsophagus then contracts, *f*, to a diameter of four twelfths; the proventriculus, *g*, is elliptical, ten twelfths long, with large glandules of a cylindrical form, about a twelfth and

a half in length, and half a twelfth in breadth, Fig. 2. The gizzard, *h*, *i*, *j*, *k*, *l*, is of an oblong form, oblique, an inch and eight twelfths long, its transverse diameter one inch. Its lateral muscles, *i*, *j*, are extremely thick, being six twelfths in the middle; the lower muscle, *k*, is also strong and prominent. The inner coat is very strong and thick, and presents two flattened surfaces, which are longitudinally fissured, opposite the lateral muscles. The cardiac lobe, Fig. 3, *h*, is rather prominent. The intestine, Fig. 1, *m*, *n*, *o*, *p*, *q*, *r*, is three feet ten inches long; its duodenal part, *m*, *n*, *o*, averages half an inch in diameter; but it gradually diminishes, so as to have a diameter of only three twelfths at the distance of a foot from the pylorus. It continues thus until near the cœca, when it enlarges to four twelfths, which is the diameter of the rectum, Fig. 4, *a*, *b*, *c*. The cœca, Fig. 4, *c*, *d*, are only three and a half twelfths long, and come off at the distance of an inch and a half from the anus.

The crop contained a large quantity of grain, chiefly bear, *Hordeum vulgare*, the small grey oat, a variety of *Avena sativa*, a few grains of *Avena fatua*, and some small seeds. In the gizzard were husks of these seeds, with fragments of quartz and felspar, varying from one to two twelfths.

Length to end of tail $14\frac{2}{12}$ inches; extent of wings 27; wing from flexure $9\frac{1}{4}$; tail $4\frac{3}{4}$; bill along the ridge $\frac{10}{12}$, along the edge of lower mandible 1; tarsus $1\frac{2}{12}$; first toe $\frac{6}{12}$, its claw $4\frac{1}{4}$ twelfths; second toe $10\frac{1}{2}$ twelfths, its claw $\frac{6}{12}$; third toe 1 inch $2\frac{1}{2}$ twelfths, its claw $6\frac{1}{2}$ twelfths; fourth toe $10\frac{3}{4}$ twelfths, its claw $4\frac{1}{4}$ twelfths.

Female.—The female has the colours rather darker and duller, the gloss of the neck less splendent, and the green tints of smaller extent. The black bars on the wings are shaded with grey; and the tips of the wings and tail are tinged with brown. The œsophagus is six inches and a quarter long; the crop three inches in breadth; the stomach an inch and eight twelfths in its greatest diameter; the intestine three feet four inches long, the diameter of its duodenal portion four inches; the cœca four twelfths long; the rectum an inch and three fourths.

Length to end of tail 13 inches; extent of wings 26; wing from flexure $8\frac{3}{4}$; tail $4\frac{1}{2}$; bill along the edge $10\frac{1}{2}$ twelfths; tarsus $1\frac{2}{12}$; middle toe and claw 1 inch $7\frac{1}{2}$ twelfths.

The Domestic Pigeon being undoubtedly the descendant of the Rock Dove, I have thought it well to compare the digestive organs of both. Figures 1, 2, 3, and 4, represent those of the former; Figs. 5, 6, and 7, those of the latter. The same letters are used in both cases.

In Fig. 1. are seen, *a*, the bill; *a*, *b*, *c*, the part of the œsophagus anterior to the crop, and much dilated; *c*, *d*, *e*, *f*, the crop, transverse and a little contracted in the middle; *f*, *g*, *h*, the intrathoracic part of the œsophagus; *g*, the proventriculus; *h*, the upper lobe of the stomach; *i*, the right lateral muscle; *j*, the left lateral muscle; *k*, the inferior muscle; *l*, one of the tendons; *m*, *n*, *o*, the duodenum; *p*, *q*, *r*, *s*, the rest of the intestine.

Fig. 2. represents a section of the proventriculus, shewing the very short broad glandules.

Fig. 3. shews the upper or posterior face of the stomach; *g*, the proventriculus; *h*, the cardiac lobe; *i*, *j*, the lateral muscles; *k*, the inferior muscle; *l*, the tendon; *m*, the commencement of the intestine.

Fig. 4. the rectum, *b*, *c*; and the cœca, *d*, *e*.

In the Domestic Pigeon, the parts differ very little. The crop is generally larger, and the cœca a little longer; but in other respects the parts are precisely similar. The œsophagus, *a*, *b*, *c*, *f*, *g*, which is six and a half inches long, is immediately dilated to the diameter of an inch and a quarter, and gradually enlarges so as to form a sac or crop three inches long, and about the same breadth. In general, the internal surface of the crop is smooth; but when the bird has young, or at least under certain circumstances, it is rugous, being covered with reticulated prominent ridges, highly vascular, and secreting an abundant mucous or gelatinous fluid. This structure is represented by Fig. 6. The lower orifice of the crop has several very prominent longitudinal rugæ, and is plentifully

supplied with mucus. Below the crop, the œsophagus contracts to a diameter of four-twelfths, *f*. The proventriculus, *g*, which is not much enlarged, is studded for the length of three quarters of an inch with oblong glandules. The stomach, *h*, *i*, *j*, *k*, *l*, is somewhat rhomboidal, an inch and a half in its transverse diameter; the lateral muscles, *i*, *j*, extremely thick, the left being five twelfths of an inch; the lower muscle, *k*, prominent. The duodenum, *m*, *n*, *o*, forms a curve three inches in length, inclosing, as usual, the pancreas; on the right side, under the liver, it curves backwards, passes behind to the left, then turns to the right, forming a second fold; it is then convoluted on the right side, passes behind the stomach, and proceeds along the middle of the sacrum. The entire length of the intestine is four feet, its greatest diameter four twelfths, its least two and a half twelfths. The cœca, Fig. 7, *c*, *d*, which arise at the distance of an inch and a half from the anus, are cylindrical, five twelfths long, one twelfth in diameter.

Not having access to a young brood of domestic pigeons, and having neglected to note the manner of their feeding, I requested my friend Mr. Weir to send me information on the subject, which he has done in the following words:—" The young pigeons, I observe, when they feed, thrust their bills into the mouths of the old ones, and receive their food in that manner." It is the same with the young Rock Doves, although the mode of feeding of Pigeons has been somewhat differently represented by authors.

Another importation of Rock Doves from Shetland having taken place since the above was written, I may be allowed farther to state some particulars respecting the species which they have enabled me to observe, and to present the few facts relative to their history supplied by the gentleman, J. Smith, Esq., Uyea Sound, who transmitted them to Dr. Aitkin. His statement, which is interesting as confirmative of that of Mr. Barclay and my own, is as follows:

" The specimens sent are from Fetlar, where these birds abound. They are *said* to hatch at all seasons of the year, except the month of March, and always to produce at each time

a male and a female. Their nests are placed in caves of the rocks on the sea-coasts, generally in the most inaccessible of these, and are constructed in the same manner as those of the Domestic Pigeon. They are easily tamed when taken young; yet it is said that when not particularly attended to, and supplied with abundance of food, they are more apt to fly away and join the flocks of their own species, than the common tame pigeon. They are seen in large flocks in the winter and spring months, when they frequent barn-yards much for food, especially when the ground is covered with snow. I have also seen them in large groups in the harvest time, when that happened late in the year. There is a cave in a holm, on the west side of North Yell, called the Holm of Gloup, a very high rock, covered however with a rich soil, in which great numbers build their nests. There are also many places in the island of Fetlar of the same description, where they are found. Indeed they may be said to be abundant throughout the country."

The three specimens sent are two males and a female, which agree with the others described above as to colouring, and all other essential qualities, as well as the form and structure of the digestive organs. The following are the dimensions of their parts:

	Male.	Male.	Female.
Length to end of tail	14	13	13
Extent of wings	27	25	25
Wing from flexure	$9\frac{1}{2}$	9	9
Tail	$4\frac{1}{2}$	4	4
Bill along the ridge	$\frac{10}{12}$	$\frac{10}{12}$	$\frac{10}{12}$
Tarsus	$1\frac{2}{12}$	$1\frac{2}{12}$	$1\frac{2}{12}$
Hind toe and claw	$\frac{11}{12}$	$\frac{11}{12}$	$\frac{10}{12}$
Middle toe and claw	$1\frac{7}{12}$	$1\frac{7}{12}$	$1\frac{8}{12}$
Œsophagus	$6\frac{1}{2}$	$6\frac{1}{2}$	$6\frac{1}{2}$
Crop in breadth	3	$3\frac{2}{12}$	$3\frac{2}{12}$
Gizzard	$1\frac{10}{12}$	$1\frac{9}{12}$	$1\frac{9}{12}$
Intestine		45	39
Cœca		$\frac{4}{12}$	$\frac{4}{12}$
Rectum		$1\frac{1}{2}$	$1\frac{2}{12}$

The crops of all were completely filled, up to the throat; that of the first with a mixture of barley and oats of the same species as mentioned above, namely, bear and the small oat, with a considerable number of what appeared to be eggs of Helices, being globular, dusky, a twelfth of an inch in diameter, their envelope membranous, and their contents a whitish fluid of the consistency of pus; along with these substances were fragments of pods of Raphanus Raphanistrum. The crop of the second was crammed with oats, among which were a few seeds apparently of polygona, and fragments of charlock pods. That of the third contained oat-seeds exclusively. In the gizzards were numerous fragments of quartz, generally white, but some tinged with chlorite, and a few of felspar and either gneiss or granite. They were for the most part highly polished, and did not exceed two twelfths of an inch in diameter.

The number of oat seeds in the crop of the second amounted to 1000 and odds, and the barley seeds in that of Mr. Barclay's female were 510. Now, supposing there may be five thousand wild pigeons in Shetland, or in Fetlar, which feed on grain for six months every year, and fill their crops once a day, half of them with barley, and half with oats, the number of seeds picked up by them would be 229,500,000 grains of barley, and 450,000,000 grains of oats;—a quantity which would gladden many poor families in a season of scarcity. I am unable to estimate the number of bushels, and must leave the task to the curious. What is the number of pigeons, wild and tame, in Britain; and how much grain do they pick from the fields and corn-yards? It is probable that were the quantity of seeds of the cereal plants, which all the granivorous birds in the country devour annually, accurately known, it would prove much higher than could be imagined; yet by far the greater part could be of no use to man, were all the birds destroyed, it being irrecoverably dispersed over the fields.

The Rock Dove, as Mr. Barclay observes, is a strong bird, and takes a heavy shot. Its feathers, like those of the Ringed Dove, are very ready to fall off when ruffled, after it has been shot or wounded, probably owing to the shortness of their

tubes, which is also the case with those of the Grouse and other gallinaceous birds. Its flesh is rather tough, but otherwise good.

The great beauty of this bird, its most interesting habits, the wild character of its places of abode, and associations connecting it with the years of boyhood, render it a special favourite with me. Partly for this reason, and partly because I have never met with any detailed history of it, I have been at considerable pains, or rather have with much pleasure endeavoured, to obtain by personal observations facts respecting its organization and habits, sufficient to serve as a sample of the manner in which I should wish to describe all our native birds.

The history of the next species, which greatly resembles it, I am unable to give from personal observation. The descriptions are taken from skins in my collection, presented by G. Headlam Greenhow, Esq., Tynemouth.

COLUMBA ŒNAS. THE BLUE-BACKED DOVE.

STOCK DOVE. WOOD DOVE.

Colombe colombin. Columba Œnas. Temm. Man. d'Orn. II. 445.
Stock-Dove. Columba Ænas. Selb. Illustr. I. 408.
Columba Œnas. Stock Dove. Jen. Brit. Vert. An. 161.

Plumage of the male greyish-blue; the sides and back of the neck splendent with green and purplish-red, the lower part brownish-purple-red; the back and lower wing-coverts blue; two short bands of black on the wing, one being on the three inner secondary quills, the other on three of the secondary coverts. The female similar, the green of the neck less extended, the purplish-red paler.

Male.—The Blue-Backed Dove, which in descriptive works still bears the name of "Stock Dove," given to it at a time when it was believed to be the origin of the domestic races, and of the same species as the Rock Dove already described, is, in form, size, and general appearance, so similar to the species just named, that one readily finds an excuse for those who erroneously considered them identical. They were first clearly distinguished and separated by M. Temminck.

The bill is short, slender, straight; the tumid basal membrane scurfy, the dorsal outline of the upper mandible straight for half its length, then arched and declinate, the edges soft at the base, towards the end sharp, the tip narrow but rounded; the lower mandible with the dorsal outline slightly convex, the sides nearly erect, the edges toward the end sharp and inflected, the tip obtuse.

The eyes are rather small, the eyelids bare. The nostrils are linear, wider anteriorly, three twelfths of an inch long. The aperture of the ear is roundish, two twelfths in diameter.

The tarsi, which are feathered anteriorly about one-third

down, have five entire scutella, and under them a double series of four, the hind part soft, and without scales. The first toe has six, the second nine, the third thirteen, the fourth eleven scutella. The claws are arched in the third of a circle, compressed, rather acute.

The plumage is generally compact, on the head and fore-neck blended, on the abdomen somewhat downy. The feathers are ovate and rounded; those of the sides and hind part of the neck with flattened shining filaments. The wings are rather long and acute; the primaries tapering, the second longest, the third almost equal, the first a little shorter; the secondaries twelve, short, obliquely rounded. The tail is slightly rounded, of twelve broad rounded feathers.

The horny part of the bill is light brown, the edges greyish-yellow; the soft parts red, excepting the posterior half of the tumid portion, which is white. The iris is yellowish-red, the bare space around the eye flesh-coloured. The tarsi and toes are carmine-purple; the claws light brown, towards the end yellowish-grey.

The general colour of the plumage is light greyish-blue, the lower parts as deeply coloured as the upper. The sides and hind part of the neck about the middle are splendent with green and purplish-red; the lower part of the neck anteriorly is brownish-purple-red, that colour gradually shaded into the blue of the breast. The feathers on the fore part of the back, and the scapulars, are tinged with brown. The primaries and their coverts are greyish-black, more or less light-blue at the base; the secondaries are light-blue, largely tipped with blackish. On the outer webs of the three inner and of their coverts, is a large patch of black. The tail has a broad terminal band of greyish-black. The downy parts of the feathers are light grey.

Length to end of tail 14 inches, to end of wings when closed 12; extent of wings 26; wing from flexure $9\frac{1}{2}$; tail 5; bill along the back $\frac{10}{12}$, along the edge of lower mandible 1; tarsus $1\frac{5}{12}$; first toe $\frac{1}{2}$, its claw $4\frac{1}{2}$ twelfths; second toe $9\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; third toe $1\frac{2}{12}$, its claw $5\frac{1}{2}$ twelfths; fourth toe $\frac{10}{12}$, its claw $3\frac{3}{4}$ twelfths.

Female.—The female scarcely differs from the male in external appearance, being merely a little smaller, and having the colours less pure, the green on the neck less extended, and the purplish-red much paler.

Length to end of tail 13½ inches; extent of wings 26; wing from flexure 9¼; tail 5.

Variations.—In adult individuals no remarkable variations occur, although slight differences are seen in the tints of the plumage. When the feathers are old, they become paler, and the quills tinged with brown towards the end.

Habits.—According to those writers who profess to be acquainted with its habits, the Blue-backed Dove resides in woods, and never betakes itself at night to rocks or old buildings. It has not been observed in Scotland, and even in England is confined to some of the midland and southern counties. White remarks that "as long as it stays with us, from November perhaps to February, it lives the same wild life with the Ring-Dove, Palumbus torquatus; frequents coppices and groves, supports itself chiefly by mast, and delights to roost in the tallest beeches." Mr. Selby states that "in its habits it resembles the Ring-Dove, and is a constant inhabitant of woods, breeding in the hollows of old and pollard trees. In winter the Stock Doves assemble in large flocks, which are sometimes found associated with the Ring Dove. Like the latter, they feed upon all grain and seeds, and for their winter's supply have recourse to the same diet." Whether these particulars are given from the author's observation, or on the authority of others, we are not informed.

Mr. Salmon, in a "Notice of the Arrival of Twenty-nine Migratory Birds in the neighbourhood of Thetford, Norfolk," inserted in Loudon's Magazine, Vol. IX, p. 520, has some very interesting remarks on this bird. The "Stock Dove (Columba Œnas, Linn.), which in all works upon natural history is stated to be only an inhabitant of woods, abounds in this neighbourhood during the spring and summer months, upon our rabbit-warrens and heaths, to which it annually resorts for the pur-

pose of nidification; and it is, in general, the first that arrives in this district for that purpose. The situation which it selects for its nest differs materially from that chosen by its congeners, the Ring and Turtle Doves (C. Palumbus, C. Turtur), the nests of which are always placed either upon trees or bushes: this species, on the contrary, occupies the deserted rabbit-burrows upon warrens; it places its pair of eggs about a yard from the entrance, generally upon the bare sand, sometimes using a small quantity of dried roots, &c., barely sufficient to keep the eggs from the ground. Besides such situations, on the heaths it nestles under the thick furze bushes (Ulex europæa), which are impervious to rain, in consequence of the sheep and rabbits eating off the young and tender shoots as they grow, always preferring those bushes that have a small opening made by the rabbits under the ground. A few pairs occasionally breed in the holes of decayed trees: this is of rare occurrence in this district. It generally commences breeding by the end of March, or the beginning of April; the young ones, which are very much esteemed, being ready for the table by the commencement of June. Towards the end of October they all leave this neighbourhood, none remaining during the winter."

The eggs are similar to those of the Rock Dove. One in my possession, presented to me by Mr. Greenhow, and from the above locality, is of a rather elongated elliptical form, an inch and seven twelfths long, one and one twelfth across, and of a pure white colour.

Remarks.—This species is easily distinguished by the purplish-red colour of the lower part of its neck, from blue-rumped individuals of the domestic pigeon, with which it was always confounded until M. Temminck separated the two species. The name of Stock Dove was given to the present species because it was conceived to be the original of our domestic pigeons; but as these are now universally admitted to be the descendants of the Rock Dove, Columba Livia, it is manifestly absurd to retain a name founded on an erroneous supposition. The Rock Dove in fact is the real Stock Dove. To prevent misapprehension, I have therefore altered the vernacular name of Columba Œnas.

COLUMBA TURTUR. TURTLE DOVE.

TURTLE. RING-NECKED TURTLE.

FIG. 54.

Columba Turtur. Linn. Syst. Nat. I. 284.
Columba Turtur. Lath. Ind. Orn. II. 605.
Turtle Dove. Mont. Orn. Dict.
Colombe Tourterelle. Columba Turtur. Temm. Man. d'Orn. II. 448.
Turtle Dove. Columba Turtur. Selb. Illustr. I. 413.
Columba Turtur. Turtle Dove. Jen. Brit. Vert. An. 162.

Male with the head light bluish-grey, the back greyish-brown, the scapulars and small wing-coverts black with broad light red margins, the breast pale greyish-purple, the neck with two large black spots barred with white, the quills and tail greyish-brown, the latter tipped with white. Female similar, but with the tints duller.

THE Turtle Dove is not only the smallest of our British species, but also the most elegantly formed, and that whose plumage exhibits the greatest variety of colours. Compared with the rest, it seems a delicate and feeble bird, its body being more slender than theirs, its bill thinner, its wings and tail proportionally longer. Unlike them too it is unable to bear the severity of our winters, and even during the short period of its residence with us remains in the southern parts of England.

Male.—The bill is slender, shorter than the head, compressed towards the end, the nostrils linear, the tumid nasal membrane elongated, the eyes of moderate size, the legs short; the tarsi stout, with seven large oblique, and two small anterior scutella; the hind toe small, with six, the second with nine, the third with twelve, the fourth with ten scutella; the claws of moderate length, arched, much compressed, and rather acute. The plumage is soft, rather blended, without gloss, the feathers generally ovate. The wings are long and acute; the second quill longest, the first almost as long, the third a little shorter than the first, the other primaries rapidly diminishing and rounded, the second and third very slightly cut out externally towards the end, all broad, as are the secondaries, which are short and rounded. The tail is long, much rounded, of twelve rather broad rounded feathers.

The bill is greyish-black, the tip of the upper mandible yellowish-brown; the bare space around the eyes light red, the irides light orange, the feet carmine-red, the claws black. The upper part of the head and hind-neck is light greyish-blue; the back greyish-brown, the rump brownish-grey; the scapulars, small wing-coverts, and inner secondaries, with a central pointed black spot, faintly edged with grey, and having broad light red margins; the feathers on the edge of the wing, and most of the secondary coverts ash-grey; the primary quills, their coverts, and the outer secondaries, greyish-brown, with narrow whitish edges; the tail-feathers are greyish-brown, those towards the sides blackish; all tipped with white, that colour becoming more extended on the lateral feathers, and occupying the entire outer web of the exterior. On each side of the neck behind is a roundish patch of black, each of the feathers tipped with white. The fore part of the neck, the breast, and the sides, are of a delicate light purplish-red colour, deepest on the lower fore-neck, and fading into ash-grey behind; the hind part of the sides light greyish blue; the abdomen and lower tail-coverts white.

Length to end of tail $11\frac{2}{12}$ inches; extent of wings 21; wing from flexure 7; tail $4\frac{1}{2}$; bill along the ridge $\frac{8}{12}$, along the edge of lower mandible $10\frac{1}{2}$ twelfths; tarsus $\frac{10}{12}$; hind toe

$5\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$; second toe $\frac{9}{12}$, its claw, $2\frac{1}{2}$ twelfths; third toe $10\frac{1}{2}$ twelfths, its claw $3\frac{1}{2}$ twelfths; fourth toe $\frac{8}{12}$, its claw $2\frac{1}{2}$ twelfths.

Female.—The female has the colours similar, but considerably paler.

Habits.—The Turtle Dove is very extensively distributed, extending, according to authors, over the greater part of the old continent, but not entering the arctic regions. In some of the southern countries it is a permanent resident, but in the colder is migratory, as in England, where it arrives in the end of spring. The south-eastern counties are those which it prefers; and in Kent, as Latham observes, it frequents the pea-fields in flocks of twenty or more. Montagu states that it is found, though rarely, as far westward as Devonshire; but it does not appear to breed in the northern or even the middle districts; although, as stated by Bewick and Mr. Selby, some individuals have been seen in Northumberland in autumn. I am not aware of its ever having occurred in Scotland. According to Montagu, Latham, and other creditable writers, it inhabits the thick woods, but frequents the open fields, where it searches for seeds of all kinds, flies in small flocks, nestles in the thickest trees, forming a carelessly constructed nest of twigs, on which it deposits two white eggs, emits a peculiarly plaintive cry, and after rearing its young, departs in September. I believe there is little more to be found in the works of our most approved authors respecting it; and I am unable to detail its history from my own observation. The specimen from which the above description has been taken I obtained in London. Two eggs in my possession are of a narrowish oval, rather pointed form, white, and glossy, one an inch and a quarter in length, the other a little shorter, their breadth ten twelfths.

Young.—According to Montagu, "the young do not throw out the black feathers on the neck the first year, and the bare space about the eyes is of a grey colour."

These are all the Pigeons that have any claims upon our consideration. An individual of the American Passenger or Migratory Pigeon, Ectopistes migratoria, is recorded by Dr. Fleming, as having been shot in December 1825, in the neighbourhood of a pigeon-house at Westhall, in the parish of Monymeal, Fifeshire. The feathers, according to the describer of this specimen, " were quite fresh and entire, like those of a wild bird." Why not? If it had escaped from confinement, and resided in a dove-cot for half a year, it might have its plumage as neat as that of any other bird. Such a circumstance affords no criterion. A beautiful specimen of the Dominican Grosbeak, Loxia dominicana, in perfect plumage, was sent to me fresh in the winter of 1831. It had been shot somewhere near Dalkeith, and I made a drawing of it for my collection of British Birds; but soon after it was reported to have escaped from Lady Dalhousie's aviary. In June 1835, a lovely little bird, fresh and with perfect plumage, was brought to me from Braid Hermitage near Edinburgh, where it had been shot when in company with another of the same species, supposed to be the female. It turned out to be the Loxia Astrild. Its skin forms part of my collection; but I should no more think of assigning this species a place among British birds, than of admitting the Migratory Pigeon. Yet its claims are certainly equal, for its feathers " were quite fresh and entire, like those of a wild bird," and remain so to the present day.

PRACTICAL ORNITHOLOGY.

SECOND LESSON.

WINTER EXCURSION DURING A SNOW-STORM FROM EDINBURGH TO PEEBLES. BIRDS OBSERVED. BAT-HUNTING IN NIDPATH CASTLE. THE VALLEY OF THE TWEED. BIRDS FOUND AROUND EDINBURGH IN WINTER. SNOW-STORM IN THE OUTER HEBRIDES VIEWED FROM THE SUMMIT OF CLISHEIM. BIRDS FOUND THERE IN WINTER.

THE naturalist must not confine his observation to objects that can be contemplated under circumstances conducive to personal comfort, nor shut himself up in his study when the wintry winds sweep fiercely over the blasted heath. He who is familiar with the actions and haunts of birds during the fine season only, knows but half of their history. How do they contrive to procure the means of subsistence when the country is covered with snow, especially when the storm has lasted for weeks; and what influence is exerted upon their character by the frosts and tempests of winter? To solve these problems, let us sally forth into the fields, now that the snow has been two days on the ground, and the cold blasts of the north-east wind howl among the leafless twigs. But as it is only half-past two in the morning, and the clouds are fast pouring down their feathery flakes, obscuring at intervals the full moon, I can scarcely recommend to the comfort-loving citizen to leave his warm bed. Indeed I feel assured that I shall contribute to his amusement more effectually by relating a nocturnal expedition in the midst of a snow-storm than by dragging him out to shiver in the cold moonlight on a bleak moor. As to the real enthusiasts in ornithology, from Audubon down to myself, they can never rest contented with the ordinary occurrences of life, but if the tide of events flows too smoothly, must ruffle it now and then by throwing some blocks into its channel.

In the morning of Monday the 26th December 1836, the

ground being covered with snow to a moderate height, the wind blowing strongly, and the moon about full, I left Edinburgh, accompanied by a young friend. It was only three o'clock when we commenced our expedition, but the moon and the snow together rendered it quite light, and we tripped along briskly in the direction of Peebles. Near Greenlaw Barracks, finding ourselves perspiring copiously, we sat down in a sheltered place to cool and rest ourselves. Not a living creature, man or beast, bat or owl, had we seen by the way. All animated nature seemed buried in sleep or congealed by the frost, the effects of which we very soon experienced, and therefore proceeded on our journey, which afforded us no other objects of contemplation than the Pentland Hills wrapped in their cold white mantles, walls and hedges nearly overtopped with snow, of which deep wreaths stretched at intervals across the road, and magnificent clouds driven over the sky, and dissolving into thick showers, which at times completely obscured the surrounding objects. At Pennicuik we met a man with a lantern, who informed us that it was half-past five; but no other other living thing occurred until near seven, when, perspiring profusely, but at the same time having our hands and faces half frozen, we arrived, after wading through a long wreath, and in the midst of a bitter blast accompanying a heavy shower, at a large house, which we found to be the Wellington Inn, upwards of twelve miles from Edinburgh. Fortunately some of the people were up, and there was a large fire in the kitchen, at which we seated ourselves. In half an hour we were furnished with a comfortable breakfast, which we prefaced and concluded with a glass of whisky, a practice which, under similar circumstances, notwithstanding the prohibition of temperance societies, I would strongly recommend as a sovereign remedy against fatigue.

It was now daylight, and the boys of the house were preparing their gins. On resuming our march we found ourselves on an open moor, but with no other birds in view than a few Rooks. Here the road was blocked up for about two hundred yards by a deep wreath, which afforded us some amusement. A small covey of Partridges flew past us at a distance, and soon

after we observed, cowering among the snow-tufts, some large birds, which I presently discovered to be Brown Ptarmigans, alias Red Grouse. Five of them were crouched near the road, but on our going up, flew off and joined another covey among some peats. These in their turn removed to a distance, and finally sped away in company with others, forming altogether a pack amounting to about fifty. As the wind blew strongly the drift was not so deep as entirely to cover the tips of the heather tufts, so that these birds could still procure a sufficiency of food; but they seemed entirely exposed to their enemies, being unable to conceal or even shelter themselves among the snow, on which their dark colour rendered them very conspicuous. Finding the locks of our guns crusted with snow and their muzzles filled, we could only wish the Grouse a merry Christmas. The only other birds we met with on the high moor were a few Rooks, which hovered over the fields, although they could scarcely obtain anything from them. By a small stream running towards the Tweed we observed a Dipper, as cheerful and lively as ever, and in a corn-yard a congregation of Chaffinches, Greenfinches, and Yellow Buntings, with a few Blackbirds, all busily occupied.

In the narrow valley of Eddlestone Water the snow lay deeper than on the high ground, it being sheltered from the north-east wind, which, sweeping the hills almost bare on the windward side, deposited the drift on the lower grounds, so that occasionally we had some difficulty in making our way through the wreaths. There is a good deal of wood in this valley, but in the plantations very few birds were to be seen. On the open grounds were observed a few Rooks; by the stream a solitary Dipper here and there; and in the little rills or springs which sometimes occurred unfrozen, as well as in the ditches by the road, we started a few Snipes. These birds rose without emitting any sound, flew high, and wheeling for some time, generally alighted again in or near the same place. Above Eddlestone we observed two Goldfinches discussing the tops of some thistles that protruded through the snow; but the only other small birds that occurred were those common in all parts of the country, namely, the Chaffinch, Green Linnet, House

Sparrow, Yellow Bunting, Blue Tit, Black Tit, Hedge Chanter, White Wagtail, Wren, and Gold-crest. A single Stonechat also was seen near a cottage. A few Magpies and Jackdaws, with two Missel Thrushes, were observed; but of Fieldfares and Redwings, so abundant about Edinburgh, not a single individual was anywhere seen. About houses, however, we met with some Blackbirds and Thrushes, and towards Peebles saw Rooks and Jackdaws in abundance, some flying slowly over the fields, others walking along the slopes, a few wading by the edges of the stream, and numbers pulling at the cornstacks, while in the shelter of a fence was a very large flock of Wood Pigeons, probably amounting to two hundred. But, upon the whole, the number of species that occurred was much less than I had anticipated. At length, after a tedious march along the valley, we arrived in the ancient town of Peebles, situated on the Tweed, at the distance of twenty-one miles from Edinburgh, and were welcomed by my excellent and esteemed friend, the Reverend Mr. Adam.

Next morning, the weather being similar, but the snow deeper, we resolved to attempt a journey to Nidpath Castle, about a mile distant, which we accomplished without much difficulty, although in several places we had to make our way through snow-drifts of great depth. A Kestrel, some Rooks and Daws, a Wren, two Missel Thrushes, a Fieldfare, a few Blackbirds, and a number of Sparrows, Chaffinches, Yellow Buntings, and Hedge Chanters, were all the species that occurred. The gamekeeper had a small collection of stuffed birds, among which however was nothing remarkable, excepting a Peregrine Falcon shot in the neighbourhood. Our object in visiting this building, which is partially in ruins, although the roof is kept in repair, was to obtain, if possible, a few Bats. We therefore ascended by a winding stair to the deserted apartments, which we searched for a long time, but without success, until at length Mr. Adam discovered one in a very small crevice in the wall. It was a Pipistrelle, of which the gamekeeper had procured a specimen some days before. Three stuffed individuals of the same species also obtained in the castle, and a Long-eared Bat, Plecotus auritus, formed part of his collection. It is certainly

strange that hitherto only two species of Bat, Vespertilio Pipistrellus and Plecotus auritus, have been found in Scotland. We were informed however that a much larger kind had sometimes been seen flying about; and of it the gamekeeper kindly engaged to procure a specimen or two in summer. We returned towards evening, without observing anything remarkable, excepting the ravages committed upon a stack of wheat by the Rooks, which had very expertly pulled out the straws in order to get at the grain. Several Dippers and a White Wagtail were seen by the Tweed, which rolled along its cold waters, margined with ice, and strewed with lumps of snow.

The town, as I have said, is situated by the side of this beautiful river, at the mouth of Eddlestone Water, one of its tributaries, in a valley enclosed by rounded hills of considerable height, which, in summer, with their green slopes, and numerous plantations, afford an agreeable prospect. Now that the whole country was covered with snow, amid which the dark firs and pines exhibited the only verdure to be seen, they presented a most chilly aspect, which however was more singular than disagreeable. Many of the exposed slopes and eminences were almost bared by the strong wind that had blown for two days, while the sheltered hollows were filled with deep wreaths. The sheep had been driven into the woods for shelter, or gathered into the low grounds, where they were supplied with turnips, or left to shift for themselves by scraping the snow from the more prominent parts.

Next day, notwithstanding the increased depth of the snow, we rambled about the town, and then crossing the Tweed, made the best of our way through the wreaths to the mouth of Manor Water, near which, we were conducted by Mr. Adam to Bellanridge, the farm of his friend Mr. Middlemass, who received us in the most hospitable manner. His well-stored stack-yard offered an attraction to the small birds in the neighbourhood, but we observed in it only the common species, some of which we procured, as well as a Creeper and a Gold-crest. We had entered rather cold, and wet to the ancles, but were soon restored to a comfortable temperature by the agency of a good fire, abundance of substantial fare, and a quantum of

diffusible stimulus, which putting "life and mettle in our heels," we wished our kind host and his amiable consort good night, and sallying forth in the dark, ascended the hill by a short cut, and in due time regained our station by the fire of Mr. Adam's parlour, where we sat talking until after twelve.

On Thursday the snow continued, but the roads having been cleared, we returned by the coach, congratulating ourselves on having obtained a full view of a diversified country clad with its wintry mantle, and on having ascertained that during snow storms comparatively few birds are to be seen in the inland parts. The smaller granivorous species can have no difficulty in procuring subsistence from the corn stacks; and some of the insectivorous, as the Thrushes, find a sufficiently nourishing food in haws and other berries; while the Waders and Ducks chiefly resort to the sea shore.

But now the snow, which has covered the face of the country for several days, is beginning to dissolve under the influence of the sun and a change of temperature. The sportsmen are abroad; you see them scattered along these meadows, on which are several pools of water, and many patches of green grass, where you observe large flocks of Thrushes, which, half-famished, are almost heedless of the dangers that surround them. Several shots are fired, and they fly off in a loose body to settle in another place; but while they are on the way, they are assailed by a volley; some of their number fall to the ground; and the rest, wheeling about, betake themselves to a clump of tall trees, where they have scarcely had time to perch, when a person running up disperses them by a distant and random shot. No rest can the persecuted birds find; yet hunger prevents them from leaving the tempting spot in which alone they can hope to obtain the means of satisfying their wants. Fieldfares, Redwings, and Thrushes intermingled are dispersed in parties over the plain; while along the hedges, keenly searching for snails and worms, are here and there seen the Blackbirds, which do not mingle with their brethren, nor trust themselves to the open fields. Among those turnips you observe a large flock of Wood Pigeons, greedily filling their crops with the blades that project through the snow; and on

the tree tops are multitudes of Linnets, Finches, and Sparrows, which, having been scared from the corn-yard by some truant schoolboys, are waiting impatiently until they may return with safety. High over head stretches a long array of Plovers, silently flying towards the shores, whither we shall follow them.

In this wood are many birds, which in the meantime it may be well to note, as we may leisurely do, for they take no notice of us, as incessantly uttering their shrill and feeble cheeps, they flit from twig to twig, ever anxious to spy the minute objects on which they feed. The bright blue tints and lively appearance of that tiny thing shew it to be the Blue Tit; its relative is readily distinguished by the deep black of its head, broken by a white spot on the occiput; while the dark stripe down the yellow breast of that larger species marks it as the Greater Tit. Now they have shifted from tree to tree, and in their rear follows a scattered flock of still smaller birds, which although too distant to be distinctly seen, are known to be Gold-crests, from their peculiar cry, fluttering motion, and varied attitudes.

The vicinity of Edinburgh seems especially favourable to Rooks, for go where you will, at all seasons of the year, and in all sorts of weather, you find them scattered over the fields. That dunghil behind the wall is covered with them, and on the road are straggling parties searching for some small fare in the ruts of the cart-wheels. What these poor Magpies can be about in the middle of the field I cannot conjecture, unless they may have discovered a frozen potato, or a dead bird.

The tide is out, and on the muddy flat at the mouth of the Almond, you observe vast collections of Rooks and Gulls. Small flocks of Ducks are swimming about in the stream; and groups of Sandpipers are diligently probing the mud along its edges. Far away, at a safe distance, are many Curlews and Oyster-catchers. But see, scattered all over the sand, running with a half-hopping motion, and as they rise on wing displaying the white of their wings and tail, the beautiful Snow Buntings. At the edge of the water stand in a fixed and watchful posture a pair of Herons; and, out at sea, are seen here and there, a few dark-coloured birds, which may be

Cormorants or Ducks. A flight of Sandpipers is a beautiful sight: there they wheel around the distant point, and advance over the margin of the water; swiftly and silently they glide along; now, all inclining their bodies to one side, present to view their under surface, glistening in the sunshine; again, bending to the other side, they have changed their colour to dusky grey; a shot is fired, and they plunge with an abrupt turn, curve aside, ascend with a gliding flight, and all uttering shrill cries, fly over the stream to settle on the shoal that stretches out towards Barnbogle Ruins. I have seen the sandfords of the Hebrides, in autumn, when these birds descend with their broods from the moors, almost completely covered with them and the Golden Plovers.

What interest one could find in merely describing the skins of these birds in his closet, it is somewhat difficult to imagine; nor is it obvious that the examination of their structure, without any reference to their habits, is a much more rational occupation. The mere closet-naturalist, and the mere anatomist, find little to interest them in such a sight as this; and the mere field-naturalist, however delighted with it, cannot enjoy that true pleasure which results from a knowledge of the adaptation of means to ends, by which all these species have their peculiar spheres of action determined.

The birds to be found around Edinburgh, on the Pentland Hills, and in the neighbouring plains of Corstorphine and Dalkeith, with the valley of the North Esk, in the winter season, are rather numerous:

In the gardens, shrubberies, and plantations:

1. The Blackbird. Turdus Merula. Common.
2. Common Thrush. Turdus musicus. Plentiful.
3. Redbreast. Rubecula familiaris. Common.
4. Hedge Chanter. Accentor modularis. Common.
5. Greater Tit. Parus major. Rather common.
6. Blue Tit. Parus cœruleus. Common.
7. Black Tit. Parus ater. Common.
8. Gold-crest. Regulus auricapillus. Not uncommon.
9. Marsh Tit. Parus palustris. Rather rare.

10. Long-tailed Tit. Parus caudatus. Not very rare.
11. Goldfinch. Carduelis elegans. Rare.
12. Bullfinch. Pyrrhula pileata. Rather rare.
13. Redpoll. Linaria minor. Rare.
14. Siskin. Carduelis spinus. Rare.
15. Creeper. Certhia familiaris. Common.
16. Magpie. Pica melanoleuca. Rather scarce.

The Granivorous Birds which frequent the stack-yards are:

17. The House Sparrow. Passer domesticus. Abundant.
18. Green Linnet. Linaria Chloris. Abundant.
19. Brown Linnet. Linaria cannabina. Abundant.
20. Twite. Linaria montium. Scarce.
21. Chaffinch. Fringilla cœlebs. Abundant.
22. Corn Bunting. Emberiza Miliaria. Not uncommon.
23. Yellow Bunting. Emberiza Citrinella. Abundant.
24. Field Lark. Alauda arvensis. Abundant.

When the weather is open, these birds betake themselves to the fields, where also are found,

25. The Grey Partridge. Perdix cinerea. Not rare.
26. Missel Thrush. Turdus viscivorus. Not uncommon.
27. Fieldfare. Turdus pilaris. Plentiful.
28. Redwing. Turdus iliacus. Plentiful.
29. Rook. Corvus frugilegus. Abundant.
30. Daw. Corvus Monedula. Rather common.
31. Wood Pigeon. Columba Palumbus. Plentiful.

In meadow and marshy ground the three Thrushes just mentioned are also frequently found, together with the Lark, the Lapwing, the common Snipe,

32. The Meadow Pipit. Anthus pratensis. Plentiful.
33. White Wagtail. Motacilla alba. Rare.

On the heaths of the Pentland Hills, the only species not found in the pastures or cultivated land is

34. The Brown Ptarmigan or Red Grouse. Lagopus scoticus.

By hedges and walls, or among thickets of gorse:

35. The Common Wren. Troglodytes europæus. Common.
36. Stone-chat. Saxicola Rubicola. Very rare.

In or by the brooks and ditches are occasionally seen,

37. The Dipper. Cinclus europæus. Uncommon.
38. Common Gallinule. Gallinula Chloropus. Not rare.
39. Woodcock. Scolopax Rusticola. Rare.
40. Snipe. Scolopax Gallinago. Common.
41. Jack Snipe. Scolopax Gallinula. Very rare.
42. Water Rail. Rallus aquaticus. Extremely rare.
43. Common Heron. Ardea cinerea. Not common.
44. Kingsfisher. Alcedo Ispida. Very rare.

On Duddingston Loch, besides several of the above, are frequently found,

45. The Coot. Fulica atra.
46. Golden Eye. Clangula chrysophthalma.
47. Mallard. Anas Boschas.
48. Tufted Pochard. Fuligula cristata.

Frequently in the plains near Corstorphine, and in the fields about Granton, are observed large flocks of

49. The Golden Plover. Charadrius Pluvialis.
50. Lapwing. Vanellus cristatus.
51. Common Gull. Larus canus.
52. Black-headed Gull. Larus ridibundus.

Along the shore from Queensferry to Musselburgh may be seen, besides the Common and Black-headed Gulls,

53. The Great Black-backed Gull. Larus marinus.
54. Herring Gull. Larus argentatus.
55. Redshank. Totanus Calidris.
56. Purre. Tringa variabilis.
57. Knot. Tringa cinerea.
58. Ringed Plover. Charadrius Hiaticula.
59. Turnstone. Strepsilas Interpres.

60. Sanderling. Calidris arenaria.
61. Purple Sandpiper. Tringa maritima.
62. Oyster-catcher. Hæmatopus Ostralegus.
63. Curlew. Numenius Arquata.
64. Rock Pipit. Anthus aquaticus.
65. Snow Bunting. Plectrophanes nivalis.

Lastly, on the waters of the Frith of Forth are seen,

66. The Cormorant. Phalacrocorax Carbo.
67. Crested Cormorant. Phalacrocorax cristatus.
68. Red-throated Diver. Colymbus arcticus.
69. Red-headed Pochard. Fuligula Ferina.
70. Velvet Scoter. Oidemia fusca.
71. Scaup Duck. Fuligula Marila.
72. Common Shielduck. Tadorna Bellonii.

Besides the above there are a few rapacious birds in the district:

73. The Kestrel. Falco Tinnunculus. Common.
74. Peregrine Falcon. Falco Peregrinus. Very rare.
75. Merlin. Falco Æsalon. Rare.
76. Sparrow Hawk. Accipiter Nisus. Common.
77. Common Buzzard. Buteo vulgaris. Rare.
78. Hen-harrier. Circus cyaneus. Rare.
79. Long-tufted Owl. Ulula Otus. Very rare.
80. Short-tufted Owl. Ulula Brachyotus. Very rare.
81. Barn or Screech Owl. Strix flammea. Rare.

Of rare birds, stragglers, or occasional visitants seen in the district in winter, may be mentioned,

82. The Common Crossbill. Crucirostra europæa.
83. Hawfinch. Loxia Coccothraustes.
84. Hoopoe. Upupa Epops. Shot near Portobello.
85. Burgomaster Gull. Larus glaucus. Shot at Musselburgh in December 1836.
86. Curlew Sandpiper. Tringa subarquata. A specimen, shot at Queensferry, is in my possession; and another was killed by myself at Musselburgh.

87. Starling. Sturnus varius. Flocks are sometimes seen in spring.
88. Grey Phalarope. Phalaropus platyrhinchus. Has been shot near Newhaven.

In most parts of Scotland similarly situated, such as Perth, Dundee, Aberdeen, and Inverness, nearly the same species are observed during the winter; but in others, as the Hebrides and Orkney and Shetland Islands, the number of species is considerably less. In these latter districts the marine and maritime species predominate, while in the former the land birds are more numerous. A winter scene in the lowlands is tame, and an excursion there during snow uninteresting, compared with the scenery of the rugged and ocean-washed Hebrides, and a shooting expedition among their dreary mountains and pathless moors.

Having in October 1817, as I find by one of my note-books, left Borve in Harris, in company with the Reverend Mr. Alexander Macleod, minister of the Forest district, I crossed the sandford and hills of Luskentir, to the little Bay of Kindibig, where we lodged with a farmer, who next day ferried us over Loch Tarbert to a place called Urga. We remained there for a night, and then continued our journey, proceeding up a long craggy and bleak valley, in which is a very dark-coloured lake, famous for a goblin-beast which is seen upon it in summer in the form of a black mass having three humps. "The wind was exceedingly keen, the hail came in great showers, and the summits of the mountains were covered with snow. I left the parson a little above Marig, a creek on Loch Seaforth, in which was his dreary-looking habitation, and having resolved to ascend the highest hill, in order to witness a Hebridian snow storm in all its glory, I proceeded toward Clisheim, the height of which is estimated at somewhat more than three thousand feet. In despite of hail and snow, and the furious whirlwinds or eddying blasts that swept the mountain at intervals, I made my way, though not without labour, to the summit; and well was I recompensed, for there I enjoyed a very sublime spectacle. I was on the highest pinnacle of that range

of islands denominated the Outer Hebrides or Long Island, perched, like a Ptarmigan, on a craggy and precipitous ridge. The islands of Uist, Harris, and Lewis lay as it were at my feet. Toward the east and south, in the extreme distance, appeared the mountains of the counties of Ross and Inverness, with the pointed hills and craggy capes, and sloping plains of Skye. Westward, a long series of summits, commencing with that on which I stood, and forming a broad ridge, intersected transversely by deep valleys, extended for several miles. They appeared to be much lower than the mountain on which I was, and resembled heaps of sand formed by pouring it from a vessel. The snow lay rather deep on them all, and the whirlwinds that swept along their ridges scattering it in spiral flakes, presented an indescribably beautiful and sublime appearance. I was enveloped in one, but it did not prove very boisterous. The Atlantic was covered with huge clouds, that advanced in disorderly groups, nearly on a level with my position, but the waving streams of snow and hail that poured from them left no trace on the stormy waters. Toward the north lay the dreary flats of Lewis, covered with lakes, and flanked with the Park and Uig mountains. Having gazed upon the splendid scene until nearly frozen, I descended with considerable difficulty into a deep valley, where I encountered a fall of snow so dense as to render me apprehensive of being smothered by it. I felt too, for the first time perhaps, the benumbing effects of cold, my feet and fingers having become almost senseless, and a feeling of faintness having crept over me. However, by walking and running I soon recovered heat enough, and after passing the deep glen of Langadale, ascended an eminence in a kind of pass between two mountains, whence I discovered tokens of cultivation at the distance of three or four miles, so that I was assured of being in the proper direction toward the house of a friend whom I had not seen for many years. By a stream in a desolate valley I fell in with a herd of seven deer, which however I did not attempt to molest; and in the evening was welcomed to the cottage of Ewen Macdiarmid, at the head of Loch Resort, one of the dreary inlets of this dismal-looking coast. Two days' rambling among the mountains pro-

cured two specimens of the wild Red Deer, which I left with my host.

In traversing the interior of these islands in winter the only birds to be seen on the hills and moors are:

1. The Brown Ptarmigan. Lagopus scoticus.
2. Grey Ptarmigan. Lagopus cinereus.
3. Snow Bunting. Plectrophanes nivalis.
4. Water Rail. Rallus aquaticus.
5. Snipe. Scolopax Gallinago.
6. Jack Snipe. Scolopax Gallinula.

On the lakes however are often met with the

7. Swan. Cygnus ferus.
8. Bean Goose. Anser segetum.
9. Brent Goose. Anser Bernicla.
10. Golden Eye. Clangula chrysophthalma.
11. Dobchick. Podiceps minor.

It is in the pasture and cultivated land along the shores that the few species of winter residents are chiefly met with; and there may be seen, scattered over the fields, and frequenting the corn-yards, or the neighbourhood of houses,

12. The Field Lark. Alauda arvensis.
13. Corn Bunting. Emberiza Miliaria.
14. Reed Bunting. Emberiza Schœniculus.
15. Brown Linnet. Linaria cannabina.
16. Twite. Linaria montium.
17. Hedge Chanter. Accentor modularis.
18. Common Wren. Troglodytes europæus.
19. Starling. Sturnus varius.
20. Rock Pigeon. Columba Livia.
21. Common Thrush. Turdus musicus.

By many of the brooks I have met with

22. The Woodcock. Scolopax Rusticola.
23. Dipper. Cinclus aquaticus.

In the pastures are sometimes, but rarely, seen

24. The Fieldfare. Turdus pilaris.
25. Redwing. Turdus iliacus.

The predatory and wandering species which occur in winter as well as summer are:

26. The White-tailed Sea-Eagle. Haliaëtus Albicilla.
27. Golden Eagle. Aquila Chrysaëtus.
28. Sparrow Hawk. Accipiter Nisus.
29. Hen-harrier. Circus cyaneus.
30. Kestrel. Falco Tinnunculus.
31. Raven. Corvus Corax.
32. Hooded Crow. Corvus Cornix.

Along the shores are met with,

33. The Golden Plover. Charadrius Pluvialis.
34. Sanderling. Calidris arenaria.
35. Oyster-catcher. Hæmatopus Ostralegus.
36. Ring Plover. Charadrius Hiaticula.
37. Turnstone. Strepsilas Interpres.
38. Lapwing. Vanellus cristatus.
39. Common Heron. Ardea cinerea.
40. Curlew. Numenius Arquata.
41. Dunlin or Purre. Tringa variabilis.
42. Purple Sandpiper. Tringa maritima.
43. Redshank. Totanus Calidris.
44. Greenshank. Totanus Glottis.
45. Rock Pipit. Anthus aquaticus.
46. Common Pipit. Anthus pratensis.

Of Sea Birds properly so called are found:

47. The Great Glaucous Gull. Larus glaucus.
48. Great Black-backed Gull. Larus marinus.
49. Herring Gull. Larus argentatus.
50. Common Gull. Larus canus.
51. Cormorant. Phalacrocorax Carbo.
52. Crested Cormorant. Phalacrocorax cristatus.

53. Great Northern Diver. Colymbus glacialis.
54. Red-throated Diver. Colymbus septentrionalis.

The prodigious flocks of Plovers that cover the sandfords and shoals at low water, and the pasture grounds when the tide is up, afford excellent shooting; as do the Rock Doves, which in winter traverse the cultivated ground in great numbers. To these, as objects of sport, may be added the Brent Geese, Curlews, Snipes, and Starlings, together with the Ptarmigans. One very severe winter, when the ground was covered for six weeks, great numbers of the Pigeons died, and several dead Woodcocks were found by the frozen rills. Flocks of Rooks sometimes make their appearance after stormy weather, although these birds breed nowhere in the district. It is seldom, however, that snow lies very long in these islands, at least along the coasts; and the frequent storms, accompanied by rain and sleet, however furious, seem to be rarely fatal to the birds, although they sometimes prevent the Pigeons and Starlings from coming abroad for days. The Ptarmigans and small birds can always find a secure retreat among the shrubs and herbage; and the Grallatores, among the rocks and stones of the shores; while for the Cormorants and other swimming birds there are generally so many small bays and creeks, filled with the young of the Gadus Carbonarius and other fishes, and more or less sheltered from the blasts and billows of the Atlantic, that they can seldom have much difficulty in obtaining food.

It will be seen, on comparing the above lists, that the number of land birds in winter is much greater in the south than in the north of Scotland; and that the littoral and aquatic species are more proportionally numerous in the latter.

Having thus taken a hasty glance of the ornithological condition of the country in the cold season, we may now continue our examination of the different species, the next tribe that comes under our consideration being that composed of the small thick-billed birds, which are perhaps the most familiar of all.

III. DEGLUBITORES. HUSKERS.

OR CONIROSTRAL BIRDS.

The species of Birds that are found in Britain not being sufficiently numerous to afford representatives of all the genera or even families of which the class is composed, it is impossible to present in this work, in a continuous series, satisfactory indications of that intertexture of affinities, by tracing which one might acquire some definite idea of the objects which they unite. The great class of Passeres or Insessores of authors is so heterogeneous in its composition, that all who have attempted to characterize it, whether in few or in many words, have utterly failed; for this plain reason, that its various groups are as unlike to each other as they are to the Raptores or Rasores, and that, in fact, the only common features which they exhibit are those of the general organization of birds. A Hornbill and a Humming-bird, a Parrot and a Wren, a Kingsfisher and a Swallow, a Starling and a Toucan, not to mention others still more dissimilar, are surely as unlike each other as a Hawk and a Shrike, a Pigeon and a Plover, or a Flamingo and a Pelican. Assuming, therefore, the privilege which every author arrogates, whether comparable to the small Nuthatch, that with much labour bores a little hole in a filbert, or to the Ivory-billed Woodpecker that demolishes half the bark of a decayed tree in looking for his morning meal, I have thought it not presumptuous to separate the genera of our native birds into large groups or orders, such as, being in a great measure natural, may be readily apprehended by my readers, for whose

accordance with my views however I am not nearly so anxious as for their rightly understanding the connexion of the objects to which our attention is directed.

Taking a general survey of the land birds, such as one may obtain by examining, after previous study, a well-arranged collection, I imagine that among the most remarkably distinct groups would be considered as one of the most easily distinguished, that which forms the subject of the present notice.

The birds of which this order is composed are in fact remarkable for a general similarity of form, and more especially for a mutual resemblance in the shape of their bill, which is more or less stout and conical, although it presents considerable differences in its outlines and apex, being, though commonly short, and rapidly tapering to a point, sometimes very short and bulging on the one hand, and on the other sometimes rather long and acuminate. In external form, they do not in general bear a close resemblance to any of the genera composing the two preceding orders, the Rasores and the Gemitores; but in the structure of their digestive organs they manifest a considerable affinity to both, more particularly in having the œsophagus dilated into a kind of crop, and in the form and composition of their stomach, which is a powerful gizzard. At the same time, it cannot be denied that some of the smaller species of the Grouse or Partridge family are not unlike some Buntings both in form and in colour. Their alliance to several of the following orders however, especially to the family Thremmaphilinæ of the order Vagatores, and the Turdinæ and Alaudanæ of that of the Cantatores, is very apparent. With the former they are connected by the intervention of the family of Icterinæ, composed of the genera Icterus, Cassicus, Quiscalus, and a few others, which by means of Sturnella are allied to the genus Sturnus on the one hand, and to Alauda on the other. The latter genus is also connected with the Cantatores by means of Anthus. But the relations of these orders are too complex to be fully explained here, and I must be content with merely indicating the families of the Deglubitores, which I conceive to be the Tanagranæ, Passerinæ, Emberizanæ, and Icterinæ. The *Tanagranæ* are distinguished by having the

bill short, strong, with more or less convex outlines, the lower mandible larger, and having its sides more or less flattened at the base, the sharp overlapping edges of the upper with a distinct notch close to the tip, the gape-line nearly straight, the nasal fossa short and broad, the nostrils roundish. This group, composed of the genera Tanagra, Pyranga, Phibalura, and others, is peculiar to America, and remarkable for the gaudy and often brilliant colours, always however without metallic lustre, with which the species are adorned. The *Passerinæ* belong to both continents, and are characterized by a short, thick, conical bill, of which the mandibles are nearly equal in size, although not always in length, the upper with the edges a little overlapping, while those of the lower are involute, the tip destitute of a notch, and the gape-line nearly straight. To this group belong the genera Fringilla, Passer, Linaria, Pyrrhula, and others. The *Emberizanæ* are in many respects similar to the Passerinæ, but present the peculiar characters of having the upper mandible much narrowed, so that its edges do not overlap, the gape-line ascending and afterwards direct, there being as it were an angular portion cut out of the mandible, while a hard knob projects from the palate, and the lower jaw is much bent in the middle. To this group belong the genera Emberiza and Plectrophanes. The Larks, which by some writers are associated with the Buntings and Finches, seem to me not even to belong to the order, but to be allied to the Pipits, Thrushes, and other slender-billed birds. Lastly, The *Icterinæ*, peculiar to America, have the bill elongated, conical, tapering to a point, its edges involute, the gape-line deflected at the base as in the Emberizanæ. They form a group intermediate between the Passerinæ and Emberizanæ on the one hand, and the Corvinæ and Thremmaphilinæ on the other.

Of these families the first and last have no representatives in Britain, they being, as stated, exclusively American. All our species therefore belong to the Passerinæ and Emberizanæ, the characters common to which are the following:

The bill is short, strong, conical, its sides convex, the edges sharp and inflected, the tip acute, the upper mandible with scarcely any notch or sinus near the extremity. The tongue

is sagittate, emarginate and denticulate at the base, fleshy, sheathed with a horny covering at the end, its apex more or less slit. The œsophagus, Pl. VIII, Figs. 1, 2, 3, 4, *a*, *b*, *c*, *d*, is rather wide at its commencement, dilates on the middle of the neck into a crop of moderate size, *b*, which always lies on the right side, becomes very narrow as it enters the thorax, *c*, and before opening into the stomach, forms an oblong proventriculus, *d*, having a complete belt of oblong or cylindrical glandules. The stomach, *e*, *f*, *g*, *h*, is a remarkably powerful gizzard, of a roundish form, compressed, with two large lateral muscles, *e*, *f*, and an inferior prominent muscle, *g*; its cuticular lining dense, tough, and longitudinally rugous. The intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, is short, or of moderate length, and of nearly equal diameter beyond the duodenal portion, *h*, *i*, *j*. There are two very small oblong or cylindrical adnate cœca, *l*, near its extremity. The rectum, *l*, *m*, *n*, is nearly of the same diameter, and very short.

The body is ovate and short; the neck short. The legs are rather strong, of ordinary length or short; the tarsus compressed, covered anteriorly with seven scutella; the toes four, compressed, three anterior, slightly spreading, the first stouter, broader beneath, and not so long as the second and fourth, which are about equal, and much shorter than the third, which is united at its base with the fourth. The claws are rather long, arched, slender, compressed, tapering to a fine point, that of the hind toe longest. The wings are of moderate length, short, rather pointed, the primaries tapering, but not separated towards the end when the wing is expanded, the three outer longest. The tail is of moderate size, and is composed of twelve feathers, of which the lateral are bent a little outwards toward the end.

The arrangement of the plumage is as follows:—There are four kinds of feathers: quills, feathers, down-feathers, and hair-feathers.

The quills, inserted along the posterior edge of the wing, are seventeen in number, ten primary and seven secondary. Three pollical quills. Twelve tail-quills inserted close together, the two middle above the line of the rest.

The feathers, properly so called, are inserted on the head all round; on an elevated line along the back of the neck, expanding on the back, and continued to the rump-gland; on a similar line down the fore part of the neck, at the middle of which it forks, each division becoming broader as it passes along the side of the breast, and narrowing near the abdomen, on which it terminates before the anus; on a narrow line coming off from that on the fore-neck, and running along the edge of the wing, then crossing the humerus, and extending a short way along the side of the back, where it is broader; on both sides of the wing, there being above a band composed of the smaller upper wing-coverts, and a line of upper large coverts, below a narrower band of smaller lower coverts, and line of large lower coverts; on a line from the knee-joint above, laterally to near the rump; on a small transverse space above, and on another beneath the tail. The ears and anus are also margined with a distinct circle.

The down-feathers cover the intervals between these feathered spaces; and all the surfaces from which the feathers come off are interspersed with very slender hairs, which are penicillate at the tip.

Birds of this order occur in all parts of the globe, but are more numerous in the temperate than in the tropical regions. They are generally gregarious after the breeding season, and feed for the most part on seeds, which they deprive, by means of the sharp edges of the bill, of their outer covering or pericarp, whence the name *Huskers* given to the order. Many of them however feed also on berries and fruits of various kinds; and the larger species of the family Icterinæ eat also worms and various other matters, approaching in this respect, as well as in appearance, to the Corvinæ. Their mode of progression on the ground is generally by a succession of short leaps, and on trees they cling with ease to the twigs, some of them being more arboreal than terrestrial. Their flight is rapid, light, and sustained, generally undulating, or performed by successive bounds. They are fond of basking in the sun, whether on trees or on the ground; and in dry weather may be seen fluttering among dust or sand, which they throw up about them-

selves. The purpose of this habit has been supposed to be to rid themselves of parasitic insects; but it is more probably connected with the gratification imparted by the warmth communicated by the heated sand. They wash occasionally in pools and streams, standing or crouching in the water, and throwing it up by repeated flutterings. They drink by immersing their bill and taking up a little at a time, elevating their head in swallowing it. They construct an elaborate nest, greatly diversified in form and texture, according to the species. The eggs, which vary from four or five to eight or nine, exhibit great diversity of marking, being however generally spotted or dotted. The young are born blind, at first thinly covered with down. The males are almost always more gayly attired than the females; the young are generally similar to the latter; and the young males sometimes moult several times before the plumage is completed.

The digestive organs of these birds are obviously adapted for seeds or other hard bodies. The strong, conical, pointed bill, with its fine point and sharp edges, performs the part of a forceps and husking instrument; the dilatation of the œsophagus receives the food collected; the gizzard, as muscular as that of the Rasores, with an equally tough and rugous internal coat, readily triturates the frequently hard seeds with the aid of gravel or sand; and the ingesta being highly nutritious do not require to undergo a protracted elaboration in the intestine, so that the cœca are merely mucous crypts, as in the Pigeons, whose food is pretty similar.

The British species are all more or less gregarious in winter. In summer they are dispersed over the country, some residing in woods, others in thickets, some in the open fields, while one species, the Common Sparrow, prefers, like the Jackdaw of the next order, lodging about the habitations of man. It is in this order that some of our finest songsters, the Brown Linnet, Greenfinch, and Goldfinch, are found; but many of them have not the faculty of emitting "sweet sounds." Being entirely granivorous for the greater part of the year, some species, as the Sparrow and Bunting, commit considerable depredations on the crops, and in winter pick the seeds from the corn-stacks. They

are generally distributed with us, most of them however occurring chiefly in the cultivated parts. Very few are strictly arboreal, like the Crossbills, and equally few are those that, like the Snowflake, reside on the ground; but the greater number seek their food chiefly on the latter, and resort to trees or shrubs for shelter, protection, or repose. They are therefore fitted for perching securely, as well as for moving with considerable speed on the ground; but their gressorial powers are much inferior to those of the Rasores, Gemitores, and Vagatores, and none of them, excepting the Lark-Buntings, are capable of running with speed. Being compact and muscular, with a considerable development of the wings and tail, they move through the air with ease and velocity. Their sight is keen, but apparently does not extend to great distances, so that in general they are easily approached within shooting distance. Their small size protects them in a great measure from man; but their enemies are numerous, and the small Rapacious Birds, and Carnivorous Quadrupeds live chiefly at their expense. Their mental faculties are not apparently of a high order, although their brain, in proportion to the size of their body, is greater than that of almost any other tribe of birds. In captivity they are gentle, and to a considerable extent docile.

All the species moult only once in the year; but in many a considerable change is effected in the colouring by the abrasion of the extremities of the filaments of their plumage. Many produce two broods in the season; and as these are generally pretty numerous, there must be a great annual destruction among the species, otherwise their number would be much greater.

Among the Conirostres of authors are by some included the Crows, Tits, Larks, and many other genera; but the digestive organs of the birds just named are different in several respects; their habits, external forms, and proportions exhibit much diversity, and their bills in particular, although in a modified sense conical, are not more so certainly than those of a multitude of genera which no one could dream of referring to this order, such as the Woodpeckers, Gannets, and Divers. It is in consequence of looking too exclusively to so vague a char-

acter as that derived from the shape of this organ, that these unnatural associations have been made. The group as above defined is natural and distinct. But although many species of the Icterinæ are obviously most intimately allied to some of the Passerinæ and Emberizanæ, and especially to the genus Ploceus of the former, yet, not having had an opportunity of examining the digestive organs of that family, I cannot with confidence affirm that it does not belong to the order Vagatores. This sort of analysis alone can determine the question.

In Britain then, there are representatives of two families of the Deglubitores; namely, *Passerinæ* and *Emberizanæ*.

PASSERINÆ.

SPARROWS AND ALLIED SPECIES.

The family of Passerinæ is composed of small birds whose average size is that of the common House Sparrow, a species which may be considered as the most extensively distributed and the most familiarly known of its tribe. The genera of which it is composed have so strong a mutual resemblance that it is very questionable whether the greater number of them ought not to be referred to the same subordinate group. These genera are Fringilla, Passer, Linaria, Carduelis, Coccothraustes, Pyrrhula, and Crucirostra, of all which there are representatives in Britain. These birds agree in presenting the following characters. Their body is ovate, compact, and stout; their neck short; their head large; their wings and tail of moderate length.

The bill, Pl. VIII, Fig. 8, is short, stout, conical, its sides convex; the upper mandible of about the same breadth as the lower, its dorsal outline nearly straight, but generally more or less arched, its tip sharp and slightly deflected, the edges a little inflected, sharp, and with a slight sinus near the tip; the gape-line nearly straight; the lower mandible with the angle short, broad, and rounded, the dorsal outline straight, or slightly convex, the edges sharp, and inflected, the tip acute. Both mandibles are internally concave, the upper with a medial prominent line, and generally two lateral ones. The tongue is sagittate, subulato-lanceolate, involute, the tip horny, bifid or terminated by a pencil of short bristles. The posterior aperture of the nares is linear, and defended by acute papillæ. The pharynx of moderate width. The œsophagus, Pl. VIII, Fig. 1, *a*, *b*, *c*, *d*, generally dilatable on the middle of the neck into a crop, *b*, lying on the left side, is afterwards narrow; the proventriculus, *d*, bulbiform, and studded with oblong or cylin-

drical glandules. The stomach, *e*, *f*, *g*, *h*, is a powerful gizzard, roundish, compressed, with two strong lateral muscles, *e*, *f*, having radiated tendons, a lower thin muscle, *g*; and a dense, tough, and longitudinally rugous inner coat. The intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, is of moderate length, of nearly equal diameter throughout, and having near its extremity two very small, adnate, cylindrical cœca, *l*. The figure referred to above represents the digestive organs of the House Sparrow; but Figs. 3 and 4, representing those of the Green Linnet and Crossbill, shew the same parts, and are marked with the same letters.

The eyes are of moderate size; the eyelids feathered, their edges bare and crenate. External ear large, oval. Nostrils nearly circular, basal, in the fore part of the nasal depression, which is very short and broad.

The legs are short; the tarsus compressed, covered anteriorly with about seven scutella, posteriorly with a long plate forming a sharp edge, and inferior rugæ. Toes slender, compressed, scutellate above, granulate beneath, three before, one behind; second and fourth shortest and equal, first a little longer if the claws be included, but otherwise shorter, third much longer, and united to the fourth as far as the second joint of the latter. Claws longish, slender, acute, arcuate, compressed, laterally grooved.

The plumage is soft and blended, the feathers rounded, with a very slender plumule of a few long barbs; those at the base of the bill with short bristle points. The wings are broad, semicordate, of moderate length; the primary quills ten, the secondary about seven; the three outer longest, but varying in relative length. Tail of moderate length, of twelve feathers, the lateral slightly bent outwards.

The skeleton of these birds is of rather delicate structure, the flat bones being extremely thin. The cranium is proportionally very large, of great breadth behind, and rounded; the jaws short, the lower with a large oblong aperture in the ramus, and slightly bent beyond the middle; the septum between the orbits very incomplete. The cervical vertebræ are generally nine, and proportionally slender; the dorsal eight, and rarely anchylosed; the united lumbar and sacral ten; the coccygeal

seven, and triangular. There are eight very slender roundish ribs, the first incomplete. The scapula is very long, linear, gently deflected towards the end. The furcula slender, narrow, with the curve acute. The sternum, Fig. 55, is of moderate size, with a very prominent crest, the posterior margin even, but with a very deep sinus on each side, leaving a linear process on the lateral edge. Being marked with the same letters as those of the Black Grouse, Fig. 43, and Rock Dove, Fig. 49, it may be compared with them. The body, *a*, *b*, *c*, *d*, *e*, *f*, is more united than in the Pigeons, the posterior lateral process, *g*, being continuous with it, the extremity, *g*, *d*, *e*, truncate; but the anterior lateral process, *f*, is still free. The ridge or crest, *a*, *e*, has a considerable prominence. The anterior process between the coracoid bones, *b*, is forked. These bones, *h*, *h*, are of moderate size. The furcula, *i*, is slender and curved, and has a flattened process at the junction of its crura, standing off at a right angle backwards. The clavicles, *j*, *j*, are linear, long, and slightly deflected towards the end. Humerus short, cylindrical, slightly curved; cubital bones nearly a third longer; the hand of the same length as the cubitus, consisting of two carpal bones, one large metacarpal, a thin pointed pollical, and three digital, of which there are two to the first phalanx. The pelvis is very open beneath; the femur short, the tibia a third longer, with a slender fibula, only a fourth of its length; the tarsal bone three-sided, being edged behind, and a little longer than the femur. The hind toe is composed of a distinct metatarsal bone and two phalanges; the second of three; the third of four; the fourth of five; the extreme phalanges long, very slender, slightly arched, compressed, and laterally grooved.

FIG. 55.

The digestive organs are obviously adapted for seeds and grain, which are easily picked up by means of the strong pointed bill, and husked by its sharp involute edges. The œsophagus generally has a median dilatation or crop, which is to

a considerable extent dilatable so as to hold a quantity of food. The stomach, being a very powerful gizzard, triturates the grain with the aid of numerous particles of sand, generally siliceous, but often of various mineral substances. The food being highly nutritious, the moderately long and rather wide intestine, which is villous in its whole length, suffices for the elaboration of the chyle, so that the cœca are merely rudimentary and mucous. The fœces and urine are deposited in the elliptical dilatation of the rectum, and voided in a soft state.

These birds are active and lively; in winter generally gregarious; and at all seasons live together without exhibiting any animosity, excepting for a short time in spring, when the males often fight, although their combats are seldom obstinate. They are easily tamed, even when caught in the adult state; and those of them which have an agreeable song, or are beautifully coloured, are highly prized as domestic pets.

Their flight is strong, more or less undulated, and generally rapid. They perch with security, glide among the branches with ease, and on the ground always move by short leaps, both feet being simultaneously raised. Their vision is acute, but they are not in general alarmed by distant objects, so that they are easily approached within shot. As their food is obtained chiefly on the ground, they frequent the open fields, retreating to trees and bushes when disturbed, and settling there at night.

Most of them breed more than once in the season, forming an elaborate, rather bulky, deep, compact nest. The eggs vary from four to eight, and are generally spotted, clouded, or lined. The young are born blind, and are at first slightly covered with dusky or greyish down. Their first plumage is, in the males, always different from that of the adult. The males are a little larger than the females.

The plumage is changed once in the year; but as the feathers are variously coloured, and the tips of their filaments are gradually worn off or decay, the summer plumage is often partially different in colour from that of winter.

These birds are generally distributed over the country, and are for the most part numerous. Many of them are peculiar

to the cultivated parts; and almost all in winter draw near to the habitations of man, as in severe weather they obtain the principal part of their food in the farm and stack yards, or in the stubble fields.

SYNOPSIS OF THE BRITISH GENERA AND SPECIES.

GENUS I. FRINGILLA. FINCH.

Bill short, straight, strong, conical, its upper outline slightly convex towards the tip, which is acute; mandibles nearly equal; edges of the lower much inflected; wings rather long, the second and third quills longest, the first a little shorter than the fourth; tail of moderate length, emarginate.

1. *Fringilla Cœlebs. Chaff Finch.* Male with the head and hind-neck greyish-blue, the forehead black, the back reddish-brown, the rump yellowish-green, the lower parts brownish-red. Female with the head and back light greyish-brown, the rump tinged with yellowish-green, the breast pale brownish-grey.

2. *Fringilla Montifringilla. Mountain* or *Brambling Finch.* Male with the head and back deep black, the feathers margined with yellowish-grey; the rump white, tinged with yellow; the sides spotted with black. Female with the head and back pale greyish-red, the central part of each feather brownish-black; the rump greyish-white, the breast pale reddish-brown.

GENUS II. PASSER. SPARROW.

Bill short, straight, strong, conical; the tip rather blunt; lower mandible rather smaller than the upper; the outlines of both slightly convex, their edges inflected; wings rather short, third quill longest, but scarcely exceeding the first and third, which are equal; tail of moderate length, emarginate.

1. *Passer domesticus. House Sparrow.* Male with the upper part of the head light brownish-grey; sides of the neck greyish-white, throat black; back and wings chestnut and

black; a white band across the latter. Female with the head greyish-brown above, the lower parts light brownish-grey.

2. *Passer montanus. Tree Sparrow.* Male with the upper part of the head chestnut; the sides of the neck white; the throat and a line over the eye black; the back and wings chestnut and black; two white bands across the latter. Female similar, but with lighter tints.

GENUS III. COCCOTHRAUSTES. GROSBEAK.

Bill of moderate length, straight, extremely thick, conical; mandibles nearly equal; upper with its dorsal outline slightly convex, lower a little broader, with its outline straight, its sides very thick, its edges much inflected; wings of moderate length, the first three quills almost equal; tail short, slightly emarginate.

1. *Coccothraustes atrogularis. Black-throated Grosbeak.* Male with the head yellowish-brown, the throat black, the fore part of the back dark chestnut; four of the primary quills emarginate and curved outwards at the tip. Female with the colours similar, but paler.

GENUS IV. LINARIA. LINNET.

Bill short, straight, thick, conical, a little compressed towards the end; mandibles nearly equal, upper with its dorsal outline very slightly convex, lower with its outline straight, its edges inflected; wings rather long, the outer three quills nearly equal, the second longest; tail of moderate length, deeply emarginate.

1. *Linaria Chloris. Green Linnet.* Male yellowish-green above, the head tinged with grey; the edge of the wing, the outer webs of the alula, and part of the outer webs of the primaries, with the basal portion of the tail-feathers yellow. Female with the upper parts greenish-brown, the lower greyish, the yellow markings similar but less extended.

2. *Linaria cannabina. Brown Linnet.* Upper mandible dusky, throat yellowish-grey streaked with brown.

Male in winter with the upper parts reddish-brown, streaked with black, the feathers of the forehead and breast dark red with light brown tips. Female streaked above with dusky and yellowish grey; the throat, breast, and sides streaked with brown and yellowish-grey.

Male in summer with the forehead and breast crimson or rose red. Female nearly as in winter.

3. *Linaria flavirostris. Twite, or Mountain Linnet.* Bill yellow, the throat light yellowish-red and unspotted; the plumage streaked with yellowish-brown and brownish-black; no red at any season on the head or breast; male in summer with crimson on the rump.

4. *Linaria minor. Smaller Redpoll.* Length nearly five inches. Upper mandible dusky, lower yellow; plumage streaked with yellowish-brown and brownish-black; loral space, edge of forehead, and throat black.

Male in winter with the top of the head and rump obscure red. Female with red on the head only.

Male in summer with the top of the head crimson; the sides of the neck, the breast, flanks, and rump, carmine. Female without the carmine colouring.

5. *Linaria borealis. Mealy Redpoll.* Length about five inches and a third; the colours as in *L. minor*, but the rump and lower parts nearly white.

GENUS V. CARDUELIS. THISTLE-FINCH.

Bill shortish, straight, conical, compressed toward the end, the tip acuminate; both mandibles with their outline straight, and their ridge narrow; wings rather long, the outer three quills nearly equal, the second longest; tail shortish, emarginate.

1. *Carduelis elegans. Goldfinch.* Forehead and throat crimson, back brown.

2. *Carduelis spinus. Siskin.* Male greenish-yellow, the top of the head and the throat black. Female yellowish-green streaked with black above, whitish streaked with black beneath.

GENUS VI. PYRRHULA. BULLFINCH.

Bill short, very strong, all its outlines convex; wings of moderate length, the second, third, and fourth quills longest; tail rather long, emarginate.

1. *Pyrrhula pileata. Common Bullfinch.* Upper part of the head glossy black. Male with the back ash-grey, the rump white, the lower parts bright red. Female with the back brownish-grey, the lower parts dull yellowish-brown.

2. *Pyrrhula Enucleator. Pine Bullfinch.* Male with the head, neck, fore part of breast, and rump bright red, the wings dusky, with two white bars. Female with the top of the head yellowish-brown, the rump brownish-yellow.

GENUS VII. LOXIA. CROSSBILL.

Bill of moderate length, very strong, its outlines convex, the points of the mandibles curved and laterally deflected in opposite directions.

1. *Loxia Europæa. Common European Crossbill.* Length about seven inches, bill from four and a half to six and a half lines in height at the base. Male red, the wings and tail dark brown. Female greyish-brown tinged with yellow above. Young male dull yellow above.

2. *Loxia Pytiopsittacus. Parrot Crossbill.* Length about eight inches, bill short, its outlines very convex, its height at the base from six to eight lines. Male red, the wings and tail dark brown. Female greyish-brown tinged with yellow above. Young male dull yellow above.

FRINGILLA. FINCH.

Bill shortish, straight, direct, conical, acute, subpentagonal and nearly as broad as deep at the base; upper mandible with the dorsal outline declinate and straight to near the end, when it becomes a little convex, the ridge broad and convex, the sides rounded, the edges sharp and inflected, but overlapping, with an obsolete notch or slight sinus close to the tip; lower mandible with the angle short, broad and rounded, the dorsal line very slightly convex, the ridge broad, the sides rounded, the edges sharp and inflected.

Mouth rather narrow; both mandibles deeply concave, the upper with a medial prominent line, two lateral lines, and four grooves. Posterior aperture of the nares linear, and, with that of the glottis, margined with acute papillæ. Tongue sagittate, subulato-lanceolate, involute so as to be nearly tubular, the tip terminated by a pencil of short bristles. Œsophagus when distended forming a large crop on the right side of the neck, afterwards narrow; proventriculus, Pl. VIII, Fig. 10, *d*, bulbiform, and furnished all round with numerous cylindrical glandules. Gizzard, *e*, *f*, *g*, roundish, compressed, with two very strong lateral muscles, *e*, *f*, and radiated tendons; its cuticular lining dense, tough, and longitudinally rugous. Intestine of moderate length, rather wide, of nearly equal diameter throughout, with two very small, cylindrical, adnate cœca near its extremity; rectum very short, with an elliptical enlargement.

Nostrils nearly circular, basal, in the fore part of the nasal depression, which is very short and broad. Eyes of moderate size; eyelids feathered, their edges bare and papillar. External aperture of ear large, oval.

Head oblong, of moderate size, the forehead rather flat; neck short; body ovate, of nearly equal breadth and depth. Legs short; tarsus compressed, covered anteriorly with seven scutella, posteriorly with a long plate forming a sharp edge, and inferior rugæ. Toes slender, compressed; covered above with few large scutella, granulate and narrow beneath; the second and fourth equal, the first a little shorter, the third much longer, and united to the fourth as far as the second joint of the latter. Claws longish, slender, acute, arcuate, compressed, laterally grooved.

Fig. 56.

Plumage soft, blended, the feathers rounded, with a very slender plumule of a few long barbs; those at the base of the bill with short bristle points. Wing broad, semicordate. Primary quills ten, secondary seven, the four outer quills nearly equal, but the second and third longest. Tail longish, or of moderate length, emarginate, of twelve feathers, the lateral slightly bent outwards.

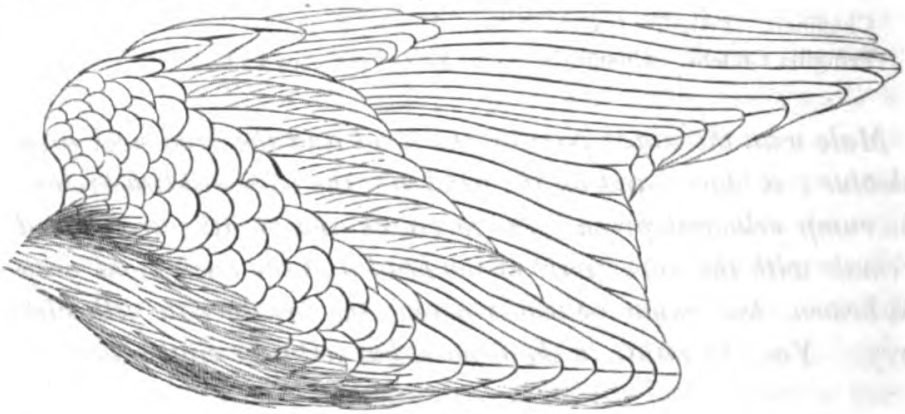


Fig. 57.

The genus Fringilla is very intimately allied to the genera Passer, Coccothraustes, Linaria, and others of this family. The species are all of small size, neat in form, with lively colours, and of active habits. In Britain there are only two, which are nearly of the same size, bear a great resemblance to each other, and live in the same manner; but the one, *F. Cœlebs* is a constant resident, while the other, *F. Montifringilla* visits us only in winter.

FRINGILLA CŒLEBS. THE CHAFFINCH.

PINK. SPINK. TWINK. BEECH-FINCH. HORSE-FINCH. SHELLY. SHELL-APPLE. SHILFA. CHAFFY. BREAC-AN-T'SIL.

FIG. 58.

Fringilla Cœlebs. Linn. Syst. Nat. I. 318.
Fringilla Cœlebs. Lath. Ind. Orn. I. 437.
Chaffinch. Mont. Orn. Dict.
Gros-bec Pinson. Fringilla Cœlebs. Temm. Man. d'Orn. I. 357.
Chaffinch. Fringilla Cœlebs. Selb. Illustr. I. 303.
Fringilla Cœlebs. Chaffinch. Jen. Brit. Vert. An. 133.

Male with the upper part of the head and the hind-neck greyish-blue; a black band on the forehead, the back reddish-brown; the rump yellowish-green; the fore-neck and breast purplish-red. Female with the upper part of the head and the back light greyish-brown, the rump yellowish-green, the breast pale yellowish-grey. Young similar to the female, but with the tints paler.

MALE.—The Chaffinch, which is one of the most familiar, as well as beautiful birds of the Passerine family, presents no remarkable peculiarity of form, it being merely, like many others, a neat and lively little bird. The bill and digestive organs being precisely as described in the generic character already given, it is unnecessary to say more here respecting them than that the œsophagus is two inches long, the intestine eleven and a half, the cœca nearly two twelfths, the rectum

one inch and a quarter. The plumage is blended, slightly glossed, the feathers rather narrow and rounded. The wings are rather long, the primary quills tapering and rounded, the secondary broader and retuse; the third quill is the longest, the fourth scarcely shorter, the second almost as long, the first considerably shorter than the fifth; the second, third, fourth, and fifth slightly cut out on the outer web towards the end.

The bill is pale reddish-brown, darker at the point, the lower mandible flesh-coloured. The irides hazel; the tarsi, toes, and claws wood-brown; the mouth and skin at the angles flesh-coloured. The frontal feathers are black, tipped with yellowish-brown; those of the upper part of the head and hind-neck light greyish-blue, tipped with reddish-brown; the anterior dorsal reddish-brown, the posterior light yellowish-green. The sides of the head, the fore-neck, and the anterior part of the breast are light purplish-red; the rest of the lower parts of the same colour, but paler. The quills, large coverts, and alula, are black; quills white at the base and along the inner margin, their outer edge towards the end yellow; the secondary coverts tipped with white, which is tinged with pale yellow; first row of smaller coverts black at the base only, the other parts white, as are the tips of many of the rest; lower wing-coverts greyish-white. Tail-feathers brownish-black, the two middle brownish-grey, blackish along the shafts; the outer marked with an oblique band of white, including the middle of the outer web and the terminal third of the inner, its shaft black; the next slightly margined with white internally, and having a long triangular patch of the same towards the extremity of the inner web. The concealed part of the feathers is blackish-grey, with a whitish line along the shafts.

Length to end of tail $6\frac{1}{2}$ inches; extent of wings $11\frac{1}{2}$; bill along the ridge $\frac{5}{12}$, along the edge of lower mandible $\frac{7}{12}$; wing from flexure $3\frac{3}{4}$; tail $2\frac{3}{4}$; tarsus $\frac{3}{4}$; first toe $3\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; second toe $4\frac{1}{2}$ twelfths, its claw $2\frac{1}{2}$ twelfths; third toe $\frac{7}{12}$, its claw $3\frac{1}{2}$ twelfths; fourth toe $4\frac{3}{4}$ twelfths, its claw $2\frac{3}{4}$ twelfths.

Female.—The female, which is considerably smaller, is

much less gaudily coloured. The bill, feet, and irides, are as in the male. The upper part of the head is greyish-brown, its central part paler; the cheeks yellowish grey; the back and sides of the neck pale yellowish-grey; the fore part of the back light greyish-brown; the rump pale yellowish-green. The wings and tail are as in the male, but their dark parts, instead of being black, are deep brown. The throat and breast are pale yellowish-grey slightly tinged with red; the abdomen and lower tail-coverts nearly white.

Length to end of tail $6\frac{1}{4}$; extent of wings 10; bill along the ridge $4\frac{1}{2}$ twelfths, along the edge of lower mandible $\frac{7}{12}$; wing from flexure $3\frac{1}{4}$; tail $2\frac{3}{4}$; tarsus $\frac{8}{12}$; middle toe and claw $\frac{8}{12}$.

Variations.—In general the variations are not remarkable; the throat and breast are of a lighter or deeper red, the quills more or less black, the white bands on the wings more or less tinged with yellow. Albino individuals sometimes occur, although I have never seen a British one. Considerable differences as to size are found, the length varying from five and a half to six and a half, or somewhat more.

Changes of Plumage.—Few birds exhibit the effects of the wearing of the feathers in a more remarkable manner than the male Chaffinch. By the beginning of April, in many individuals even so early as January, the black of the forehead has become nearly pure, the greyish-blue of the head almost unmixed, the red of the back brighter, and the breast has assumed a much lighter and livelier tint. At this season also the bill is of a fine leaden blue. The changes which the female undergoes are less remarkable.

Habits.—This species, which is of very common occurrence in all the wooded and cultivated parts of the country, is permanently resident, even in the bleakest parts of the north of Scotland, although in corresponding latitudes on the continent it appears that many individuals migrate southward. Towards the end of autumn, the Chaffinches are commonly to be seen

in the vicinity of houses, searching for food by the hedges, in the orchards, gardens, farm-yards, and fields. As the winter approaches, they collect into loose flocks, and associate with Green Grosbeaks, Yellow Buntings, Sparrows, and other species of this order, frequenting the stubble fields and farm-yards, and frequently settling on the roads to search among horse-dung for undigested seeds. Their food at this season consists of seeds of various kinds, but especially oats and wheat, to aid the disgestion of which they swallow small rounded smooth grains of gravel, generally of a blackish colour. Some of these seeds are often found in the œsophagus, which, as in all the other birds of this family, seems to answer the purpose of a recipient, although it has no very distinct enlargement or crop.

Their flight, which is rapid, and on occasion protracted, is undulated, being performed by quickly repeated flaps, with short intervals of cessation. They alight abruptly, move on the ground by very short leaps, and when alarmed perch on trees or bushes. When not at rest the males usually raise the feathers of the forehead somewhat in the manner of the Field Lark. They are among the most familiar of our birds, being nearly as little distrustful of man as the Sparrow. Towards the end of March the flocks break up, and in April preparations are made for breeding.

The pairing takes place without much display of animosity among the males, who at this season are frequently heard repeating their ordinary note, from two to six, generally four, times, in rapid succession, *tweet, tweet, tweet—tweet.* At other periods it is generally a single tweet, rather deep and mellow. Its song is short, modulated, mellow, and for a time pleasant to the listener, although apt to become disagreeable from its being so frequently repeated without the least variation. Previous to the arrival of the migratory warblers, the Chaffinch, the Yellow Bunting, and the Robin, are the species with whose song we are everywhere assailed; but as the season advances, their notes become in a great measure lost by being blended with those of more pleasing performers. The people in the south of Scotland most unpoetically imagine the song of the

Chaffinch to resemble the words "wee, wee, wee, wee drunken sowie," to which no doubt it bears some semblance. In the lanes and gardens it is almost incessantly heard from the beginning of May to the middle of June, or considerably earlier if the weather be fine; but its quality is by no means in harmony with the beauty of the bird, which is such as to attract the most unobservant as it hops familiarly along the road, or perches on the boughs.

The nest is of moderate size, very neatly constructed, having its exterior composed of moss, lichens, grass, thread and rags, its interior of wool, feathers, hair, and other suitable materials. Not that all these articles enter into the composition of every nest, for there is great diversity in this respect. When neatly crusted with grey lichens, it is very difficult to distinguish it in the cleft of a tree, which is the situation usually selected for it. But it is found in a great variety of places, often on tall trees, sometimes in the fork of a shrub, not unfrequently among ivy on a wall, and still more commonly among the twigs of a hawthorn hedge. Gardens, orchards, hedges, groves, copses, and woods, are all inhabited by the Chaffinches at this season; but they are very rarely met with in the depth of large woods, especially of those composed of fir. When a person approaches the nest, the birds manifest much anxiety, flying about or hopping among the twigs, and repeating their ordinary tweet in a hurried manner. The female sits very close, and from her colour and that of the nest is seldom perceived, but when aware that she has been discovered, she slips off with alacrity, and joins the male in evincing her anxiety as to the result of the intrusion. The eggs, four or five in number, are of a regular oval form, averaging about three fourths of an inch in length, by six and a half twelfths in their greatest breadth, purplish white, or pale reddish-grey, sparsely spotted with reddish-brown, and having a few irregular lines of the same.

Young.—The young when fledged resemble the female, but have the tints paler, and are destitute of the bright green on the rump. The first brood is usually abroad by the middle or beginning of May; the second by the end of July. The young

are fed on insects of various kinds, which also form a principal part of the food of the old birds during the summer.

Progress toward Maturity.—At the first moult, the young assume the colours considered peculiar to the adult, although, until the second moult, they may generally be distinguished from older birds by their paler tints. Some males are much more richly coloured than others, especially on the throat and neck, while the wings and tail are deep black in their dark parts.

Remarks.—As a song-bird the Chaffinch does not rank high, and therefore is very seldom kept in cages, although its beauty and lively disposition render it a very pleasing parlour companion. It is easily reared from the nest, and when caught in the adult state, soon becomes reconciled to captivity.

FRINGILLA MONTIFRINGILLA. THE MOUNTAIN FINCH, OR BRAMBLING.

MOUNTAIN FINCH. BRAMBLE FINCH. BRAMBLING.

Fringilla Montifringilla. Linn. Syst. Nat. I. 318.
Fringilla Montifringilla. Lath. Ind. Orn. I. 425.
Brambling. Mont. Orn. Dict.
Grosbec d'Ardennes. Fringilla Montifringilla. Temm. Man. d'Orn. 360.
Mountain Finch. Fringilla Montifringilla. Selb. Illustr. I. 306.
Fringilla Montifringilla. Mountain Finch. Jen. Brit. Vert. An. 134.

Male with the head and back deep black, the feathers margined with yellowish-grey; the rump white, tinged with yellow; the fore-neck and breast light reddish-brown; the sides spotted with black. Female with the head and back pale greyish-red, the central part of each feather brownish-black; the rump greyish-white; the breast pale reddish-brown.

Male.—The Brambling is nearly of the same size as the Chaffinch, which it greatly resembles in form. Its bill, although of the same shape, is proportionally larger, and presents a remarkable difference, having a toothlike projection on the edge of the lower mandible near the base. The plumage is soft and blended, the feathers rounded. The wings are of moderate length, the primary quills tapering and rounded, the secondary broader and retuse; the third quill longest, the second scarcely shorter, the first a little shorter, and of the same length as the fourth; the second, third, and fourth slightly cut out on the outer web towards the end. The tail, which is of moderate length, is distinctly emarginate, the two middle feathers being nearly half an inch shorter than the lateral, which are curved a little outwards at the end.

The greater part of the upper mandible and the end of the lower are dusky, the base of the former pale grey, and the basal portion of the latter, with the skin at the angle of the mouth,

yellow. The irides are brown. The feet light greyish-brown. The upper part and sides of the head, the hind-neck and back, are black, the feathers margined with yellowish-grey; the smaller wing coverts and scapulars light reddish-brown; of which colour there is a band across the wing, formed by the tips of the secondary coverts. The quills and large coverts are black, the former margined externally with pale yellow, excepting the inner, which are more broadly edged with reddish-brown, and having a white spot at the base, which forms a narrow bar on the extended wing; the first row of small coverts tipped with white. The tail also is black, the outer feather white at the base externally, with an oblique line of greyish-white on the inner web, the rest margined with greyish-white, excepting the two middle ones, which are tinged with grey, and edged with greyish-brown. The hind part of the back is white; the upper tail-coverts black, broadly margined with light greyish-brown. The fore-neck and anterior part of the breast are light brownish-red, the sides paler, and marked with oblong brownish-black spots; the abdomen and lower tail-coverts, yellowish-white.

Length to end of tail $6\frac{1}{4}$ inches; extent of wings $10\frac{1}{2}$; wing from flexure $3\frac{3}{4}$; tail $2\frac{8}{12}$; bill along the ridge $\frac{1}{2}$, along the edge of lower mandible $\frac{5}{8}$; tarsus $\frac{7}{8}$; first toe $\frac{1}{4}$, its claw $4\frac{1}{2}$ twelfths; second toe $4\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$; third toe $\frac{7}{12}$, its claw $\frac{4}{12}$; fourth toe $4\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$.

Female.—The female is considerably smaller, and less beautiful. The bill, irides, and feet are as in the male. The upper part of the head and the back are pale greyish-red, the feathers brownish-black in the centre; the cheeks are of the same colour, without spots; the hind part and sides of the neck pale grey, with two longitudinal black bands behind; the throat and breast light reddish-brown, the sides paler and unspotted, the abdomen and under tail-coverts brownish-white. The wings and tail are marked as in the male, but the dark parts are blackish-brown, and the two middle tail-feathers grey. The hind part of the back is patched with greyish-white.

Length to end of tail 6 inches; extent of wings 10; wing

from flexure $6\frac{1}{2}$; tail $2\frac{1}{2}$; bill along the ridge nearly $\frac{1}{2}$; tarsus $\frac{8}{12}$; middle toe and claw $9\frac{1}{4}$ twelfths.

Variations.—Individuals are sometimes found white, or having patches of that colour; but I have not observed any remarkable variations of this kind. Young males have the black of the head, back, and wings tinged with brown.

Changes of Plumage.—The changes which the plumage undergoes, owing to the wearing of the feathers, are described by Temminck as analogous to those observed in the Chaffinch; but as the species does not remain with us in summer, I need not describe its dress at that season further than by stating that the dark parts of the upper surface are then pure black.

Habits.—We have seen that in its general form and style of colouring, the Brambling is very closely allied to the Chaffinch. Its flight, mode of walking, and other manners, are also similar, so that on trees or on the ground, the two species can scarcely be distinguished by a person seeing them together at a little distance. It now and then appears in different parts of the country during winter, and searches for food in the open fields, generally in company with Chaffinches and Yellow Buntings. When alarmed, it betakes itself to trees, like other small birds of this family. Its flight is rapid and undulated, and its note is a *tweet* very similar to that of the Chaffinch. Towards the end of spring it disappears; and I am not aware that any individuals have ever been found breeding in this country. The only opportunity which I have had of observing it occurred in February 1835, when I fell in with a flock on some beech trees about a mile from Corstorphine, near Edinburgh. They were mingled with Chaffinches, from which I did not distinguish them, until some of them having alighted in a field, I fired at them, and on going up found to my surprise, two Bramblings and a Chaffinch. I have, however, seen many specimens, recent and stuffed, which had been killed in Scotland, and of which I have several in my possession.

PASSER. SPARROW.

Bill shortish, straight, direct, conical, rather acute, subpentagonal and nearly as broad as deep at the base: upper mandible with the dorsal outline declinate and slightly arched, the ridge narrow but obtuse, the sides much rounded, the edges sharp and inflected, but overlapping, with an obsolete notch or slight sinus close to the tip; lower mandible somewhat smaller, with the angle short, broad, and rounded, the dorsal line very slightly convex, the ridge broad, the sides much rounded, the edges sharp and inflected.

Mouth rather narrow; both mandibles deeply concave, the upper with a medial prominent line, two smaller lateral lines, and four grooves. Aperture of the posterior nares linear, and with that of the glottis margined with acute papillæ. Tongue sagittate, fleshy, subulato-lanceolate, involute, so as to be grooved above, the tip very slightly bifid. Œsophagus, Pl. VIII, Fig. 1, *a*, *b*, *c*, *d*, when distended forming a large crop, *b*, on the middle of the neck, afterwards narrow and of nearly uniform diameter, *c*; proventriculus, *d*, bulbiform, and furnished all round with numerous cylindrical glandules. Gizzard, *e*, *f*, *g*, *h*, roundish, compressed, with two very strong lateral muscles, *e*, *f*, having radiated tendons, and a lower prominent muscle, *g*; its cuticular lining dense, tough, and longitudinally rugous. Intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, of moderate length, rather wide, of nearly equal diameter throughout, with two very small, cylindrical, adnate cœca, *l*, near its extremity; rectum, *l*, *m*, *n*, short, with an elliptical enlargement.

Nostrils broadly elliptical, oblique, basal, in the fore part of

the short, broad, nasal depression, and concealed by the reflected feathers. Eyes of moderate size; eyelids feathered, their edges bare and crenate. External aperture of ears large, oval.

Head rather large, oblong, the forehead rather flat; neck short; body ovate, of nearly equal breadth and depth. Legs short; tarsus compressed, covered anteriorly with seven scutella, posteriorly with a long plate forming a sharp edge, and inferior rugæ. Toes slender, compressed, covered above with few large scutella, granulate and narrow beneath; the second and fourth equal, the first a little shorter, the third much longer, and united to the fourth as far as the second joint of the latter. Claws rather long, arched, deep, much compressed, laterally grooved, acute.

Plumage blended, softish, rather compact above, slightly glossed, the feathers ovate, rather acuminate, with a very slender plumule of a few long barbs; those at the base of the bill with short bristle-points. Wing broad, semicordate, rather short, primary quills ten, secondary seven, the three outer quills nearly equal, but the third longest. Tail rather short, or of moderate length, slightly emarginate, of twelve feathers, the lateral slightly bent outwards.

The genus Passer is so intimately allied to the genera Fringilla and Linaria, as to present only rather nice distinctions. The species are all of small size, compact, less gayly attired than the Finches, and having a somewhat less rapid flight. Two species only occur in Britain, the Common or House Sparrow, *P. domesticus*, and the Tree Sparrow, *P. montanus*, the former generally distributed, the latter confined chiefly to some of the midland and northern counties of England.

PASSER DOMESTICUS. THE HOUSE SPARROW.

HOUSE SPARROW. SPARROW. GEALBHAG.

FIG. 59.

Fringilla domestica. Linn. Syst. Nat. I. 323.
Fringilla domestica. Lath. Ind. Orn. I. 432.
House Sparrow. Mont. Orn. Dict.
Gros-bec Moineau. Fringilla domestica. Temm. Man. d'Orn. I. 350.
House-Sparrow. Passer domesticus. Selb. Illustr. I. 298.
Fringilla domestica. House Sparrow. Jen. Brit. Vert. An. I. 134.

Male with the upper part of the head light brownish-grey; a broad band of chestnut from the eye down the neck, of which the sides are greyish-white; the throat black; the back chestnut mixed with black; a white band across the wing; the lower parts light brownish-grey. Female with the head greyish-brown above; the sides of the neck yellowish-grey, the lower parts light brownish-grey. Young similar to the female.

MALE.—It may be considered superfluous to describe a bird so familiar to every person as the Sparrow; but it is necessary to preserve a uniformity of method, and therefore it is incumbent upon me to treat this "vulgar fellow" with as much consideration as the most elegant and unexpected visitor. Every body knows that it is a small, stout, active, and occasionally noisy bird, not remarkable for beauty, and content, as becomes

its humble station, with indifferent food, and poor accommodation. Its form and external parts correspond with the generic character in every point. The œsophagus, Pl. VIII, Fig. 1, *a*, *b*, *c*, *d*, is three inches long, the crop, *b*, one inch, the gizzard, *e*, *f*, *g*, *h*, three-fourths, the intestine, *h*, *i*, *l*, *m*, *n*, eight, its diameter from nearly two twelfths to one twelfth, the cœca, *l*, two twelfths, and placed at the distance of ten twelfths from the anus, the rectum ten twelfths. The plumage is blended, rather compact above, the feathers ovate, rather acuminate, with a very slender plumule consisting of a few long filaments. The feathers about the base of the bill are terminated by short bristles, and there are five distinct, pretty large, almost simple bristles at the base of the upper mandible. The wings are rather short, broad, and a little rounded; the first and third quills about equal, the third slightly longer, the other primaries slowly graduated; the third, fourth, and fifth very slightly cut out on the outer edge towards the tip; the secondary quills truncato-emarginate. The tail is shortish, nearly even, being very slightly emarginate.

The bill is black tinged with grey; the iris dark-brown; the feet pale brown, the claws darker. The upper part of the head is light brownish-grey; the loral or preocular space, a line above, another beneath the eye, the feathers at the base of the lower mandible, those of the chin and fore-neck, black, most of them tipped with grey. The black space before the eye is margined above by greyish-white, and the supraocular black line is terminated behind by a small white spot. A broad band of bright chestnut from the eye down the neck, obscurely meeting its fellow behind. The auricular coverts are whitish-grey, and from them extends a broad band on either side down the neck, gradually fading into yellowish-grey. Feathers of the lower part of the hind-neck, and of the fore part of the back, with the scapulars, brownish-red, their inner web brownish-black. Those of the hind part of the back, and the upper tail-coverts light brownish-grey, of which colour, but paler, are all the under parts, the lower tail-coverts being dusky-grey in the centre. The quills are blackish-brown, externally margined with brownish-yellow, the inner more broadly margined

with brownish-red; the large coverts are darker, but with broader brownish-red margins, and slightly tipped with whitish; the first row of smaller coverts brownish-black, their terminal half white; the rest brownish-red, their concealed part black. The tail is wood-brown, the outer webs blackish, the margins yellowish-grey.

Length to end of tail $6\frac{1}{4}$ inches, extent of wings $9\frac{5}{12}$; wing from flexure $3\frac{2}{12}$; tail $2\frac{4}{12}$; bill along the ridge $\frac{1}{2}$, along the edge of lower mandible $\frac{8}{12}$; tarsus $\frac{9}{12}$; first toe $4\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; second toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths; third two $\frac{9}{12}$, its claw $3\frac{1}{2}$ twelfths; fourth toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths.

Female.—The female is somewhat smaller, and less deeply coloured. The bill is light greyish-brown, as are the feet; the iris dark brown. The head and hind-neck are greyish-brown. Above the eye is a pale yellowish-grey band. The ear-coverts are brownish-grey, as are all the lower parts, the abdomen fading to brownish-white, the under tail-coverts darker in the centre. The back and scapulars are dull yellowish-brown, the feathers black on the inner web. The wings and tail are brownish-black, the edges of the feathers light yellowish-brown, and the transverse band formed by the tips of the first row of small coverts pale yellowish-grey.

Length to end of tail 6; extent of wings $9\frac{4}{12}$; wing from flexure $2\frac{11}{12}$; tail $2\frac{2}{12}$; bill along the ridge $5\frac{3}{4}$ twelfths; tarsus $\frac{9}{12}$; middle toe and claw $\frac{9}{12}$.

Variations.—The Sparrow exhibits several remarkable variations, individuals of various tints sometimes occurring. I have seen it pure white, cream-coloured, dusky or nearly black, and frequently with white feathers, especially quills. Specimens of this latter kind are not very uncommon.

Changes in Colour.—Toward summer, when the tips of the feathers are worn off, the head becomes pure bluish-grey, the fore-neck deep black, and the dark markings on the back are more conspicuous. The female undergoes a corresponding change, which, however, is not so evident, as her head is brown,

and the black on the neck wanting. Farther on in the season, the colours fade considerably, and the feathers become worn and ragged.

Habits.—The House Sparrow is the boldest and most familiar of our Passerine birds, and indeed of all our native species, not excepting the Robin and Chaffinch. This fact has been questioned, and it has been alleged that, although apparently familiar, it is in reality more shy than many other small birds. But it must be obvious to every one that unless when pursued, and apprehensive of danger, it admits of a nearer approach than would seem safe to any other bird of its size, and that it will not hesitate to pick up its food from the door or window, even in the midst of the domestic fowls, which frequently pursue it. No doubt, when abroad in the fields, or in a corn-yard, and perceiving a suspicious-looking person prowling about with a gun, the sparrows do not conceive themselves safe in his immediate vicinity, and in this they evince their prudence and observation; but in ordinary cases, if one should want a dozen of sparrows, he could have no difficulty in obtaining them. Towards the end of autumn, and in winter, when they often fly about the hedges in large packs, they become more shy; and should a gunner fire once or twice at a flock, he might find it difficult to get within shot again, although even then it would be much easier to thin them than to obtain specimens from a flock of Chaffinches, Green Linnets, or Yellow Buntings. The Sparrows in fact are extremely vigilant when on a marauding expedition, and fly off from a field of wheat when a person stands at the distance of two hundred or more yards; yet, when in small groups, or scattered, they are less sensitive, and on the streets and roads, as well as in the hedges, will allow people to pass quite close to them.

The social propensity is more apparent in the Sparrow than in any other British species of its family; for even during the breeding season, it is seen searching for food in small groups, and in autumn and winter it is decidedly gregarious, although irregularly so, for the individuals of a flock do not seem to consort with each other exclusively, and betake themselves to the

same roosting places. The flocks, on the contrary, are accidentally formed by individuals casually meeting with each other, and are liable to be broken up by slight causes.

Its usual places of resort are those in the immediate vicinity of human habitations; and at night it reposes under the eaves of houses, about chimneys, in holes and crevices of buildings, and among ivy covering walls. During a great part of the year, it subsists chiefly on the fragments of ejected food which it finds about the doors, on the streets, or on dunghils. But it also feeds upon grain, which it obtains abundantly during several weeks in autumn on the standing corn, and less profusely supplied in winter, when it searches the stubble fields. Being extremely numerous in the large towns, it must commit great havock among the corn in their vicinity; and, in fact, its depredations on the wheat are often very perceptible in the earless stalks which are often very numerous in places not far from towns. The seeds of various plants, such as the field mustard, Sinapis arvensis, the Charlock, Raphanus Raphanistrum, the Chickweeds and Mouse-ears, Stellaria and Cerastium, as well as of the field and garden Pea, Pisum sativum, are also gathered; and in summer it subsists partly on insects of various kinds, which also afford the chief nourishment of its young. Like the Chaffinch, it is often seen searching the heaps of horse-dung on the roads for undigested grains, and like the Common Pigeon, it gleans the nutritious particles to be found on the streets. Farm-yards and corn-stacks are chief places of resort, for there it readily obtains a supply of wholesome food. Occasionally it pursues an insect on wing, but it is far from being an expert flycatcher, for I have frequently seen a sparrow make several darts even at so large an insect as a butterfly before it secured it.

The flight of the Sparrow is of the same general character as that of the Finches; that is, it is undulated and rapid, but less so than the flight of the Greenfinch or Chaffinch; and when the bird traverses short spaces, is nearly direct, with a continued fluttering motion. On the ground it advances by hops or leaps, varying from half an inch or so to eight or nine inches, according to circumstances. It would be impossible to

ascertain the distance to which it can move at a single leap, as the incitements which induce men and the horse and other animals to try their powers in this respect, cannot be applied to it; but it may frequently be seen to leap its own length without apparent exertion. It is curious to observe how its mode of progression and attitudes are modified by the condition of the ground; for, when the latter is dry, it moves about with the tibio-tarsal joints much bent, and the tail depressed, whereas, when it is wet, it keeps the leg extended, the body stretched up, and the tail elevated. This circumstance brings to my recollection the pleasure I experienced on seeing a celebrated painting, representing some cows in a meadow, by Cuyp, in which a magpie had been figured walking about with its tail elevated to keep it from contact with the moist grass,—a fact which probably would have escaped the notice of at least nine-tenths of those who undertake to represent nature on canvas.

When in a state of activity, the Sparrow displays a neatness and compactness of form, arising from the closeness of its plumage, very different from the loose and bulky appearance which it presents when at rest, or when perched in rainy weather; but in this respect it does not differ from other small birds. Rustic sparrows are always more beautiful than those residing in large towns, the latter generally having their plumage soiled by smoke and dirt. Indeed, the difference is striking, and the country sparrow is really a beautiful bird, having none of that slovenly appearance which has gained for it in towns the appellation of a vulgar and dirty-looking creature. But this is equally the case with our own species; for the farm-servant or field-labourer is a cleanly, robust, and healthy animal, compared with the artizan of the city, begrimmed with unwashed filth, pallid in countenance, feeble, bloated in frame, and of unenduring constitution.

In summer, it rolls itself in the dust, and basks in the sun, like the domestic fowl. It also loves to lie on one side, in a crouching attitude, on the sunny side of roofs, or on wall tops. At all seasons, when the roads are dry, the Sparrows may be seen fluttering in the dust, and casting it up around them with their wings, often continuing this action for a long time.

When not engaged in feeding, they perch on trees and bushes, especially hawthorn hedges, as well as on dead twigs, wood, or straw, near houses, and on the tops of corn-stacks, walls, and buildings.

Males, females, and young associate and live peaceaby together, from the termination of the breeding season, about the middle of autumn, to its commencement in spring. At the latter period, desperate conflicts take place among the males, in which the females also sometimes assist. When three or four males are engaged in combat, they keep up a loud and incessant noise, uttering their usual note, which bears some resemblance to the word *phillip* or *yellop*. After they have paired, the males meet each other without animosity, and from the middle of April may be seen sunning themselves on the hedges or houses in little flocks, while the females are engaged in the labour of incubation. In autumn they may be seen flying about in large flocks. They alight in the fields, pick about for some time, and when alarmed betake themselves to a hedge, where they make a great clamour. In a short time they return to the field, disperse, and search for food.

The sudden appearance of a hawk or other enemy instantly produces a cessation of their noise, and causes them to remain motionless or retreat into the hedge. They are preyed upon by the Sparrow-Hawk, the Merlin, the Weasel, and perhaps other small quadrupeds, as well as by boys, cockney sportsmen, and field naturalists, although they are not much in request among the bird-stuffers. It does not appear that they molest any species of their own class. Boys are fond of catching sparrows in traps, which are constructed in the following manner. Two bricks are laid parallel to each other, with another across one of their extremities. A fourth brick, or a piece of slate, tile, or board, is supported between the two parallel bricks by a bit of stick, the lower end of which rests on the edge of the transverse brick. The trap is baited with bread, oatmeal, or any other eatable substance, in attempting to attain which the bird removes the prop, when the lid falls and encloses it. Sparrows may be taken in great numbers, when they perch among ivy on a wall, by means of a net.

Like that of all the small granivorous birds, their flesh affords delicate eating; but their small size exempts them in a great measure from the voracity of the typical pantophagist. When a Sparrow is wounded so as to be unable to fly, it exhibits more courage than almost any other bird of its size, and seizes the hand by which it is laid hold of with much energy, seldom uttering any cry, although when teased it will open its mouth and emit a hoarse scream.

I need hardly say that Sparrows have no song, their concerts, which are composed of single notes, being, although loud, and doubtless pleasing to themselves, by no means agreeable. Mr. Neville Wood speaks of their "awkward and vulgar manners;" but I have failed in discovering any thing like awkwardness, restraint, or want of adroitness, in their actions, which, on the contrary, are prompt, apt, and efficient, although they are not so light and graceful as the Goldfinch or Chaffinch, nor so elegantly and delicately constructed as the Wagtails and Pipits.

A convocation of Sparrows at the commencement of the breeding season affords an interesting sight. Two males attack each other, making much clamour, but doing little execution; another comes up and joins the fray, when he is presently attacked by a fourth. Other males stand still, or descend to the combat, while the females seem quite uninterested in the proceedings, although occasionally one pecks at a male that happens to come in its way. The noise of the combatants increases, until some deem it expedient to retreat, when perhaps the party breaks up. No damage ever happens, and the affair looks more like a sham-fight than a real tug for victory. Frequently a male may be seen perched on a twig, or standing on a wall or house-top, in a kind of crouching attitude, with his feathers ruffled, his neck retracted, his head a little raised, his tail and wings drooping, the pectoral feathers raised over the latter; and he utters a frequent repetition of calls, or love-notes, until a female makes her appearance and approaches him. The caresses of the male do not cease even after the young are excluded from the eggs. The female may often be seen sitting on the ground, or perched, in an attitude indica-

tive of a willingness to receive his advances. He hops about with great alacrity, depresses and stiffens his wings, raises and spreads his tail, and makes an incessant noise by repeating his usual note. She pecks at him, on which he hops off, and is pursued, but soon returns; and in this manner they amuse themselves often for a considerable time.

The place which the Sparrow selects for its nest is some hole or cavity, or crack, in a wall, or chimney, or under the eaves, or among the thatch; in short, any convenient locality at a considerable height, the capital of a pillar, or the ivy along a wall. Sometimes it is found in a hedge or tree, but such a position is not a favourite one. The male and the female are observed busily engaged from morning to night, in carrying up materials for the bulky fabric, such as straw, stalks of small plants, rags of linen or woollen cloth, thread, and feathers. The nest is very bulky, soft, and warm, being usually lined with feathers, or other soft materials. One which had fallen from a cluster of rooks' nests in the grounds of Sir Robert Dick of Prestonfield, I found to be six inches in diameter, formed externally of stems of Agrostis alba, a very few small twigs, one or two oat-straws, numerous rooks' feathers, a little moss, and much wool; then a great mass of wool, with some hogs' bristles and horse-hair; the interior composed of hair, some moss, and a great quantity of large soft feathers, chiefly of the rook, but also of the Domestic Fowl, the Guinea Fowl, and the Peacock. The eggs vary from four to six, and are of an elongated form, from ten to eleven twelfths of an inch in length, and from six to seven and a half twelfths in their greatest breadth. They have generally a greyish-white ground, and are more or less covered with longitudinally oblong spots of pale grey and greyish-black; but are sometimes closely freckled all over with grey and brown; so that they differ extremely in colour, as well as in size.

Young.—The young when fledged resemble the female, but are much lighter, the upper parts being dull yellowish-brown, the lower greyish-white, tinged with yellow; the bill greyish-yellow, or horn-colour, as are the feet. They often come

abroad before they are well able to provide by effective flight for their security, and individuals are frequently accidentally pushed from the nests, or lose their footing, when they fall to the ground, to become the prey of cats and children. They are fed for some time after coming abroad, by their parents, who however soon leave them to shift for themselves, and make preparations for rearing another brood. Several broods are produced each season; but whether the same pair continue their attachment, or mate with other individuals, I am unable to say. The nests are frequently destroyed by boys, in which case the birds manifest much anxiety, and sometimes display considerable courage.

Progress toward Maturity.—At the first moult, which is completed by the beginning of winter, the males assume the colours of the adult birds, although it is not until the next season that they are perfected. The females also acquire deeper tints. In its second plumage the male is as follows. The upper mandible is light greyish-brown, the lower flesh-coloured, with the tip brown; the feet pale brown. The upper part of the head is brownish-grey; the preocular space blackish-grey; a line over the eye, extending down the neck, yellowish-grey, mixed with chestnut brown; some of the lateral feathers of the neck with a little chestnut near the tip; auricular coverts greenish-grey. The fore part of the neck, the breast, and the abdomen, light yellowish-grey, fading posteriorly into white; a broad band down the fore-neck, from the mandible, obscurely black, that colour being concealed by the whitish tips of the feathers. Anterior dorsal and scapular feathers light yellowish-brown, their inner web brownish-black at the tip; posterior dorsal and upper tail-coverts light greenish-grey; lower tail-coverts light yellowish-grey. Tail wood-brown, margined with grey. Smaller wing-coverts light brown, with a little chestnut near the tips; quills dusky, externally margined with yellowish-brown; primary coverts the same; secondary coverts with a broader external margin of yellowish-brown; the first row of small coverts tipped with paler yellowish-brown. As the bird becomes older its colours assume a richer tint, until

the wings and back become bright chestnut, and the bar on the former is pure white.

Remarks.—The common House Sparrow, according to M. Temminck, is generally distributed over Europe, excepting in the south, where its place is occupied by the Brown-headed Sparrow, *Passer cisalpinus*, and the Spanish Sparrow, *Passer Hispaniolensis*. In Britain it occurs in all the cultivated districts, being chiefly resident in towns and villages. It is singular that in the Outer Hebrides it was, until of late, to be seen only at Kilbar, in the island of Barray, where it had made its abode in a ruined church, although now, according to the minister of Stornoway, a few individuals have appeared in that town, where they will doubtless speedily multiply. A village without sparrows has as desolate an aspect as a house without children; but, fortunately for the world, the one is nearly as rare as the other. Multitudes of these birds in a place are indicative of its prosperity, for where there are few crumbs there will be few beggars.

This bird I have assumed as in a manner typical of the family to which it belongs. Its bill is intermediate in form between that of the Bullfinches and the Thistlefinches, and its other organs have similar relations, while it is a species at least as generally known as any that can be named.

PASSER MONTANUS. THE TREE SPARROW.

TREE SPARROW. MOUNTAIN SPARROW.

Fringilla montana. Linn. Syst. Nat. I. 234.
Fringilla montana. Lath. Ind. Orn. I. 433.
Tree Sparrow. Mont. Orn. Dict.
Gros-bec Friquet. Fringilla montana. Temm. Man. d'Orn. I. 354.
Tree Sparrow. Passer montanus. Selb. Illustr. I. 300.
Fringilla montana. Tree Sparrow. Jen. Brit. Vert. An. 135.

Male with the upper part of the head chestnut-red; a band over the eye, the auricular feathers, the space before the eye, and the throat black; the sides of the neck, and a collar on the nape, white; the back chestnut mixed with black; two white bands across the wings; the lower parts whitish. Female with the colours similar but paler.

Male.—The Tree Sparrow bears a great resemblance to the common species, but, besides being smaller, is easily distinguished by the characters given above. I have had no opportunity of examining it in a recent state, so that the description must necessarily be taken from skins. Its form and external parts agree with the generic character, but the tail is less forked than in the common species. The bill is black, the legs pale greyish-yellow. The upper part of the head and the nape are chestnut, the tips of the barbs brownish-grey; the space before and under the eye, with a large patch on the cheek, black, as is the throat; the sides of the neck and an incomplete band on the nape, white. The lower hind-neck, fore part of the back, and the scapulars, chestnut, with black spots, the inner webs of the feathers being of the latter colour; the hind part of the back yellowish-brown. The wing-coverts are chestnut, the greater coverts, and the first row of smaller coverts white at the end, so that there are two bands of that colour across the wing, instead of one, as in the common species. The quills

are brownish-black, edged externally with pale yellowish-brown, the inner more broadly with chestnut. The tail-feathers are hair-brown, edged with yellowish-grey. The lower parts are greyish-white, the sides tinged with brown.

Length $5\frac{8}{12}$ inches; wing from flexure 3; tail $2\frac{1}{12}$; bill along the ridge $4\frac{1}{2}$ twelfths; tarsus $\frac{8}{12}$; hind toe $\frac{4}{12}$, its claw $\frac{4}{12}$; middle toe and claw $\frac{10}{12}$.

Female.—The female is similar to the male, but with the tints paler, the head yellowish-brown above, and the chestnut parts changed to yellowish-brown.

Length to end of tail $5\frac{1}{2}$ inches; bill along the ridge $4\frac{1}{2}$ twelfths; wing from flexure $2\frac{11}{12}$.

Habits.—The Tree Sparrow, which is stated by M. Temminck to be common in almost every part of the continent, from Spain and Italy to the arctic circle, is rare in Britain, where it is chiefly to be found in the northern counties of England. I am not aware that it has ever been met with in Scotland. The only accounts of its manners given by persons who have actually observed them, are those of Montagu and Mr. Selby, who, however, merely inform us that it never frequents villages or towns, but is met with about old trees, in the holes of which it forms its nest, which is made of the same materials as those commonly used by the house sparrow, chiefly hay and feathers, and contains four or five eggs, similar in colour to those of that bird, but smaller; further, that it is active and lively, feeds on seeds and grain, together with insects, and buds, has a note similar to that of its cousin, but shriller, and is rarely met with even in those parts where it has long been known as indigenous. This is a poor account of so handsome a bird, but I can find no one to help me to a better; for on consulting descriptive books, I find only the same sing-song story repeated after Montagu, who first ascertained that the female does not differ materially from the male in plumage.

COCCOTHRAUSTES. GROSBEAK.

Bill of moderate length, straight, direct, conical, extremely thick, acute, subpentagonal, and deeper than broad at the base, the mandibles nearly equal: upper mandible with the dorsal outline very slightly convex, the ridge broad and rounded, the sides rounded, the edges slightly inflected and sharp, but overlapping, with a slight notch close to the tip; lower mandible broader at the base, and somewhat larger, although seemingly smaller on account of the overlapping of the edges of the upper, its crura extremely thick, its dorsal outline straight, the angle extremely short, broad, and slightly rounded, the back very broad, the edges sharp and inflected; the gape-line a little arched.

Mouth rather wide; both mandibles deeply concave, the upper with a medial prominent line, and a slight prominence on the fore part of the palate. Aperture of the posterior nares linear, and with that of the glottis margined with acute papillæ. Tongue sagittate, fleshy, narrow, grooved above, the tip bifid. Œsophagus thin, of nearly equal diameter; proventriculus bulbiform, and furnished all round with numerous roundish glandules. Gizzard roundish, compressed, with two very strong lateral muscles, and radiated tendons; its cuticular lining dense, tough, and marked with broad longitudinal rugæ. Intestine of moderate length, rather wide, of nearly equal diameter throughout, with two very small, cylindrical, adnate cœca near its extremity; rectum very short.

Nostrils small, elliptical, oblique, basal, in the fore part of the extremely short and broad nasal groove, so as to seem

placed behind the bill, and concealed by the reflected feathers. Eyes of moderate size; eyelids feathered, their edges bare and crenate. External aperture of ears large, oval.

Head large and broad, the forehead flattened; neck short and thick; body ovate, of nearly equal breadth and depth. Legs short, tarsus compressed, covered anteriorly with seven scutella, posteriorly with a long plate, forming a sharp edge, and inferior rugæ. Toes slender, compressed, covered above with a few large scutella, narrow and granulate beneath; the second and fourth nearly equal, the first a little shorter, the third much longer, and united to the fourth as far as the second joint of the latter. Claws rather long, arched, deep, much compressed, laterally grooved, acute.

Plumage blended, soft, rather glossy, the feathers ovate and rounded, with a very slender plumule of a few long barbs, those at the base of the bill with very short bristle-tips. Wing broad, semicordate, of moderate length, primary quills ten, secondary seven; the three outer quills nearly equal, the first being very little shorter than the second, which is longest. Tail short, a little emarginate, of twelve feathers, the lateral slightly bent outwards.

The genus Coccothraustes is composed of a few species belonging to both continents, remarkable for the extraordinary thickness of their conical bill, and the great strength of their lower mandible, of which the crura are extremely thick. This thickness of the bill renders necessary a large size of head, and a thick neck, which give to these birds a clumsy appearance, their body and limbs seeming disproportionately small. One of the most remarkable instances of false reasoning, and of the perversion of observation by preconceived theoretical notions, is presented by Mr. Swainson's remarks on this genus in the *Fauna Boreali-Americana*, Vol. II, p. 270. "The bill, although particularly large, betrays a decided weakness of structure, by the under mandible being much narrower and smaller than the upper; while in the sub-genus *Guiraca* both mandibles are of equal thickness. This inequality is one of the most striking characters of the *Tenuirostres*, and of nearly all groups and types which represent that tribe. Of this the *Musophagidæ*,

the *Ceblepyrinæ*, the *Oriolinæ*, &c., are striking instances. The yellow and black plumage of the present species immediately reminds us of an Oriole, an Icterus, and a Goldfinch; which are unquestionably Tenuirostral types: it is, therefore, highly probable that this form possesses the same relation. There is a concealed, but a very singular analogy between our European *Coccothraustes* and the *Bombycilla garrula;* and this latter also forms part of a group—the *Ampelidæ*, which likewise represents the *Tenuirostres*." The Grosbeak has an excessively strong bill, but because its lower mandible is somewhat smaller than the upper, it is analogous to the Tenuirostres, or slender-billed birds! But, even allowing the reasoning to be correct, the fact on which it is founded, namely, the relative smallness of the lower mandible, is not so. Mr. Swainson certainly has never examined the lower mandible of the Hawfinch, or even of the Greenfinch, for it is larger and broader than the upper, is enormously thick in its walls, and is apt to excite the surprise of a person looking at it for the twentieth time, so very unusually strong is it, —so strong that it enables these birds to crack the hardest kernels as easily as a Goldfinch shells a grain of hemp seed. The bill altogether is prodigiously strong; and therefore, to talk of holding it as analogous to that of a Tenuirostral bird, is not commendable. Not to insist longer upon this manifest absurdity, let us consider the Genus Coccothraustes as presenting in the form of its bill a most powerful instrument for extracting from the hardest and thickest endocarps the seeds which afford it nourishment. Only one species occurs in Britain, the Hawfinch, or Haw Grosbeak, *Coccothraustes atrogularis*. Several writers have associated with it the Greenfinch, *Fringilla Chloris* of authors, but the bill of that bird is not nearly large enough to entitle it to rank with the Hawfinch, the difference being much greater between the bills of these birds, than between those of the Siskin and Twite.

COCCOTHRAUSTES ATROGULARIS. THE BLACK-THROATED GROSBEAK, OR HAWFINCH.

HAWFINCH. COMMON GROSBEAK. GROSBEAK.

FIG. 60.

Loxia Coccothraustes. Linn. Syst. Nat. I. 299.
Loxia Coccothraustes. Lath. Ind. Orn. I. 371.
Hawfinch. Mont. Orn. Dict.
Le Gros-bec. Fringilla Coccothraustes. Temm. Man. d'Orn. I. 344.
Hawfinch. Coccothraustes vulgaris. Selb. Illustr. I. 324.
Fringilla Coccothraustes. Common Grosbeak. Jen. Brit. Vert. An. 136.

Male with the head yellowish-brown, the throat and space before the eyes black, the fore part of the back dark chestnut; four of the primary quills emarginate and curved outwards at the extremity. Female with the colours similar but paler, the quills similar.

MALE.—This beautiful though by no means elegantly formed bird is with us for the most part merely an occasional winter visitant, and therefore little merits the epithets *Common* and *Vulgaris* bestowed upon it even by those who consider as of the same genus the Greenfinch, which has a good enough claim to those titles. It is in several respects a bird of singular appearance, but more especially on account of the great size of

the bill and head, which is such that some systematist might do a worse act than dignify it with the title of "Logger-headed," applied to another bird. The neck is short and very thick; but the body and limbs are proportionally smaller. In short, the Hawfinch looks like a small bird on which has been stuck the head and bill of another double the size.

The œsophagus is three inches in length; the intestine nineteen and a half; and the cœca, which are two twelfths long, are placed at the distance of one inch from the anus. The plumage is very soft, blended, but firm, and but slightly glossed, excepting the extremities of the quills, which are shining. The wings are very broad, and of moderate length; the first pri-

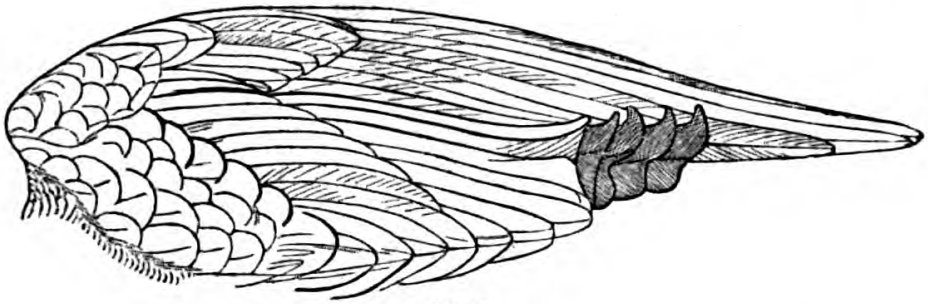


Fig. 61.

mary quill slightly shorter than the second, which is longest, but scarcely exceeds the third; the fourth is a little shorter, and the rest slowly diminish, the secondaries being long. The fifth, sixth, seventh, and eighth primaries have their tip emarginate, and its external margin somewhat falcate; while the ninth and tenth, together with five of the secondaries, are truncate, the inner edge of their tip rounded, the outer sharp, and the three inner quills are rounded. This singular form of the quills is sufficient of itself to distinguish the Hawfinch from every other bird. The tail is short, straight, a little emarginate, the feathers obliquely rounded.

The bill is flesh-coloured, or white tinged with rose, a small portion of the tip only being dusky. The irides greyish-white; the feet and claws flesh-coloured, with a tinge of brown. The feathers margining the base of the bill, those on the loral space, and throat, black; the rest of the head yellowish-brown,

the forehead and cheeks paler. A broad band of ash-grey runs across the hind-neck. The fore part of the back, and the scapulars are dark chestnut; the hind part light brownish-grey, gradually changing to yellowish-brown, which is the colour of the upper tail-coverts. Small upper wing-coverts blackish-brown; those of the first row tipped with white. Primary coverts greyish-white, secondary yellowish-brown. Alula, primary coverts, and quills black, their outer webs and tips glossed with purple and blue; the outer primaries with a white spot on the inner web near the middle, the rest and the secondaries with the greater part of their inner web greyish-white. Tail-feathers black; the outer four on each side with a large terminal white spot on the inner web, the four middle grey towards the end, tipped with white, and tinged with red on part of the outer web. The lower parts are pale yellowish-brown, the lower tail-coverts white.

Length to end of tail $7\frac{1}{12}$; extent of wings $11\frac{1}{2}$; wing from flexure $4\frac{1}{12}$; tail $2\frac{1}{4}$; bill along the ridge $\frac{10}{12}$, along the edge of lower mandible $\frac{11}{12}$; tarsus $10\frac{1}{2}$ twelfths; hind toe $4\frac{1}{2}$ twelfths, its claw $4\frac{1}{2}$ twelfths; second toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths; third toe $\frac{8}{12}$, its claw $\frac{4}{12}$.

Female.—The female is somewhat smaller than the male, but similarly coloured, although the tints are paler; the fore part of the back being light chestnut or brownish-red.

Length to end of tail $6\frac{11}{12}$.

Variations.—I have not observed any remarkable variations in the colours of the individuals which I have examined, about a dozen in number, three of them recent; but M. Temminck states that the species varies occasionally to pure white, yellowish, or greyish; the wings or tail often white; or white feathers interspersed among the rest.

Habits.—The Grosbeak is an irregular visitant in the northern parts of the island, appearing here and there in various parts of the country towards the beginning of winter. It is more frequently met with in England than in Scotland, al-

though it is not so rare in the latter country as has been supposed, several specimens killed in the southern counties having come under my inspection. I have never had the good fortune, however, to fall in with it alive; which I regret, as it renders it necessary for me to refer to those who have studied its habits for a brief account of them. According to M. Temminck, it feeds, on the continent, where it occurs chiefly in the mountainous districts, on the seeds of various trees, such as the plane-tree, pines, and cherry; and places its elaborately constructed nest on the highest branches, laying from three to five eggs, of an ash-grey colour, tinged with green, and marked with brown spots, and bluish black lines. Montagu, who is perhaps more to be depended upon than any other British ornithologist, makes the following statement, as the result of his observation.

"These birds usually visit England in the autumn, and continue with us till the month of April. They appear in small flocks, seldom more than four or five, but are in no parts common. We once saw as many as a dozen together, feeding on the hawthorn berries in Badmington Park in Gloucestershire. The facility with which they break the hard stones of that fruit to get at the kernel is astonishing. It is done apparently with as much ease as other small birds break hempseed.

"No instance has been recorded of its breeding with us; but Dr. Latham assures us he had one sent to him in the summer months. What the song of this bird may be in the season of love, authors are silent about; but we have heard it sing pleasantly, in low plaintive notes, even in winter, when the weather has been unusually warm. The nest is very beautifully constructed of lichens, liverwort, and vegetable fibres, lined with feathers and other soft materials, placed in the upper branches of a tree. The eggs are from three to five in number, of a bluish-green, spotted with olive-brown, with a few irregular black markings."

Mr. Jesse, in his "Gleanings," informs us, however, that it not only stays with us all the year, but breeds in this country, the nests being frequently found amongst the Hornbeam pollards in Epping Forest, where the bird may be seen at all

periods of the year. He further states that it has bred for some years past in the grounds of Lord Clifden, at Rochampton, where a nest with four young ones was taken in the summer of 1834. It was built at the extremity of a horse-chestnut, near the lodge, and was composed chiefly of twigs of the privet and birch, and lined with hair and fine grass.

The history of this bird has recently received much elucidation from Mr. Doubleday, who has published, in the fifth number of the Magazine of Zoology and Botany, some very interesting notes respecting its habits as observed in the vicinity of Epping Forest. He states that they are there permanent residents, and very abundant, although so extremely shy that it is almost impossible to approach them within gunshot. "Their principal food appears to be the seed of the Hornbeam, which is the prevailing species of tree in the forest; but they also feed on the kernels of the haws, plum-stones, laurel-berries, &c., and in summer make great havock amongst green peas in gardens. About the middle of April they pair, and in a week or two commence nidification. The situation of the nest is various, but it is most commonly placed in an old scrubby whitethorn bush, often in a very exposed situation. They also frequently build on the horizontal arms of large oaks, the heads of pollard hornbeams, in hollies, and occasionally in fir trees in plantations, the elevation of the nest varying from five to twenty-five or thirty feet. The most correct description of the nest which I have seen is in Latham's *Synopsis*. It is there said to be composed of the dead twigs of oak, honeysuckle, &c., intermixed with pieces of grey lichen. The quantity of this last material varies much in different nests, but it is never absent. In some, it is only very sparingly placed among the twigs; in others, the greater part of the nest is composed of it. The lining consists of fine roots and a little hair. The whole fabric is very loosely put together, and it requires considerable care to remove it from its situation uninjured. The eggs vary in number from four to six, and are of a pale olive green, spotted with black, and irregularly streaked with dusky. Some specimens are far less marked than others, and I have seen some of a uniform pale green. The

young are hatched about the third week of May, and as soon as they are able to provide for themselves, they unite with the old birds, in flocks varying in numbers from fifteen or twenty to one or even two hundred individuals. In this manner they remain through the winter, feeding on the hornbeam seeds which have fallen to the ground, and only separate at the approach of the breeding season. I believe the male has no song worth notice. In warm days in March I have heard them, when a number have been sitting together on a tree, uttering a few notes in a soft tone, bearing some resemblance to those of the Bullfinch. The plumage of the young bears considerable resemblance to that of the young Greenfinch. The throat is bright yellow; head, neck, and upper parts olive-brown; the under parts paler, each feather tipped with brown. In winter the bill is a pinkish horn-colour, but becomes deep blue in the breeding season."

The change of colour in the bill is thus similar to that exhibited by the Chaffinch, which I observed several years ago, and which I have not found mentioned by any author. It is quite possible that, although the Hawfinches are now permanently resident in several parts of England, they may at a former period have been merely winter visitants. In Scotland this would appear to have been the case with the Missel Thrush, which appeared occasionally in flocks during the winter in districts where it was not seen in summer. Twenty years ago, it was scarcely ever observed in the neighbourhood of Edin burgh at the latter season, insomuch that I was scarcely dis posed to believe the evidence of my eyes when I first saw a pair of them at Rosslyn; but now they are quite numerous, and may be found in summer in the immediate vicinity of the town, where they breed.

Young.—According to M. Temminck, "the young differ in a remarkable degree from the old birds; the throat being yellow; the face, cheeks, and top of the head pale yellowish; the lower parts white or whitish; the sides marked with small brown spots, with which all the feathers are terminated.

Remarks.—The bill of the Greenfinch, although very similar in form to that of the Hawfinch, is proportionally so much smaller that one scruples to admit it into the same family. On the other hand it is so much stronger than that of the Linnets, that the bird seems equally out of place among them; and although it might be placed among the Sparrows, with as much propriety as among the Grosbeaks or Linnets, yet its bill comes nearer to that of the latter. In short, this unfortunate bird, unwelcome in any of these genera, clearly shews that all the three are so closely connected that no fault could reasonably be found with the systematist who, like M. Temminck, should unite into a single genus Fringilla, Passer, Coccothraustes, Linaria, and Carduelis. The only reason for which I separate them is, that they can be distinguished from each other, and, being numerous, can be better studied in small groups. *Vulgaris*, applied as a name to any bird, ought to be rejected as not only vulgar, but inappropriate. The Grosbeak is not common with us, and if the Greenfinch be admitted into the genus, as it is by those who employ that epithet, it is much more deserving of it.

LINARIA. LINNET.

Bill short, straight, direct, conical, thick, acute, subpentagonal, and nearly as broad as deep at the base, compressed towards the end, the mandibles of equal breadth: upper mandible with the dorsal outline nearly straight, being very slightly convex, the ridge broad and rounded, but narrowed towards the end, the sides rounded, the edges inflected and sharp, but slightly overlapping, without a notch, or with a very slight one near the tip; lower mandible with the angle semicircular, the dorsal outline straight, the ridge broad and rounded, the sides convex, inflected near the end, the edges sharp and inflected, but towards the end meeting those of the upper; the gape-line nearly straight.

Mouth narrow; both mandibles, Pl. VIII, Fig. 3, *a*, deeply concave, the upper with a medial prominent line, and two lateral broad ridges, between which and the margins is a groove for the reception of the strong edges of the lower mandible. Posterior aperture of the nares linear, and with that of the glottis margined with acute papillæ. Tongue sagittate, narrow, grooved above, the tip slightly bifid. Œsophagus, *a*, *b*, *c*, *d*, of nearly equal diameter, but dilatable about the middle into a kind of crop, *b*, which lies on the right side of the neck, afterwards narrow; proventriculus, *d*, elliptical, and furnished all round with numerous cylindrical glandules. Gizzard, *e*, *f*, *g*, *h*, roundish, compressed, with two very strong lateral muscles, *e*, *f*, *g*, and radiated tendons; its cuticular lining dense, tough, and longitudinally rugous. Intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, of moderate length, rather wide, of nearly equal diameter throughout, with two very small, cylindrical, adnate cœca, *l*, near its

extremity; rectum, *l*, *m*, *n*, very short, with an elliptical enlargement.

Nostrils circular, of moderate size, basal, in the fore part of the nasal depression, which is very short and broad, and concealed by the reflected feathers. Eyes of moderate size; eyelids feathered, their edges bare and crenate. External aperture of ear large, oval.

Head oblong, rather large, the forehead rather flat; neck short; body ovate, of nearly equal breadth and depth. Legs short; tarsus compressed; covered anteriorly with seven scutella, posteriorly with a long plate forming a sharp edge, and inferior rugæ. Toes slender, compressed; covered above with a few large scutella, granulate and narrow beneath; the second and fourth equal, the first a little shorter, the third much longer, and united to the fourth as far as the second joint of the latter. Claws longish, slender, very acute, arcuate, compressed, laterally grooved.

Plumage soft, blended, the feathers rather narrow, rounded, with a very slender plumule, consisting of a few long barbs; those at the base of the bill with short bristle-points. Wing rather long, broad, semicordate. Primary quills ten, secondary seven, the first, second, and third quills almost equal and longest, the fourth nearly as long, the other primaries slowly graduated, all narrow and rounded; the secondaries broader and truncato-rotundate or slightly emarginate. Tail shortish, or of moderate length, emarginate, of twelve feathers, of which the outer are slightly bent outwards.

The genus Linaria is very intimately allied to the genera Passer, Fringilla, and Carduelis, the three passing into each other so gradually that a line of distinction can be but arbitrarily drawn between the groups. The species are all of small size, generally neat in appearance, lively, and prettily although not often gaudily coloured. Four species are constant residents, and more or less common in most parts of the country; namely, the Greenfinch or Green Linnet, *L. Chloris;* the Larger Redpoll or Brown Linnet, *L. cannabina;* the Mountain Linnet or Twite, *L. Montium;* and the Smaller Redpoll, *L. minor*. A fifth, the Mealy Linnet, *L. borealis*, has also been found.

LINARIA CHLORIS. THE GREEN LINNET, OR GREENFINCH.

GREEN LINNET. GREENFINCH. GREEN GROSBEAK. GREEN LINTIE.

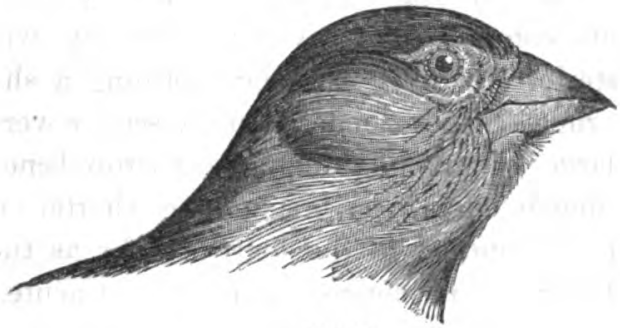


FIG. 62.

Loxia Chloris. Linn. Syst. Nat. I. 304.
Loxia Chloris. Lath. Ind. Orn. I. 382.
Greenfinch. Mont. Orn. Dict.
Gros-bec verdier. Fringilla Chloris. Temm. Man. d'Orn. I. 346.
Green Grosbeak. Coccothraustes Chloris. Selb. Illustr. I. 326.
Fringilla Chloris. Green Grosbeak. Jen. Brit. Vert. An. 136.

Male with the upper parts and breast yellowish green, the head tinged with grey, the edge of the wing, the outer webs of the alula, and part of the outer webs of the primary quills, with the basal part of the tail-feathers yellow. Female with the upper parts greenish-brown, the breast greyish-brown, the wings and tail marked with yellow as in the male, but to a less extent. Young similar to the female.

MALE.—The Green Linnet, which, considered in a systematic point of view, is as much related to the Sparrows and Grosbeaks as to the Linnets, is ranked with the latter merely because its bill is not bulged enough to assimilate to that of the first, nor nearly so large as that of the second. It is a bird of about the size of the House Sparrow, somewhat smarter and

more beautiful perhaps, but, on the other hand, having a rather heavier appearance, on account of the great size of its head and bill. As its position is rather doubtful, I shall give a full description of it.

The bill, Pl. VIII, Fig. 8, is shortish, straight, direct, conical, acute, subpentagonal at the base, nearly as broad as deep, compressed towards the end; the upper mandible with its dorsal outline slightly curved, the ridge broad and convex, the sides convex, the edges inflected, sharp, with scarcely perceptible indications of a notch, close to the acute tip; lower mandible with the angle semicircular, the dorsal outline straight, the back broad and convex, the sides rounded, the edges inflected and sharp; the gape-line slightly arched, and a little deflected at the base.

The mouth is rather narrow, the mandibles being very thick. The tongue narrow, sagittate and papillate behind, pointed but slightly bifid. The digestive organs, Pl. VIII, Fig. 3, are as described in the generic character; the œsophagus, *a*, *b*, *c*, *d*, is two inches long; the stomach, *e*, *f*, *g*, nine twelfths; the intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, eleven and a half inches; the cœca, *l*, one twelfth; the rectum, *l*, *m*, *n*, three fourths; the crop, *b*, is capable of being dilated to a considerable size, although when empty it is apt to be overlooked.

The plumage is blended, softish, slightly glossed, the feathers rather narrow and rounded; the frontal feathers slightly encroaching on the bill on either side; those about its base terminated by a very short bristle. The wings are broad, semicordate; the first, second, and third quills almost equal, and longest, the fourth nearly as long; the second, third, and fourth cut out on the outer web toward the end; the other primaries slowly graduated and rounded, the secondaries broader, and truncato-rotundate. The tail is shortish, emarginate, the lateral feathers slightly bent outwards.

The bill is pale reddish-brown, darker at the point, the back of the lower mandible tinged with carmine. The irides are hazel; the tarsi, toes, and claws, wood-brown; the mouth and skin at the angle of the bill flesh coloured. The general colour of the plumage is yellowish-green, on the head tinged with light

brownish-grey, on the back with reddish-brown. The edge of the wing, the outer webs of the alula, and part of the outer webs of the primaries from the base to near the end, gamboge-yellow. The primary coverts are brownish-black, edged externally with yellowish-green, and tipped with ash-grey; the secondary coverts ash-grey, as is the greater part of the last secondary quills. The quills are brownish-black, with light grey tips, and yellowish-white inner edges, excepting towards the end. The tail feathers are gamboge-yellow from the base to within a third of the tip, the remaining portion brownish-black, edged with grey; the four middle feathers nearly all brownish-black, being tinged with green at the base only. The general colour of the lower parts is lighter, the lower breast pure yellow, the abdomen white, the lower tail-coverts light yellow mixed with white.

Length to end of tail $6\frac{1}{4}$ inches; extent of wings $10\frac{1}{4}$; wing from flexure $3\frac{4}{12}$; tail $2\frac{1}{12}$; bill along the ridge $\frac{1}{2}$, along the edge of lower mandible $\frac{2}{3}$; tarsus $\frac{3}{4}$; first toe $\frac{4}{12}$, its claw $\frac{4}{12}$; second toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths; third toe $8\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; fourth toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths.

Female.—The female is rather smaller than the male, has a much less robust bill, and is less brightly coloured. The distribution of the colours is the same, but they are duller; there is more brown on the upper parts, the lower are greyish-brown, and the yellow markings on the quills are less pure.

Length to end of tail 6 inches; extent of wings 10; wing from flexure $3\frac{5}{12}$; tail $2\frac{1}{12}$; bill along the ridge $\frac{1}{2}$; tarsus $\frac{9}{12}$; middle toe and claw $\frac{11}{12}$.

Variations.—Considerable variations are observed in the tints of the males, some being almost pure greenish-yellow above, others tinged with brown; the cheeks with more or less ash-grey; but these differences depend mostly upon age. Among wild birds I have not observed any white, or dark-coloured individuals.

Changes.—The changes which the plumage undergoes in

consequence of the wearing of its tips, are much less remarkable in this than in any other British species of the family.

Habits.—Towards the end of autumn, the Green Linnets collect into flocks, which are often very large, and frequent the lower districts, appearing chiefly in the neighbourhood of towns or farm-steadings. Their flight is more rapid than that of the Lark, and is similar to that of the Chaffinch and Yellow Bunting, being performed in an undulated line, the bird flapping its wings two or three times with rapidity, then closing them, descending in a curve, and again ascending, after which it repeats the flaps. They search for food in the open fields, and during severe weather in the corn-yards, and even upon the roads, associating with Chaffinches, Sparrows, Yellow Buntings, and other species of this order. In general, however, they keep by themselves in straggling flocks, which sometimes are seen to alight abruptly, but often to wheel about for some time previous to alighting, after which they scatter about, and collect the seeds of oats, wheat, chickweed, and other plants. I have seen them picking those of Centaurium nigrum in the manner of the Goldfinch, as well as of Rosa canina. On being alarmed, they arise abruptly, fly off, and betake themselves to the twigs of the highest trees in the neighbourhood, on which they settle abruptly, and remain in a crouching attitude until the alarm is over, when they drop into the field or yard. At other times, as when shot at, or otherwise disturbed, they perform long flights, which they do with great celerity in a loose body. When flying, and frequently when perched, they utter, at intervals, three or four rather mellow short notes, nearly in the same key, but do not sing until the commencement of the breeding season. These flocks are met with in all the cultivated parts of the country, excepting the western and northern islands of Scotland; and in most districts the Green Linnet is very abundant. By the middle of April they have all disappeared from their winter haunts; but long before, often about the middle of March, they have begun to disperse over the country.

The Green Linnet is a robust and hardy bird, feeding dur-

ing the greater part of the year on the seeds of Gramineæ, and especially of the cultivated species, as well as on those of the Compositæ, Caryophylleæ, and other plants; to enable its gizzard to triturate which, it swallows particles of various mineral substances, among which I have frequently observed fragments of coal. In spring and summer it also picks the buds of various trees, and adds to its then less nutritive fare insects and larvæ of various kinds, with which chiefly it feeds its young. Although timid, like all other small birds of the family, it is not so shy as to render it difficult for a person to approach it within shooting distance. When wounded by a shot, it pecks at the hand, and holds fast, although it has not strength enough to inflict injury; and when pursued on being winged, it seldom screams in the apprehension of being caught.

These are the principal circumstances relative to the habits of the Greenfinch as observed in a cursory manner; but we have now to complete its history by watching it during the breeding season. The males frequently engage in bloodless combats, like those of the House Sparrow, at the period when the instinct of pairing is in action, while the females conduct themselves much in the same manner as those of the species just named. Many authors have repeated the observation made by Montagu, or possibly by some other person, that the Greenfinch is very late in breeding; but I am inclined to doubt its accuracy, having seen the young abroad as early as those of the Chaffinch. The few notes which it utters during the spring and summer can scarcely be called a song, although some of them are full and mellow; but they mingle with good effect with those of the Yellow Bunting and Sparrow; although the concert thus produced is not one of the most harmonious. The nest is constructed in April, or sometimes earlier, and is of good workmanship, being composed externally of fibrous roots, slender twigs, and straws, internally of finer materials of the same nature intermixed with moss, and lined with hair of different kinds. The eggs, from four to six in number, are of a regular oval form, about eleven twelfths of an inch in length, eight or a little more in breadth, of a bluish or purplish-white, spotted with purplish-grey and blackish-brown,

and generally more or less streaked with black. Two broods are frequently reared in the season. The places usually chosen for the nest are low and thick bushes, frequently evergreens, a close hawthorn hedge, the ivy on a tree or wall, and sometimes the fork of a tree.

Young.—The young when fledged have the bill pale brown above, flesh-coloured beneath, the tip brown. The general colour of the upper parts is olivaceous, the central portion of each feather faintly tinged with brown; the quills and tail dusky brown; the edge of the wing, and the outer margin of the primary quills greenish-yellow; the fore-neck and breast greyish-brown, as are the sides; the rest of the lower parts greyish-white; the feet flesh-colour, tinged with brown.

As in every instance in which the young birds are said by ornithologists to resemble the females, the young Greenfinch differs from the adult female so as to be easily distinguished with a little attention. The more remarkable differences are the following. The bill is somewhat smaller, and considerably paler. In the female the general colour of the upper parts is uniform, and more tinged with reddish-brown, whereas in the young it is indistinctly streaked, each feather having a darker centre. The secondary quill-coverts are ash-grey in the female, and brown in the young, while a larger space on the edge of the wing is yellow in the former, and the yellow edges of the primaries form a uniform space when the wing is closed, and in the latter they are merely yellow lines. The lower parts of the young are paler, with less yellow.

Progress toward Maturity.—The older the males are, the lighter and purer are their tints; but as the character of the colouring varies little, it is unnecessary to trace minute gradations.

Remarks.—The Greenfinch, although destitute of a continued song, is frequently kept in cages, where it thrives well, being of a quiet and patient temper, and possessed at the same time of considerable liveliness. It has moreover the faculty of acquiring the notes of other birds, and is not delicate as to its food, eating freely of the seeds of Gramineæ and Cruciferæ, as well as green herbage of the groundsel and chickweed.

LINARIA CANNABINA. THE BROWN LINNET.

GREY LINNET. BROWN LINNET. ROSE LINNET. WHIN LINNET.
GREATER REDPOLL. LINTIE.

FIG. 63.

Fringilla cannabina. Linn. Syst. Nat. I. 322.
Fringilla cannabina. Lath. Ind. Orn. I. 458. Adult.
Fringilla Linota. Lath. Ind. Orn. I. 457. Young.
Greater Redpoll, or Brown Linnet. Mont. Orn. Dict.
Grosbec Linote. Fringilla cannabina. Temm. Man. d'Orn. I. 364.
Common or Brown Linnet. Linaria cannabina. Selb. Illustr. I. 315.
Fringilla cannabina. Common Linnet. Jen. Brit. Vert. An. 139.

Male in winter, with the bill dusky above, the throat yellowish-grey, streaked with brown, back and wing-coverts reddish-brown, streaked with darker; forehead and breast with the feathers dark red in their covered parts. Female with the upper parts streaked with dusky brown and greyish-yellow, the lower light yellowish-grey, the throat, breast, and sides streaked with yellowish-brown.

Male in summer, with the bill greyish-black above, the throat whitish, streaked with brown, the back and wing-coverts reddish-brown, without streaks; forehead and breast crimson or rose red, the grey tips of the feathers being worn off.

Young similar to the female; streaked above with umber-brown, and greyish-yellow, the lower parts light-yellowish, more largely streaked with brown.

Male.—When the moult is completed, which happens generally in November, this Linnet presents a very different appearance, as to the colours of its plumage, from that which it exhibited in summer. Agreeably to the order of nature, I shall first describe the bird as examined when in full plumage, and then trace the variations of colour induced by the decay of the feathers. The Brown Linnet is the largest of our four British species, which bear a great resemblance to each other, although very different in size, the smallest being the Smaller Redpoll, and the intermediate species the Twite and Mealy Linnet. The present bird is not only the largest of the four, but also the most robust, although the epithet does not apply well to it when compared with other birds of the family, it being a neat, active, and lively bird, exempted by the moderate size of its bill and head, from the heavy aspect presented by the Green Linnet and the Sparrow. The body is ovate, the wings of moderate length, as is the tail, and the feet are short and slender; the tarsi very short and much compressed, the toes of moderate length, much compressed, as are the arched, acute, laterally grooved claws.

The bill is strong, conical, acute, compressed towards the tip, in all respects similar to that of the Green Linnet, but proportionally smaller; its upper outline slightly convex, the ridge narrowed towards the end, the lower outline straight. The tongue is narrow, sagittate and papillate at the base, pointed, but slightly bifid. The œsophagus is two inches and eight twelfths long, the stomach roundish, compressed, seven twelfths in its greatest length; the intestine twelve inches long, the cœca one twelfth, and placed at the distance of an inch from the anus.

The plumage is blended, rather compact above, tufty behind, slightly glossed; the feathers in general broadly oblong. The wing is broad; the first and second quills equal, the third scarcely shorter (but sometimes the first longest); the second, third, and fourth slightly cut out on the outer web. The primaries are rounded, the secondaries broad and emarginate. When the wing is closed, the primaries rapidly decrease, the secondaries increase to the fifth, the other two shorter. The

tail is of moderate length, deeply emarginate, spreading at the end, the feathers obliquely rounded.

The bill is dusky or greyish-brown above, pale greyish-blue beneath. The irides deep brown, the feet wood-brown, the claws blackish. The upper part of the head is streaked with greyish-brown and yellowish-grey, the central part of each feather being of the former colour; the feathers of the forehead dull blood-red, tipped with brown. The back, scapulars, and wing-coverts reddish-brown, the central parts of the feathers darker, their edges yellowish-grey; the hind part of the back lighter and tinged with grey; the tail-coverts dusky in the centre, greyish-white on the edges. Quills, primary coverts, and alula brownish-black; the primaries margined externally with white, the white edges of the five inner much broader, so as to form a conspicuous mark on the wing; the secondaries margined externally with yellowish-brown, internally with greyish-white. The tail-feathers are brownish-black; the middles ones margined with brownish-yellow, the five lateral on each side margined externally with white, and internally more broadly with the same. The fore part of the neck is yellowish-grey, streaked with greyish-brown or light reddish-brown; the feathers on the breast are dull red, broadly margined with yellowish-grey, the former colour concealed by the latter; the sides and abdomen are yellowish-grey, the former streaked with brown; the lower tail-coverts whitish, their central part dusky.

Length to end of tail $5\frac{3}{4}$ inches; extent of wings $9\frac{3}{4}$; bill $\frac{3}{8}$, edge of lower mandible nearly $\frac{1}{2}$; tarsus $7\frac{1}{2}$ twelfths; middle toe and claw $\frac{9}{12}$; hind toe $\frac{5}{12}$, its claw $\frac{5}{12}$.

Of another individual, the length $5\frac{1}{2}$; extent of wings $9\frac{3}{4}$; bill $4\frac{1}{2}$ twelfths, and $\frac{5}{12}$; tarsus $7\frac{1}{2}$ twelfths; middle toe and claw $\frac{9}{12}$.

Of another, the length $5\frac{9}{12}$; extent of wings $9\frac{3}{4}$; bill $4\frac{1}{2}$ twelfths, and $\frac{5}{12}$; tarsus $\frac{7}{12}$; middle toe and claw $9\frac{1}{2}$ twelfths.

Female.—The female is somewhat smaller. The bill and feet are similarly coloured. The upper parts are streaked with dusky brown and greyish-yellow, the rump lighter, the upper

tail-coverts darker, with the outer edge yellowish, the inner whitish. The wing-coverts are dull brown, edged with lighter. The quills are brownish-black, the primaries externally margined with white, but much more narrowly than in the male. The tail-feathers are brownish-black, externally edged with light yellowish-brown, the outer with greyish-white, the inner webs greyish-white for half their breadth. The lower parts are light yellowish-grey, tinged with red on the neck and breast, and fading into whitish on the abdomen; the throat, breast, and sides streaked with dusky brown; the lower tail-coverts yellowish-grey, with a blackish central mark.

Length to end of tail $5\frac{1}{4}$ inches; extent of wings $9\frac{1}{2}$; bill along the ridge $\frac{4}{12}$; wing from flexure $3\frac{2}{12}$; tail 2; tarsus $7\frac{1}{2}$ twelfths; middle toe $\frac{7}{12}$, its claw $3\frac{1}{4}$ twelfths.

Variations.—In adults in the winter plumage, the variations are not very remarkable, some being of lighter tints than others, and the hind part of the back in particular being not unfrequently greyish, or even greyish-white.

Changes of Plumage.—The changes which the colours undergo in consequence of the action of air and light, are very remarkable in the males of this species, insomuch that one might at first have some difficulty in believing that a summer specimen was of the same species with one obtained in the beginning of winter. It will therefore be necessary to describe the bird as it appears in the breeding season, or from the beginning of May to the end of summer.

Male in Summer.—A specimen shot at Guillon in East Lothian, on the 14th May, was as follows:—Bill dusky brown above, paler and bluish beneath. Iris deep brown. Feet yellowish-brown; claws dusky. Head yellowish-brown, streaked with darker; sides of the head and neck yellowish-grey; an indistinct line of greyish-yellow over the eye, and another under it. Back deep reddish-brown, streaked with darker; scapulars, smaller coverts, and large secondary coverts of a tint approaching to chestnut, and unspotted. Quills, primary co-

verts, and alula, brownish-black; primaries margined externally with white, excepting towards the end, the white margins of the proximal ones broader, and forming a conspicuous mark on the wing; secondaries margined externally with yellowish-brown, internally with greyish-white. The brown of the back is shaded behind into light brownish-yellow; the upper tail-coverts and middle tail-feathers brownish-black, margined with brownish-yellow; the other tail-feathers of the same dark tint, the five lateral margined with white externally to near the tip, and internally more broadly with the same. The frontal feathers are deep red about the middle. The fore part of the neck is yellowish-grey, streaked with brownish-grey; the feathers of the breast are blood-red, tipped with yellowish-white, the sides yellowish-brown, streaked with darker; the rest of the lower parts light brownish-grey, paler on the middle of the abdomen.

In this case the change from the winter colouring was not very remarkable, excepting in the appearance of the red, yet dark, on the forehead and breast. But towards the end of summer the change is much greater. A specimen shot on the Pentland Hills, on the 23d June, had the bill bluish-brown above, paler beneath, the tip darker; the feet yellowish-brown, the claws dusky. The head and neck light greyish-brown; the forehead bright red; the back and wing-coverts uniform reddish-brown; the breast light red; the sides yellowish-brown, with only faint indications of dark streaks.

In some individuals at this season, the red on the forehead and breast become so light as to be nearly rose-red. Specimens shot with the dark red tint, assume this very light red after being exposed to the sun. The entire changes may be satisfactorily accounted for by the wearing of the tips of the feathers, and the action of light in dissipating the dark tints. Before these circumstances were made known by M. Temminck, this species was, naturally enough, divided into two. It is remarkable that cage birds do not acquire the red tints on the breast and forehead.

Habits.—The Common Linnet, variously denominated the

Brown, Grey, and Rose Linnet, is generally distributed in Britain, being found at all seasons in most parts of England and Scotland. Towards the end of autumn individuals collect into flocks, which unite as the winter advances, and betake themselves to the lower districts, where, in the neighbourhood of towns and farm-steadings, they search the fields, and in severe weather frequent the corn-yards, to procure seeds of oats, and various plants, on which they subsist entirely from the middle of autumn until the beginning of summer. These flocks sometimes mingle with those of the Mountain Linnet, and occasionally the Green Linnet, as well as for a time with other birds; but for the most part they keep distinct, performing their various evolutions by themselves. They appear over a field, attracting notice by their soft and mellow notes, and either fly over it in curving sweeps for some time, or alight abruptly, when the bystander can easily distinguish them by the white which appears on their wings and tail, as they spread them out while settling on the ground. They generally move in a rather close flock, advance in one direction, by short leaps, crouching as they go on, and searching for food with great assiduity, the stragglers every now and then flying up to the main body. They are easily approached when thus engaged, unless they have been previously chased; but when a person draws near them, they either all stand still for a short while, and fly off nearly simultaneously, or the nearer individuals advance to the front of the party successively, so that frequently they thus traverse a considerable space before they consider it necessary to extend their flight. In the latter case, they betake themselves to a distant part, or perch on trees or bushes in the neighbourhood.

The flight of this species is rapid and undulated, being performed by alternate flaps and cessations, in a curved line, in the manner of the Green Linnet, but with still more activity. The flocks glide and wheel, the individuals crossing the direction of each other, in a very beautiful manner. On the ground, it is equally active. Its voice is soft and mellow, and its song varied, and remarkably sweet; on which account it is frequently kept in cages. It is easily reared from the nest, and

feeds when grown on canary, rape, and hemp seed, with chickweed and groundsel. In this state it pairs with the Canary and Goldfinch.

When the fine weather commences in spring, the flocks break up, and the individuals betake themselves to their summer haunts, in the hilly and mountainous parts of the country, especially where there are thickets of broom, whin, or sloe, or even, in defect of these, where the heather attains an unusual size on the slopes of the craggy braes and glens. There the male, perched on a twig or stone, pours forth his sweet notes, while his mate is brooding over her precious charge. But the song of the Linnet, pleasant as it may be when heard in a room, has little effect on the hill side, compared with that of the Mavis or Merle, although to the shepherd swain reclining on the soft moss on a sloping bank overgrown with "the lang yellow broom," or the weary traveller resting a while by the way-side, it may seem gentle as the melody of the primeval groves of lost paradise, filling the soul with pleasing thoughts.

The nest of the Linnet is generally placed in a bush of furze or heath, or among brushwood, and is neatly constructed, being formed externally of blades and stalks of grass, intermingled with moss and wool, and lined with the hair of various animals. The eggs are from four to six, of a regular oval form, about nine-twelfths of an inch long, from six to nearly seven twelfths in their greatest diameter, bluish-white, distantly spotted with purplish-grey and reddish-brown, the spots more numerous towards the larger end. The young are usually abroad by the end of May; and there are commonly two broods in the season.

Young.—The young when fledged have the upper mandible pale greyish-brown, the lower flesh-coloured tinged with blue; the feet flesh-coloured, the claws brown. The upper parts are yellowish-grey streaked with dusky, of which the spots are larger than in the adult female; the lower greyish-yellow, streaked with brown, excepting the middle of the abdomen.

Progress toward Maturity.—It is unnecessary, and indeed

almost impracticable, to detail the minute gradations and changes that are exhibited by this bird, as it advances in age. I shall therefore rest content with the descriptions already given, apprehensive that they may prove quite sufficient to exhaust the patience of the reader.

Remarks.—The Brown Linnet very closely resembles the next species, which, however, besides being smaller, has never any red on the head or breast, and has the throat always unstreaked.

LINARIA FLAVIROSTRIS. THE MOUNTAIN LINNET, OR TWITE.

MOUNTAIN LINNET. TWITE. HEATHER LINTIE. BICIAN.

Fringilla flavirostris. Linn. Fauna Suec. 87.
Fringilla montium. Lath. Ind. Orn. I. 459.
Twite. Mont. Orn. Dict.
Gros-bec a gorge rousse ou de Montagne. Fringilla montium. Temm. Man. d'Orn. I. 368. II. 262.
Mountain Linnet, or Twite. Linaria montana. Selb. Illustr. I. 318.
Fringilla montium. Mountain Linnet. Jen. Brit. Vert. An. 140.

Male in winter, with the bill greyish-yellow, the upper parts light yellowish-brown, streaked with brownish-black, the feathers of the rump red in the middle, the lower parts light brownish-yellow, of which are two bands across the wing; the throat unspotted; the feet black. Female in winter, with the bill tipped with dusky, the colours of the plumage similar, but lighter, the rump destitute of red.

Male in summer, with the bill whitish, the rump rose-red, in other respects as in winter, but paler. Female as in winter.

Male.—The Yellow-billed Linnet, or Twite, also named by authors the Mountain Linnet, is inferior in size to the Common or Brown Linnet, and superior to the Redpoll. In form and proportions it resembles the preceding species, from which it is easily distinguished by attending to the specific characters given above. The bill is short, stout, and tapers to a fine point, its upper outline almost straight, and its base, although pentagonal, has the two lateral angles so rounded, that, as M. Temminck has described it, one might call it triangular in its transverse section, although certainly not "formant un triangle parfait," whether viewed directly or transversely. The tarsi are

much compressed, as are the toes, and the claws are very slender, arched, and taper to a very fine point.

The plumage is blended and very soft, with little gloss, the feathers generally oblong and rounded. The wing is proportionally longer than in the last species; the first and second quills of the same length, the third a little shorter, the other primaries rounded, but the inner slightly emarginate; the secondaries truncato-emarginate, excepting the inner two. The tail is rather long, and deeply emarginate, the middle feathers being five twelfths of an inch shorter than the lateral.

The bill is greyish-yellow, or wax-yellow; the irides brown; the feet and claws greyish-black. The upper parts are streaked with light yellowish-brown and brownish-black, the central part of each feather being of the latter colour; that of the rump feathers, however, deep red. The quills are brownish-black, margined with greyish-yellow, excepting four of the inner primaries, which are edged with white; and there are two transverse light brownish bands on the wing, formed by the tips of the primary and first row of small coverts. The tail-feathers are brownish-black, margined externally with yellowish-brown, the outer with white at the base, internally with greyish-white. The sides of the head, throat, and fore part of the breast are light reddish-brown; the throat without spots, but the other parts and the sides streaked with dusky; the abdomen paler, and the lower tail-coverts whitish, some of them with a dark central mark.

Length to end of tail $5\frac{1}{4}$ inches; extent of wings $8\frac{10}{12}$; wing from flexure $2\frac{11}{12}$; tail $2\frac{5}{12}$; bill along the ridge $4\frac{1}{2}$ twelfths, along the edge of lower mandible $5\frac{1}{2}$ twelfths; tarsus $\frac{8}{12}$; middle toe and claw $\frac{9}{12}$.

Female.—The female in winter resembles the male, but has the colours somewhat paler, is destitute of red on the feathers of the rump, and has the bill slightly tipped with dusky.

Length to end of tail $5\frac{2}{12}$ inches; extent of wings $8\frac{9}{12}$; wing from flexure $2\frac{10}{12}$; tail $2\frac{4}{12}$; bill along the ridge $\frac{4}{12}$; tarsus $\frac{8}{12}$; middle toe and claw $\frac{9}{12}$.

Variations.—I have not observed any remarkable accidental or irregular variations in this species.

Changes of Plumage.—The changes exhibited by the Twite are not so remarkable as those of the Brown Linnet, although perfectly analogous.

Male in Summer.—The bill is yellowish-white; the feet black. The upper parts are darker, the light brown streaks having become narrower; the rump is crimson or purplish-red. The lower parts are nearly as in winter, the throat remaining unspotted at all seasons.

Habits.—The Twite almost precisely resembles in its habits the Brown Linnet, with which in winter it sometimes associates. Towards the commencement of that season, the individuals unite into flocks, sometimes of great extent, and search for food chiefly in the stubble fields, where, besides the seeds of chickweed, field-mustard, polygona, and other plants, they pick up those of the cultivated grasses. Although both this and the Brown Linnet might seem too small to feed upon these latter seeds, yet in winter I have generally found the greater part of the contents of their stomach to consist of them. It appears to be as extensively distributed as the last species, but not nearly so abundant in the southern districts. In the Hebrides it is plentiful, and in winter frequents the corn-yards in large flocks, clinging to the stacks of oats, and picking out the seeds. I have several times seen some of them killed by throwing a stick in the midst of them, and more frequently by trapping them with a riddle; and this merely for the purpose of being eaten by the young savages, who have no taste for caging.

Its flight is rapid and undulated, and it wheels over the fields previous to alighting, uttering a soft twitter at intervals. When disturbed, it betakes itself to tall trees, or to a distant field; but is not shy, and may therefore be easily approached when feeding. In spring it forsakes its winter haunts, and disperses over the hilly tracts, where it forms its nest on the

ground, among short heath, or on the grassy slopes of craggy spots. It is neatly constructed, being composed externally of fine dry grass, fragments of heath, and a little moss, internally of fibrous roots, wool, and hair. The eggs are bluish-white, marked towards the larger end with light-brown and purplish-red, sometimes with a few blackish dots.

Young.—The young when fledged have the bill pale greyish-brown, the feet light brown, the claws dusky; the plumage coloured as in the adult female, but with dark brown, in place of blackish-brown markings, the white on the wings less extended, and the brownish bands duller.

Remarks.—Although the Twite bears a strong resemblance to the Brown Linnet, especially in the winter plumage, it may always be very easily distinguished from that species by its yellowish-red throat, destitute of dark streaks, and the yellow colour of the bill.

LINARIA MINOR. THE SMALLER REDPOLL LINNET.

LESSER REDPOLL.

FIG. 64.

Fringilla Linaria. Linn. Syst. Nat. I. 322.
Fringilla Linaria. Lath. Ind. Orn. I. 458.
Lesser Redpoll. Mont. Orn. Dict.
Gros-bec Sizerin. Fringilla Linaria. Temm. Man. d'Orn. I. 373.
Lesser Redpoll Linnet. Linaria Minor. Selb. Illustr. I. 320.
Fringilla Linaria. Lesser Redpoll. Jen. Brit. Vert. An. 138.

Length nearly five inches.

Male in winter, with the bill dusky above, the throat blackish, the back and sides yellowish-brown, streaked with dusky-brown, the loral space and edge of the forehead brownish-black, the feathers on the upper part of the head and rump dull red. Female similar, but without red on the rump, and having the dark streaks larger.

Male in summer, with the edge of the forehead, the loral space, and the throat, black; the upper part of the head crimson, the sides of the neck, the breast, and the rump carmine. Female with the fore part of the head crimson, the throat black, the other parts nearly as in winter.

MALE.—The Smaller Redpoll is the most diminutive of our native Passerine birds, and withal so delicate, lively, and affectionate a creature, that it is a special favourite with most people

who know it. In form it resembles the Twite, but has the wings and tail proportionally longer. The bill is more compressed and pointed than in the other species, its upper outline almost perfectly straight, as is the lower, the points of both mandibles acute, the lower somewhat broader at the base than the upper. The feet are proportionally strong, and the claws are very long, arched, and acute, indicating an adaptation for clinging to trees, or other plants. The plumage is soft and blended. The wings are rather long; the three first primaries almost equal, the second however being the longest; the outer secondaries are very slightly emarginate. The tail is long, and deeply emarginate, the middle feathers nearly half an inch shorter than the lateral.

The upper mandible is greyish-brown, the lower yellow, but with the point blackish. The irides are brown; the feet blackish-brown. The loral space, a band edging the forehead, and the throat are blackish, the tips being yellowish-grey, while the bodies of the feathers are black. The upper part of the head is dull red, as is the rump; the general colours of the rest of the upper parts yellowish-brown, streaked with blackish-brown. Wing-coverts, quills, and tail dusky-brown, margined with pale yellowish-brown, of which are two bands across the wing formed by the tips of the secondary coverts and first row of small coverts. The sides of the throat, the fore-neck, breast and sides, are pale brown, with longitudinal dark markings; the abdomen and lower tail-coverts whitish.

Length to end of tail $4\frac{10}{12}$ inches; extent of wings $8\frac{3}{4}$; wing from flexure $2\frac{9}{12}$; tail $2\frac{4}{12}$; bill along the ridge $3\frac{1}{2}$ twelfths, along the edge of lower mandible $\frac{5}{12}$; tarsus $6\frac{1}{2}$ twelfths; middle toe $4\frac{1}{2}$ twelfths, its claw $\frac{3}{12}$.

Female.—The female, which is somewhat smaller, resembles the male in the general colours of the plumage, but has less red on the head, without any indication of that colour on any other part. The bill and feet are similarly coloured.

Length to end of tail $4\frac{9}{12}$ inches.

Variations.—Slight variations of tint occur, according to

the age of the individuals; but in the wild state I have not met with albinoes, or parti-coloured specimens. The appearance of the bird in summer differs so much as to require a separate description.

Male in Summer.—The bill is greyish-brown above, pale yellow beneath, with the tip dusky, the feet also as in winter. The forehead, loral space, and throat, are black; the crown of the head crimson; the hind part of the head, the neck, the fore part of the back, and the scapulars, are blackish-brown, the feathers with pale yellowish-brown edges; the hind part of the back, carmine; the wings and tail dusky, with yellowish-brown edges, and two transverse bands of the same. The sides of the neck, its fore part, the breast, and flanks, carmine; the middle of the breast, the abdomen, and the lower tail-coverts white, tinged with rose-colour.

Female in Summer.—The female has the black of the forehead and throat brownish, with less red on the head, and generally none on the lower parts or rump, which are nearly as described in the winter plumage, but paler.

Habits.—The Redpoll resembles the Siskin in its habits, as well as in shape, it being one of the species that forms the transition from Linaria to Carduelis. Its flight is peculiarly bounding and buoyant, and its voice remarkably clear and loud. When starting it emits a hurried chatter of short notes, and as it proceeds on its flight utters a single note at intervals less prolonged than those of our other Linnets. Its cry is so different from that of the Brown Linnet and Twite, being clearer and sharper, that one who has attended to it can readily distinguish the species on wing. Although not abundant in any part of the country, it forms large flocks in winter, and betakes itself to the birch and alder woods, in procuring the seeds of which the birds hang in all kinds of attitudes, like many other small species that find their subsistence on trees, such as Tit-mice and Gold-crests. I have also seen them in August scattered over a tract overgrown with thistles, the seeds of

which they picked out precisely in the same manner as the Goldfinch. On such occasions, unless they have previously been shot at or pursued, they take little heed of approaching danger, so that one may easily approach them, or even go so near as to snare them with a noose on a long stick or fishing-rod.

In many parts of Scotland, and in the north of England, the Redpoll remains all the year, breeding in the hilly districts among the brushwood that skirts the flanks of the mountains, or covers the margins of streams in rocky dells. Not having met with its nest, however, I take the liberty of borrowing Mr. Selby's account of it. "It is built in a bush or low tree (such as willow, alder, or hazel), of moss and the stalks of dry grass, intermixed with down from the catkin of the willow, which also forms the lining, and renders it a particularly soft and warm receptacle for the eggs and young. From this substance being a constant material of the nest, it follows that the young are produced late in the season, and are seldom able to fly before the end of June or the beginning of July. The eggs are four or five in number; their colour pale bluish-green, spotted with orange brown, principally towards the larger end."

Young.—The young birds in November, when their first moult is completed, are as follows:—The upper mandible is greyish-brown, the lower dull yellow with the point dusky. The tarsi are light brown, the toes darker, the claws dusky. The loral space, a narrow frontal band, and the reversed feathers covering the nostrils, are dull blackish-brown. The feathers on the top of the head are dark brown, but with yellowish-red shining edges. The upper parts are streaked with dusky brown and dull light yellowish-red, of which latter are two broad bands on the wing-coverts. The wings and tail are dusky, edged with yellowish-brown. There are indications of black on the throat, concealed however by the light-coloured tips of the feathers. The cheeks, sides of the neck, fore-neck, and sides of the body are streaked with dusky and light yellowish-brown, the middle of the breast, the abdomen, and lower tail-coverts brownish-white.

Remarks.—The Redpoll is frequently kept in cages, not so much for its song, which is very inferior to that of the Brown Linnet, as for its lively and gentle disposition. It readily pairs with the Canary and Goldfinch. This species, according to authors, inhabits the northern and temperate parts of Europe and North America, feeding during winter on the buds of the alder, and at other seasons on the seeds of that tree, the birch, and pines, as well as those of flax and cruciferæ. It is however to be remarked that the Lesser Redpoll of the Fauna Boreali-Americana, and of Mr. Ord's edition of Wilson's American Ornithology, agrees better with the next species than with the present.

LINARIA BOREALIS. THE MEALY REDPOLL.

Linaria borealis. Selb. Newcastle Transact. I. 263.
Gros-bec boreal. Fringilla borealis. Temm. Man. d'Orn. III. 264.
Lesser Redpoll Linnet. Linaria Minor. Var. Selb. Illustr. I. 320.
Fringilla Linaria. Lesser Redpoll. Var. B. Jen. Brit. Vert. An. 139.

Length five inches and a third. The colours as in the Common Redpoll, but the edges of the feathers paler, the rump greyish-white, and the lower parts nearly white.

Some birds of a larger size than the Common Redpoll, but resembling it in form, as well as, with certain differences, in colour, having been observed in Britain of late years, they have been variously considered by authors as belonging to a larger race of the last species, or to a distinct species, to which the name of Mealy Linnet, Linaria canescens, has been given by Mr. Gould. The only specimen of this kind that I have seen was obtained by Mr. Weir of Boghead, in the neighbourhood of Bathgate, and is now before me. It was killed in winter, and appears to belong to the Fringilla borealis of Temminck, whose description I shall in the first place translate.

" Fringilla borealis. Gros-bec boreal. Larger than the Siskin; winter plumage whitish all over; rump pure white.

" Throat and lore black; upper part of the head and the forehead blood-red; forepart of the neck, breast, and rump rose-red; belly, abdomen, and flanks pure white; occiput and nape covered with blackish streaks on a reddish-white ground; back and scapulars with broad blackish streaks, all edged with white; broad margins of pure white on all the feathers and quills of the wings and tail. Bill yellow, upper mandible brown above. Length five (French) inches. *The old male in spring.*

" *The males in autumn* have the rump white, with a faint rosy tint and brown streaks; slight reddish tints on the cheeks; brown streaks of the back margined with reddish; the red on the top of the head somewhat dull, and covered with very slight reddish tints.

" The *female* has the fore part of the head whitish; red on the top of the head; the breast, the lower parts, and the rump white, marked with brown streaks, which are pretty numerous on the flanks.

" *Both sexes in winter* have the top of the head of a dull red, the forehead white or reddish, marked with a black band; the lore and throat dull black; the lower parts pure white, more or less variegated with brown streaks; the edges of the feathers of the back of a dull white or pale reddish."

If M. Temminck uses the terms *white* and *whitish* with too little qualification, his species is probably the Mealy Linnet of Mr. Gould, as well as the bird represented by Mr. Selby in his *Illustrations*, Pl. 53,** Fig. 2, which he considers as a large variety of the Redpoll.

Mr. Weir's specimen is of the size of the Twite, Linaria flavirostris, and may be described as follows:

The bill is much larger than that of the Redpoll, but of the same form. The plumage is soft and blended; the wings rather long, the three first primaries almost equal, but the second longest; the tail long and deeply emarginate. The bill is dull yellow, the upper mandible towards the end greyish-brown, the feet dusky, the claws brownish-black. The reversed bristly feathers at the base of the bill are yellowish-grey; the loral space and throat brownish-black. The feathers on the head are dusky, tipped with yellowish-grey, a few of them deep red towards the end. The general colour of the upper parts is light yellowish-brown, streaked with dusky brown, the rump greyish-white, streaked with dusky. The quills, larger coverts, and tail, are dark brown, margined with whitish-brown, of which are two bands across the wing, formed by the tips of the secondary, and first row of small coverts. The cheeks are greyish-white, as are the fore part of the neck,

the middle of the breast, the abdomen, and lower tail-coverts; the sides tinged with brown, and streaked with dusky.

Length to end of tail $5\frac{4}{12}$ inches; bill along the ridge $\frac{5}{12}$, along the edge of lower mandible $6\frac{1}{2}$ twelfths; wing from flexure $2\frac{10}{12}$; tail $2\frac{4}{12}$, tarsus $7\frac{1}{2}$ twelfths; hind toe $3\frac{1}{4}$ twelfths, its claw $4\frac{1}{2}$ twelfths; third toe $4\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$.

On comparing it with a winter specimen of the Redpoll, besides being considerably larger, it also presents much lighter tints, which, however, it would require some poetical license to consider as white, at least pure white.

CARDUELIS. THISTLEFINCH.

Bill shortish, straight, direct, strong, conical, tapering to a slender point, subpentagonal at the base, deeper than broad in its whole length, more especially towards the end ; upper mandible with the dorsal outline nearly straight, the ridge narrow, the sides sloping and slightly convex, the edges sharp and direct, destitute of notch, the tip very acute and considerably extended beyond that of the lower ; lower mandible with the angle semicircular, the dorsal line straight or slightly concave, the ridge convex at the base, narrowed towards the end, the edges sharp and inflected. Gape-line nearly straight, at the base slightly deflected.

Mouth narrow, both mandibles deeply concave within, the upper with a medial and two lateral prominent lines, and four grooves. Aperture of the posterior nares linear, and with that of the glottis margined with acute papillæ. Tongue sagittate, subulate, involute, the tip terminated by a pencil of short bristles. Œsophagus dilated on the middle of the neck into a kind of crop, afterwards narrow ; proventriculus bulbiform, and furnished all round with numerous cylindrical glandules. Gizzard roundish, compressed, with two very strong lateral muscles with radiated tendons, and a narrow prominent basal muscle ; its cuticular lining dense, tough, and longitudinally rugous. Intestine of moderate length, rather wide, of nearly equal diameter throughout, with two very small cylindrical, adnate cœca near its extremity ; rectum very short.

Nostrils circular, basal, in the fore part of the short and broad nasal depression, and concealed by the reflected feathers.

Eyes of moderate size; eyelids feathered, their edges bare and papillar. External ears large, oval.

Head rather small, oblong; neck short; body ovate, rather slender. Legs short; tarsus very short, compressed, covered anteriorly with seven scutella, posteriorly with a long plate forming a sharp edge, and inferior rugæ; toes slender, compressed, covered above with few large scutella, narrow and granulate beneath; the second and fourth equal, the first a little shorter, the third much longer. Claws long, slender, compressed, arched, laterally grooved.

Plumage soft, blended, the feathers rounded, with a slender plumule composed of a few loose filaments; those at the base of the bill with short bristle-points. Wing rather broad. Primary quills ten, secondary seven, the three outer quills nearly equal, the second longest, the third shorter than the first; the second, third, and fourth slightly cut out on the external margin towards the end; the primaries rounded, the secondaries emarginate. Tail shortish, emarginate, the lateral feathers slightly bent outwards.

The genus Carduelis is very intimately allied to the preceding, the principal difference being in its having the bill more slender and elongated. The species are all small, and generally of lively colours, the wings marked with yellow. They are extensively distributed, and some occur on both continents. Although they occasionally descend to the ground, they usually seek their food on trees or tall herbaceous plants, of which, especially the Amentaceæ and Compositæ, they pick the seeds. In Britain two species occur; the Red-fronted Thistlefinch or Goldfinch, *C. elegans*, and the Siskin, *C. spinus*; both permanent residents, but the latter appearing irregularly in flocks during autumn and winter, although breeding in Scotland.

CARDUELIS ELEGANS. THE RED-FRONTED THISTLEFINCH, OR GOLDFINCH.

GOLDFINCH. GOLDSPINK. GOUDSPINK. GOLDIE. LASAIR-CHOILLE.

FIG. 65. *Male.*

FIG. 66. *Female.*

Fringilla Carduelis. Linn. Syst. Nat. I. 118.
Fringilla Carduelis. Lath. Ind. Orn. I. 449.
Goldfinch. Mont. Orn. Dict.
Gros-bec Chardonneret. Fringilla Carduelis. Temm. Man. d'Orn. I. 376.
Goldfinch. Carduelis elegans. Selb. Illustr. I. 312.
Fringilla Carduelis. Goldfinch. Jen. Brit. Vert. An. I. 137.

Forehead and throat crimson ; loral space, top of the head, and occipital band black.

MALE.—The Goldfinch is one of the most elegant as well as gayly attired of our native birds, and being held in great estimation on account of its docility and the sweetness of its song, is a special favourite with those who find pleasure in imprisoning birds. Its form is compact and rather slender, and as its bill is more attenuated than that of most other birds of the Passerine family, and its head proportionally small, it has not the heavy aspect of the Green Linnet or Sparrow. As all the characters given in detail in the generic character apply to it, we may dispense with a particular description of the parts.

The œsophagus, which dilates into a small crop, is two inches in length ; the gizzard eight twelfths ; the intestine ten inches ; the cœca nearly two twelfths. The plumage is blended, very

soft, and slightly glossed, excepting the red feathers on the fore part of the head, which have a silky lustre. The wings are rather broad; the second quill longest, but scarcely exceeding the first, which is a little longer than the third. The primary quills are rounded, the secondary emarginate, excepting the inner two. The tail is short, and rather deeply emarginate, the difference in length between the middle and outer feathers being a quarter of an inch.

The bill is whitish, tinged with red, the point of both mandibles blackish-brown. The irides brown. The feet dusky-brown. The feathers margining the bill all round, the loral or preocular space, the top of the head, the occiput, and a semicircular band on the upper part of the neck from behind, black. Anterior to this is a broader band of white passing over the throat, and behind it a narrower of brownish-white. The throat and forehead are crimson, that colour extending over the eyes. The hind-neck and back are umber brown, that colour passing into ochre-yellow on the rump; the sides of the breast and flanks paler; the rest of the lower parts white. The smaller wing-coverts and alula are black, as are the primary coverts; the secondary coverts rich yellow; the proximal or basal half of the outer webs of the quills pure yellow, that of the first excepted; the other parts of the quills black, their tips pure white. The tail-feathers are black, tipped with white; the two outer have a large white spot on the inner web.

Length to end of tail 5 inches; extent of wings 9; wing from flexure $3\frac{2}{12}$; tail $1\frac{11}{12}$; bill along the ridge $5\frac{1}{2}$ twelfths, along the edge of lower mandible $6\frac{1}{2}$ twelfths; tarsus $\frac{7}{12}$; hind toe $3\frac{1}{2}$ twelfths, its claw $5\frac{1}{2}$ twelfths; second toe $\frac{4}{12}$, its claw $\frac{5}{12}$; third toe $\frac{6}{12}$, its claw $\frac{4}{12}$.

Female.—The female is considerably smaller. The colouring is similar, but presents the following differences. The crimson of the forehead and throat is less extensive; the cheeks and the white spots on the wings and tail are tinged with brown; the hind part of the breast and abdomen are of a less pure white; the black of the head is mixed with grey and brown behind, and that of the wings and tail is less deep.

Length to end of tail $4\frac{10}{12}$; extent of wings $8\frac{10}{12}$.

Variations of Plumage.—I have not met with any remarkable accidental differences of colour in wild birds, although in captivity individuals may sometimes be seen of a dusky brown, or more or less white or cream-coloured. As in other birds, the feathers become ragged in summer, but the changes thereby induced are not great, the white tips of the quills and tail-feathers being, however, more or less abraded.

Habits.—It is not my purpose to treat of caged birds, so that we shall escape a great deal of unnecessary sentimentalism, and save the time that might otherwise be lost in learning how dear a pet was Matilda's Goldfinch, how sweetly it sung, how neatly it preened its plumage, how delightedly it nibbled the nice bit of white sugar presented to it, and how excruciating were its agonies, as well as those of its gentle mistress, when its little dear bones were crunched by the serried teeth of cruel grimalkin, that sworn foe of all birdlets. Let us stroll abroad on this fine autumnal day, when the sun shines brightly on the yellow fields, and the thistle down floats along on the gentle breeze, gliding like snow-flakes over the river. There, on that old pasture, is the source of the plumy eruption, a forest of tall weeds, which the husbandman ought to have pulled up and burnt before they had time to perfect their seeds. See what tufts of down are scattered about by those little birds that seem bent on demolishing all the heads, anthodia, or capitula, as the botanists term them. How curiously they hang on the prickly stems and leaves, with what adroitness do they thrust their bills into the heart of the involucres, and how little do they regard us as they ply their pleasant pursuit, unconscious of danger, and piping their mellow call-notes! Now, some of them have perceived us; they fly off, chuckling, to a distant clump of thistles; and as we approach, others shift their stations; but as yet the main body has no thoughts of retreating. Let us stand still to observe them. They flutter over the plants, cling to the stalks, bend in various attitudes, disperse the down, already dry and easily separable, pick out the pericarps one by one, and swallow them. There comes a stray cow pursued by the herd boy. The birds suddenly intermit

their labours, pause for a moment, and fly off in succession. You observe how lightly and buoyantly they cleave the air, each bird fluttering its little wings, descending in a curved line, mounting again, and speeding along. They wheel around the field, now descending almost to the ground, now springing up again. Some of them suddenly alight, when, the example thus set, all betake themselves to the tiny thicket of dried and withered weeds, and in settling display to the delighted eye the beautiful tints of their plumage, as with fluttering wings and expanded tail they hover for a moment to select a landing place amid the prickly points that seem to stand forth as if to prevent aggression. The Goldfinch doubtless would smile at the threat of the "Nemo me impune lacesset," which every Scot calls to mind when he thinks of a thistle; for to it the spears of the Cnicus lanceolatus are not more formidable than the bayonets of the Cnicus palustris, or the daggers of the Cnicus arvensis. From all these species, as well as others, it obtains a portion of its food, and when thistles are not plentiful, it attacks the heads of the Knapweed, Centaurea nigra, and other plants of the Syngenesian tribe.

But its food is not exclusively composed of the seeds of the Compositæ; for it also eats those of Gramineæ, Caryophylleæ, and other herbaceous plants; as well as those of the Birch, Alder, and some trees of a similar nature. I find it recorded in the first note-book I ever wrote, that in November 1816, in which year, as the same document informs me, "I began the study of zoology, and in consequence purchased a fowling-piece," I shot "three at Hilton, near Aberdeen, where they had collected in immense flocks to eat the hawthorn seeds." Flocks of several hundreds, in fact, I have more than once met with; but it is nevertheless true, as Mr. Selby observes, that "Goldfinches do not (usually) associate in large flocks; their societies rarely exceeding twenty in number." That from which I obtained the three specimens which furnished the descriptions given at the commencement of this article, was composed of about a dozen, which, on the 19th September 1833, were busily picking the seeds of Centaurea nigra, at Caroline Park, near Newhaven, when the ruthless prowler thinned their

number, to furnish a plate for his intended portraits of British birds. In winter, I have seen even so few as two together, pecking at the few thistle-tops that shot up here and there through the snow.

The Goldfinch is generally distributed, occurring in most of our wooded and cultivated districts; but while plentiful in some parts, it is rare in others that seem to be equally favourable. Thus, although not uncommon about Aberdeen and Elgin, it is very rare in the neighbourhood of Edinburgh, in which I never met with more than a single flock. Its song, which usually commences about the end of March, and continues until July, is very sweet, and varied. Its flight resembles that of the Linnets, with which it sometimes associates in winter, searching the fields for oat and other seeds.

It usually nestles on trees, in orchards, gardens, or plantations. The nest resembles that of the Chaffinch in form, but is more elaborately interwoven with wool and hair, the exterior being composed of grass, moss, and lichens, as well as occasionally thread, twigs, and other substances, the interior of the down of various plants, cotton, and such other delicate filaments as it meets with. The eggs, about five in number, are about nine twelfths of an inch in length, six and a half in breadth, bluish-white, or pale greyish-blue, sometimes tinged with brown, and marked with a few spots of greyish-purple and brown, and in some cases a dark streak or two.

Among various notices respecting birds sent by my friend Mr. Weir, is the following account of this species. "In this neighbourhood, and most parts of Linlithgowshire, Goldfinches, which, during the summer season, were at one time very abundant, are now rarely seen. In severe winters they often perish, particularly when they are accompanied with heavy falls of snow. This was the case in the winter of 1823. Several pairs of them used to build every year on the tall plane-trees on the south side of Balbardie garden. I have known their nest in yew and apple trees in gardens in the middle of the town of Bathgate, but their young ones were generally destroyed by cats or boys. A pair of them built one year on a balsam poplar which grew on the side of one of the streets of the last-

mentioned town, within a few inches of which dozens of people used to pass and repass during the most part of the day. So exceedingly tame were they that they alighted in the gutters, in company with the sparrows, in pursuit of their food. I knew the man who took the young ones out of their nest, and put them in a cage, which he placed at his window, where they were fed by their parents until they were able to provide food for themselves. I knew a remarkable instance of a female Goldfinch pairing with a male Green Linnet in the wild state. They first built their nest in a thorn hedge in a garden, in the immediate neighbourhood of Bathgate, in which they reared four young ones. They were taken out and brought up by a young man in the town. They built a second time in an old beech hedge on the estate of Mrs. Marjoribanks of Balbardie, where they succeeded in hatching another brood, of which they were again deprived. They were given to a weaver, who succeeded in bringing them up. They lived for several years, but they were not much admired for their fine singing, their note being accounted rather harsh by our connoisseurs.

"I knew another instance of the same kind, which took place some years ago, in the garden on the north side of the Castle of Edinburgh, at present in the possession of Messrs. Eagle and Henderson. The male Green Linnet and the female Goldfinch were caught by a bird-catcher, who kept the latter for some time as a call-bird. I saw both of them last year, and one of their brood, which a cabinet-maker in Edinburgh has now in his possession. It is a very strong and fine male, which, he says, sings remarkably well.

"These seemingly unsociable birds, as soon as the breeding season is over, flock together in numbers. About the end of autumn, and during the winter months, they come to this parish, and that of Whitburn. At their first arrival they feed on the seeds of the meadow thistle, then on the common thistle, afterwards on the selfheal, Prunella vulgaris, and sometimes on the Ragwort, Senecio Jacobæa. A great many of them, particularly the males, are caught with bird-lime, by bird-catchers and other people. About the beginning of spring, or as soon as the courting season commences, they separate, each pair making choice of a particular situation for their abode."

Young.—The young when fledged present the same appearance as the old birds, but the colours are fainter; the bill and feet flesh-coloured, the black of the head mixed with grey, and the lower parts brownish-grey. At the first moult, the colours are generally as bright as those of old birds.

Remarks.—Mr. Syme, in his excellent treatise on British Song Birds, gives the following account of this species in a civilized state. "The Goldfinch is easily tamed and easily taught, and its capability of learning the notes of other birds is well known; but the tricks it may be taught to perform are truly astonishing. A few years ago, the Sieur Roman exhibited his birds, which were goldfinches, linnets, and canaries. One appeared dead, and was held up by the tail or claw without exhibiting any signs of life; a second stood on its head with its claws in the air; a third imitated a Dutch milk-maid going to market, with pails on its shoulders; a fourth mimicked a Venetian girl looking out at a window; a fifth appeared as a soldier, and mounted guard as a sentinel; and the sixth acted as a cannoneer, with a cap on its head, a firelock on its shoulder, and a match in its claw, and discharged a small cannon. The same bird also acted as if it had been wounded. It was wheeled in a barrow, to convey it, as it were to the hospital; after which it flew away before the company. The seventh turned a kind of windmill; and the last bird stood in the midst of some fire-works which were discharged all round it, and this without exhibiting the least symptom of fear.

"They may also be taught to draw up little buckets or cups with food and water. To teach them this, there must be put round them a narrow soft leather belt, in which there must be four holes, two for the wings, and two for the feet. The belt is joined a little below the breast, where there is a ring, to which the chain is attached, that supports the little bucket or cup."

CARDUELIS SPINUS. THE BLACK-HEADED THISTLEFINCH, OR SISKIN.

SISKIN. ABERDEVINE.

FIG. 67.

Fringilla Spinus. Linn. Syst. Nat. I. 322.
Fringilla Spinus. Lath. Ind. Orn. I. 452.
Siskin. Mont. Orn. Dict.
Gros-bec Tarin. Fringilla Spinus. Temm. Man. d'Orn. I. 371.
Siskin. Carduelis Spinus. Selb. Illustr. I. 309.
Fringilla Spinus. Siskin. Jen. Brit. Vert. An. 137.

Male with the top of the head and the throat black; the back greyish-green; the lower parts yellow; the sides white, marked with black streaks. Female with the upper parts greenish-grey, streaked with black; the lower whitish, variegated with narrow black spots.

MALE.—The Siskin, although a beautiful bird, is less richly coloured than the Goldfinch, to which it is also inferior in size, being, next to the Redpoll Linnet, the smallest British bird of the Passerine family. It is neat and compact in form, like the smaller Linnets, but its bill most resembles that of the Goldfinch, it being however still more compressed towards the point, which is extremely attenuated; the upper mandible with its dorsal outline very slightly convex, its ridge sharp, its tip extending a little beyond that of the lower, which has its outline

slightly concave, and its ridge very narrow. The plumage is soft, blended, and slightly glossed. The wings are of moderate length; the first primary of the same length as the second, which is a little longer than the third; the primaries rounded, the secondaries slightly emarginate. The tail is of moderate length, and rather deeply emarginate.

The bill is light grey above, whitish below, the tip dusky. The iris is brown. The feet light brown. The upper part of the head, and the throat are black; the hind part of the head and neck yellowish-green mixed with black streaks. A yellow band extends from above the eye backwards. The fore part of the back and the scapulars are yellowish-green, tinged with grey, each feather having a central dusky line, the rump greenish-yellow, the upper tail-coverts yellowish-brown. The smaller wing-coverts are blackish at the base, dull green at the end; the alula, primary coverts and quills black; the basal part and outer edges of the latter pure yellow; the secondary coverts black, their extremities greenish-yellow, forming a broad band of that colour across the wing. Tail-feathers yellow, black at the end, the two middle brownish-black. The fore-neck and breast are yellow, the abdomen whitish, the sides and lower tail-coverts greyish-white, each feather with a black central streak.

Length to end of tail $4\frac{8}{12}$ inches; extent of wings 9; wing from flexure $2\frac{9}{12}$; tail $1\frac{10}{12}$; bill along the ridge $\frac{5}{12}$, along the edge of lower mandible $5\frac{1}{2}$ twelfths; tarsus $\frac{7}{12}$; middle toe and claw $8\frac{1}{2}$ twelfths.

Female.—The female has the bill pale brown above, lighter beneath; the feet light brown; all the upper parts light greyish-green, each feather with a brownish-black central band; the wings and tail as in the male, but the black parts tinged with brown, and the yellow with green; the lower parts yellowish-white, each feather having a narrow longitudinal band of black.

Length to end of tail $4\frac{5}{12}$; wing from flexure $2\frac{9}{12}$; tail $1\frac{9}{12}$; bill along the ridge $4\frac{1}{2}$ twelfths; tarsus $\frac{7}{12}$.

Variations.—In wild birds I have not met with any remark-

able variations, excepting such as are usually produced by age; but in captivity, the Siskin varies to white or dusky.

Habits.—The earliest period of the year at which I have fallen in with Siskins, was on the 4th of August; when being, in 1830, on a geological and botanical excursion, in Braemar, and in company with some full-plumed and several unfledged philosophers, I observed in a field near Mar Lodge, a very large flock of these birds, feeding on the thistles that covered a sloping field on the side of an eminence. On pointing them out, I was informed by one of the naturalists present, that such a flock was in no way remarkable, and that Siskins were quite plentiful about Edinburgh. To this I replied, that I had never met with any there, unless on the North Bridge, where specimens in cages were frequently shewn for sale. However, as there is not more candour in the world than is barely necessary, I was allowed to enjoy the sight as I listed, it being considered nothing marvellous. The Siskins pursued their occupation, in which they manifested the same diligence and activity as Goldfinches, clinging to the plants and extracting the seeds in the same manner, and appearing to pay no attention to our party. It was difficult to believe that these were migrating individuals that had arrived at so early a season from the northern regions; and therefore it seemed to me probable that the species breeds in Scotland.

On the 5th September 1832, I saw a considerable number in a fir wood, in Etterickdale, in Selkirkshire. They were in the tops of the trees, accompanied by Grey Flycatchers, Golden-crested Wrens, and Black Titmice; and I succeeded in shooting three individuals. But in no other part of Scotland have I ever seen this species, which I must consequently infer to be rare in that country; notwithstanding that a friend of mine informed me that he had seen it in great abundance, picking the seeds from the cones of the alders, at Gifford in East Lothian, in the spring of 1836. Specimens I have also occasionally seen in winter with the bird-stuffers in Edinburgh.

Mr. Selby states that "in the winters of 1820 and 1821 Northumberland was visited by considerable flocks of these

birds, which, during their stay, frequented the margins of rivers, and other small streams, where the alder generally grows spontaneously and in abundance, upon the seeds of which tree, and that of the birch, they appeared principally to subsist." From that time to 1833, he could not find that any had migrated into that part of the country. Near Killin, in Perthshire, some of these birds were observed by himself and Sir William Jardine "to be in pairs in the month of June, inhabiting a wood of very old and lofty pines."

Montagu says that in December 1805 a small flock was seen feeding on the seeds of the alder trees, in South Devon; and various observers have noted their occurrence in other parts of England, and particularly in the neighbourhood of London, where they are occasionally obtained by the bird-catchers. Mr. Neville Wood states that "it has been ascertained to breed in several parts of Scotland." "Mr. Gardiner," he continues, "has likewise found it to breed in the neighbourhood of Edinburgh. But I have heard of no authentic instance of its breeding in England."

I have only to add, that little additional information is to be found respecting it in the works of our best ornithologists, excepting as to its manners in a state of confinement, where it is said to sing little, but to manifest a cheerful and lively disposition.

Since the above was written, my respected friend, Mr. Weir of Boghead, an acute and indefatigable observer of birds, has enabled me to record an authentic instance of the Siskin's breeding in Scotland.

"About the latter end of May 1834, as I was returning from Bathgate, I was astonished at seeing, on the parish road between it and my house, a pair of Siskins feeding very greedily on the ripe tops of the dandelion. The head of the male was very dark, and the yellow on its wings uncommonly rich. I followed them for several hundred yards, being exceedingly anxious to discover their nest. In this, however, I did not succeed, as they flew off to a considerable distance, when I lost sight of them. Several individuals with whom I was intimately acquainted told me that they had seen them near to

the place where I had formerly started them. I again and again renewed my search, but without success. A few days after this, when two persons where catching Rose Linnets with bird-lime in a small park belonging to me, they were struck with the unusual chirping of young birds in a spruce which was planted in the middle of a very strong hawthorn hedge. When they were looking into the tree in order to discover what kind of birds they were, they immediately flew out of their nest, and, being ripe, effected their escape. They appeared to have a resemblance to the female Siskin. The nest was a small one; it was built upon two of the branches, one side of it resting upon the trunk of the tree. It was about five feet and a half from the ground, and within twelve yards of the north Glasgow road. It was one of the best concealed nests I ever saw. Indeed, had it not been so, it would not have so long eluded the notice of some of our most celebrated nest-hunting youths, who were almost in the daily habit of passing the place in pursuit of their favourite amusement. The old Siskins, with their four young ones, were seen for two or three weeks afterwards in the immediate neighbourhood. Mr. Macduff Carfrae, bird-stuffer in Edinburgh, who came out to pay me a visit, when taking a walk one morning about the middle of July, with Mr. Robert M'Nab, saddler in Bathgate, saw the same birds hopping among the branches of some alder trees, about the distance of a quarter of a mile from the place where they had been hatched."

PYRRHULA. BULLFINCH.

Bill short, very strong, subpentagonal and about as high as broad at the base. Upper mandible with its dorsal outline convex, the sides much rounded, the edges sharp, at first ascending, then nearly straight, and forming a wide sinus or curve towards the tip, which is decurved and contracts to a narrow but rather blunt point extending considerably beyond the other. Lower mandible with the angle very broad and semicircular, the dorsal line ascending and a little convex, the back very broad, the sides much rounded, the edges involute, with a thin angular prominence near the middle, the tip slightly compressed and rounded.

The mouth is of moderate width; the upper mandible within deeply and widely concave, with five prominent lines and six grooves, of which the lateral are deeper and receive the edges of the lower mandible, which is very deeply concave. Tongue very short, fleshy, oblong, concave above. Œsophagus dilated into a membranous crop; proventriculus oblong. Stomach a strong gizzard. Intestine of moderate length, rather wide; cœca minute.

Nostrils basal, in the very short broad nasal sinus, rather small, round, covered by reflected bristly feathers. Eyes rather small. External aperture of the ear large and circular.

Body moderately stout; neck short; head rather large. Legs short and rather slender; tarsus very short, compressed, covered anteriorly with seven scutella, posteriorly with two narrow plates meeting at an acute angle; toes slender and short, the first proportionally stout, the third much longer than the

two lateral, which are about equal; claws rather long, arched, much compressed, acute, laterally grooved.

Plumage soft, full, blended, the feathers oblong. At the base of the upper mandible are short bristly feathers directed forwards. Wings of moderate length, with eighteen quills; the primaries rounded, the secondaries slightly emarginate; the second, third, and fourth quills longest, and with the fifth having their outer webs slightly cut out. Tail rather long, emarginate, of twelve moderately broad feathers.

The species included in this genus vary considerably in the comparative length of the bill, which however is so peculiarly characterized by its bulging form that the small shades of difference presented by it do not seem sufficient to warrant a separation. I therefore agree with M. Temminck in referring our Common Bullfinch and the Pine Grosbeak of the older writers to the same genus. Cuvier separates the Bouvreuils, Pyrrhula, from the Durbecs, Corythus; but the distinctive character which he gives is insignificant, the former being characterized by having "the bill rounded, and bulging or convex in all directions," the latter by having it "bulging on all sides, its point curved over the lower mandible." The point is curved in the Common Bullfinch, but is not so extended as in the Pine Bullfinch. The former is the only species resident in Britain, and the latter has so rarely been met with there that I have never seen a British specimen.

PYRRHULA PILEATA. THE COMMON BULLFINCH.

BULLFINCH. ALP. POPE. NOPE. TONY-HOOP. RED-HOOP. COAL-HOOD, OR COALLY-HOOD. DEARGAN-CHOILLE.

FIG. 68.

Loxia Pyrrhula. Linn. Syst. Nat. I. 338.
Loxia Pyrrhula. Lath. Ind. Orn. I. 387.
Bullfinch. Mont. Orn. Dict.
Bouvreuil commun. Pyrrhula vulgaris. Temm. Man. d'Orn. I. 338.
Common Bullfinch. Pyrrhula vulgaris. Selb. Illustr. I. 336.
Pyrrhula vulgaris. Common Bullfinch. Jen. Brit. Vert. An. 140.

Male with the upper part of the head, a band round the base of the lower mandible, the wings, upper tail-coverts, and tail, bluish-black, the back ash-grey, the rump white, the lower parts bright red. Female with the same parts black, the back brownish-grey, the lower parts dull yellowish-brown.

MALE.—In this species the bill is remarkably short and bulging, all its outlines being convex, and the decurved tip of the upper mandible not much exceeding that of the lower. The head is large, the neck short, the body ovate, and moderately stout. The upper mandible is broadly and deeply concave within, its two lateral grooves for the reception of the edges of the lower mandible very distinct. The tongue is very short, fleshy, oblong, concave above. The œsophagus, which is two

and a half inches long, is about the middle dilated into a membranous bag or crop; the proventriculus oblong, with cylindrical glandules. The gizzard is of the ordinary form, its greatest diameter seven twelfths of an inch, its cuticular coat thick, tough and rugous. The intestine is ten inches long, with a diameter varying from two and a half twelfths to one twelfth, the cœca a twelfth and a half long. The tarsi are short and much compressed, with seven large anterior scutella; the first toe with five, the second with nine, the third with twelve, the fourth with eleven scutella; the claws arched, much compressed, acute, laterally grooved.

The plumage is soft and blended; the feathers oblong and rounded, with a long plumule of few filaments. Around the base of the bill the feathers are bristle-pointed, and conceal the nostrils. The wings are of ordinary length; the third quill longest, the second scarcely shorter, the fourth longer than the first; the secondaries are rather long, broad, and very slightly emarginate. Tail nearly straight, slightly emarginate, of twelve broad, rounded feathers, having a small tip.

The bill is brownish-black, the eyes dark brown; the feet dusky flesh-colour, the claws brownish-black. The whole upper part of the head, and a band at the base of the lower mandible, glossy black, with blue reflections. The hind-neck, back, and scapulars are ash-grey; the rump and lower tail-coverts pure white; the upper tail-coverts and tail glossy bluish black. The quills, primary coverts, and alula are brownish-black, the outer webs of the secondaries glossed with blue; the secondary coverts glossy bluish-black, their tips pale bluish-grey or greyish-white, forming a conspicuous bar on the wing; the small coverts ash-grey. The cheeks, fore-neck, breast and sides are light red, of a tint between lake and vermilion; the abdomen greyish-white.

Length to end of tail 6 inches; extent of wings $9\frac{10}{12}$; bill along the ridge of upper mandible $\frac{4}{12}$, along the edge of lower $\frac{5}{12}$; wing from flexure $3\frac{4}{12}$; tail $2\frac{1}{2}$; tarsus $\frac{8}{12}$; first toe $2\frac{3}{4}$ twelfths, its claw $\frac{3}{12}$; second toe $\frac{4}{12}$, its claw $\frac{2}{12}$; third toe $\frac{6}{12}$, its claw $\frac{3}{12}$; fourth toe $\frac{4}{12}$, its claw $\frac{2}{12}$.

Female.—The female is considerably smaller. The character of the colouring is similar to that of the male; but the tints are much duller. The black is scarcely inferior in depth or lustre; the grey of the back is tinged with brown; the white on the rump is of less extent, that of the lower tail-coverts less pure; the cheeks, fore-neck, breast and sides are of a dull greyish-brown. The bill is black; the iris brown; the feet brownish, the claws black.

Length to end of tail $5\frac{10}{12}$; extent of wings $9\frac{10}{12}$.

Variations.—In old birds the principal variations are in the red colour of the lower parts, in a few white feathers being rarely seen in the wings, and sometimes in the inner secondaries being tinged with red. In captivity the whole plumage sometimes becomes black or dusky. Individuals also vary considerably in size, the largest being $6\frac{1}{2}$ inches long.

Habits.—The Bullfinch is generally distributed in Britain, occurring in most of our wooded and cultivated districts, but avoiding bare maritime tracts, as well as the northern islands, which are destitute of wood. It is not, however, very common anywhere, and seldom associates with other birds, but keeps in small flocks of a single family. Its flight is quick and undulated, its ordinary note a soft plaintive whistle, its song short and mellow; and during the greater part of the year it lives in the thickets, hedges, and woods, betaking itself occasionally to the fields in their neighbourhood, in search of seeds, and in spring and the early part of summer to gardens and orchards, where it commits great havock among the flower-buds of the fruit-trees and gooseberry-bushes. The only substances which I have found in its crop and stomach were small seeds of various kinds, and particles of quartz; and of the individuals thus examined some were shot in February and April; but, as the species is not common in any place where I have resided in spring, I have not been able to ascertain whether, in destroying buds and flowers, the bird is searching for insects, or feeding on these substances. Judging from the structure of its diges-

tive organs, I should doubt that such crude vegetable matters as buds could afford it sufficient nourishment.

The flight of the Bullfinch is undulated, and capable of being protracted on occasion; but it seldom flies to a great distance when pursued, and in winter may sometimes be seen flitting along the hedges and roads, scarcely evincing more shyness than the Chaffinch. At the same time, it is an active and lively bird, and on account of the beauty of its plumage is a general favourite. Although its natural song is not remarkable for variety or duration, its voice is mellow, and it may be taught to whistle a variety of tunes.

About the beginning of May, it begins to construct its nest, which is rather loosely formed of small dry twigs, with a lining of fibrous roots, and is placed at no great height in a bush, frequently of hawthorn, or on the horizontal branch of a spruce. The eggs, four or five in number, are of a rather broad oval form, nine and a half twelfths long, seven and a half twelfths in their greatest diameter, of a bluish or purplish-white colour, spotted and streaked with purplish-grey and reddish-brown.

Young.—The young, when fledged, have the upper parts greyish-brown, without any black on the head, the lower parts yellowish-brown. At the first moult the plumage assumes its bright colours, but it is not until the second year that the red of the male acquires its full tint.

Remarks.—The Common Bullfinch is said by authors to be of general occurrence in the northern and temperate parts of Europe, residing chiefly in wooded and hilly districts; but to occur in the south only as a bird of passage. With us it is a permanent resident, and it does not appear that its numbers undergo any diminution or augmentation in winter. I have not observed any remarkable differences between individuals, indicating the existence of two species usually confounded, although I have heard it said that such have been met with.

PYRRHULA ENUCLEATOR. THE PINE BULLFINCH.

PINE GROSBEAK. GREATER BULLFINCH.

Loxia Enucleator. Linn. Syst. Nat. I.
Loxia Enucleator. Lath. Ind. Orn. I.
Pine Grosbeak. Mont. Orn. Dict.
Bouvreuil Dur-bec. Pyrrhula Enucleator. Temm. Man. d'Orn. I. 333.
Pine Bullfinch. Pyrrhula Enucleator. Selb. Illustr. I. 334.
Pyrrhula Enucleator. Pine Bullfinch. Jen. Brit. Vert. An. 141.

Male with the head, neck, and fore part of the breast and rump bright red, the back greyish-brown, the feathers edged with red; the wings dusky, with two white bars; the lower parts light grey. Female with the head yellowish-brown, the rump brownish-yellow, the rest of the plumage grey, the wings as in the male.

Male.—The Pine Bullfinch is the largest of our Passerine species, and in colour bears a strong resemblance to the Common Crossbill, which it also resembles in its habits, haunts, and mode of life. In form it presents nothing that essentially differs from the Common Bullfinch, the body being moderately stout, the neck short, the head ovate and rather large. The bill is shortish, very strong, its outlines and sides convex, the tip of the upper mandible considerably longer than that of the lower. The mouth is of moderate width, the upper mandible within deeply and widely concave, with five prominent lines and corresponding grooves, the lower more deeply concave. The tarsi are very short, compressed, with six anterior scutella, and a posterior thin edge; the toes slender and short, the first proportionally stout, the third much longer than the two lateral, which are about equal; the claws rather long, arched, much compressed, laterally grooved, and acute. The plumage is soft, full, and rather blended, the feathers oblong. At the base

of the upper mandible are strong bristly feathers directed forwards. The wings are of moderate length, with seventeen quills; the primaries rounded, the secondaries slightly emarginate; the second and third quills longest, and with the fourth and fifth having their outer webs slightly cut out. The tail is rather long and emarginate.

The bill is dusky, the base of the lower mandible paler; the feet blackish-brown, the claws black. The head, neck, fore part of the breast, and rump, are bright carmine tinged with vermilion; the feathers of the back and the scapulars brownish-grey, edged with red; the bristly feathers at the base of the bill blackish-brown. The wings are blackish-brown; the primaries and their coverts narrowly edged with reddish-white, the secondaries more broadly with white; the secondary coverts and first row of small coverts tipped with white, of which there are thus two bands across the wing, the smaller coverts edged with red. The tail is greyish-brown, the feathers slightly edged with whitish. The greater part of the breast, the abdomen, and the lower tail-coverts, are light grey, the latter with a central dusky streak, and tipped with greyish-white.

Length to end of tail $8\frac{1}{2}$ inches; wing from flexure $4\frac{3}{4}$; tail $3\frac{9}{12}$; bill along the ridge $7\frac{1}{2}$ twelfths, along the edge of lower mandible $\frac{7}{12}$; tarsus $\frac{9}{12}$; first toe $4\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; second toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths; third toe $\frac{8}{12}$, its claw $\frac{4}{12}$; fourth toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths.

Female.—The female has the bill and feet of the same colour as those of the male. The upper part of the head and the hind-neck are yellowish-brown, each feather with a dusky central streak; the rump is dull brownish-yellow; the rest of the upper parts light brownish-grey. The wings and tail are as in the male, the white edgings and tips tinged with grey, the cheeks and throat are brownish-grey; the fore part and sides of the neck, the breast, sides, abdomen and lower tail-coverts ash-grey slightly tinged with brown.

Length to end of tail $8\frac{1}{4}$ inches; wing from flexure $4\frac{1}{2}$; tail $3\frac{9}{12}$; bill along the ridge $7\frac{1}{2}$ twelfths; tarsus $\frac{9}{12}$; middle toe and claw $\frac{11}{12}$.

Remarks.—The above descriptions are taken from two perfect skins from America, obligingly lent for the purpose by Mr. Macduff Carfrae. I have never seen a British specimen, recent or stuffed, of this bird; nor am I aware of the existence of any in public or private collections. Pennant mentions having met with it early in August in the pine forest of Invercauld in Aberdeenshire, and supposed that they breed there; but no subsequent British author speaks of them from personal observation. Yet it is possible enough that the bird may be a permanent resident, although, in the present state of our knowledge, we must consent to assign it the rank of a very rare occasional visitant. It occurs, according to authors, in the northern parts of both continents, and feeds on the seeds of pines, and various other plants, as well as berries.

The young males, at first similar to the females, assume an orange tint at their first moult; in short, exhibit the same gradations as the Crossbills; but as I have not examined them in these states, I deem it expedient to conclude my necessarily brief account of this species with observing that it clearly forms the transition from the Common Bullfinch to the Crossbills, the affinities of which, without so obvious a link, it might be very difficult to determine; and lastly, that M. Temminck has erred in stating that in the Bullfinches the fourth quill is the longest, and that the tail is slightly rounded or even, the second and third quills being the longest in our two species, and the tail distinctly emarginate in both, but more especially in the present.

LOXIA. CROSSBILL.

Bill of moderate length, very strong, subpentagonal and rather deeper than broad at the base, tapering, compressed toward the end, the tips laterally deflected, and curved in opposite directions. Upper mandible larger, its dorsal outline convex, the ridge rather narrow, the sides sloping, the edges sharp, towards the end much inflected, the tip decurved, compressed, worn beneath to a thin edge, slightly deflected to one side, and rather acute. Lower mandible with the angle very short and extremely broad, its dorsal outline convex, the back rounded, the sides rather flattened, the edges sharp, much inflected, with an angular process near the middle, the tip compressed, acute, deflected to one side.

Although the bill is very broad at the base, the mouth is rather narrow; the upper mandible within slightly concave, with a deep central and two shallow lateral grooves; the lower very deeply concave; the palate declinate; the posterior aperture of the nares oblong and papillate. Tongue, Pl. VIII, Fig. 4, *a*, slender, at the base emarginate and papillate, compressed in the middle, horny and concave towards the end. Œsophagus, *a*, *b*, *c*, *d*, rather wide, very thin, with a large dilatation or crop, *b*, on the right side near the middle; proventriculus, *d*, with numerous oblong four-sided glandules. Gizzard, *e*, *f*, *g*, strong, rather small, subrhomboidal, its muscles, *e*, *f*, *g*, distinct; its cuticular lining longitudinally rugous. Intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, shortish, rather wide, with two minute oblong adnate cœca, *l*.

Nostrils basal, in the shallow sinus, rather small, circular, covered over by short reflected bristly feathers. Eyes rather

small; eyelids feathered. External aperture of the ear large, circular; the meatus oblique and narrow.

Head large, roundish; neck short; body ovate. Legs short and strong; tarsus compressed, covered anteriorly with six scutella, posteriorly with two narrow plates meeting at an acute angle; toes of moderate strength; the first stout, the third much longer than the second and fourth, which are nearly equal; claws large, arched, compressed, grooved on the sides, with the tip very acute, the hind one largest.

Plumage soft, rather blended, the feathers ovate, with their filaments separated. At the base of the upper mandible are short bristly feathers directed forwards so as to conceal the nostrils. Wings long, with eighteen quills; the primaries rounded, the secondaries slightly emarginate or retuse, the first, second, and third quills longest. Tail short, emarginate, of twelve moderately broad feathers, which taper obliquely outwards to a rounded point, the lateral considerably curved outwards.

The Crossbills appear to be most nearly allied to the genus Pyrrhula on the one hand, and to Emberiza on the other, although the compression and curvature of the extremities of the mandibles give the bill a singular appearance. The genus is composed of four species, which inhabit the forests of the northern parts of Europe and America, feeding upon the seeds of pines and firs, which they extract from the cones by means of their powerful and curiously constructed bill, the points of which appear to have received their lateral curvature from the force applied in that direction to separate the scales. The hard spoon-shaped tongue seems to be the instrument by which the seeds are then taken up. They are gregarious, and wander about in search of their favourite food, appearing at irregular intervals in places not usually frequented by them.

When the genus Loxia of Linnæus, which included a multitude of thick-billed species, was broken up, the dissevered groups received various generic names, and the original designation was left with the Crossbills, on pretence of its having been applied to them by Brisson, who however had no precise notions as to generic and specific names, and who moreover

was not the inventor of the name, it having been first used by Gesner. That name, which signifies *curved*, although not nearly so appropriate as Crucirostra, I adopt. Wilson, who very properly instituted the genus, employed Curvirostra, a name which is equally applicable to all the Falconine, Strigine, and Psittacine families, as well as to various other genera. As to the specific name *curvirostra*, it could only be admitted so long as there was but a single species having a curved bill in a family composed of birds with the bill straight. All the species of this genus are curvirostral, and therefore they must receive each a name from some other circumstance. One of them, the White-winged, is appropriately named *leucoptera ;* another, having a remarkably strong and short bill, somewhat like that of a parrot, has been designated by the name of *Pytiopsittacus ;* the species common in Europe, and that common in North America, so precisely resemble each other in the forms and colouring of their plumage, that no name can be derived from any thing having reference to it, and as Wilson has named the latter *Americana*, I may take the liberty of naming the former *Europæa*. However, I neither assume any authority in this matter, nor expect that every one will adopt my notions on the subject, my object being merely to enable the reader to distinguish the species of which I treat.

Loxia Pytiopsittacus is said to have been once or twice met with in Britain. *L. europæa* cannot be considered a very rare bird with us, being much more frequently seen than the Hawfinch, although its appearance is irregular, and it has been found to breed with us only in one or two instances. *L. americana* and *L. leucoptera*, are peculiar to the western world ; but a single specimen of the latter, if accounts be correct, has been shot in Ireland.

LOXIA EUROPÆA. THE COMMON EUROPEAN CROSSBILL.

CROSSBILL. SHELD-APPLE.

FIG. 69.

Loxia curvirostra. Linn. Syst. Nat. I. 299.
Loxia curvirostra. Lath. Ind. Orn. I. 370.
Crossbill. Mont. Orn. Dict.
Bec-croisé commun. Loxia curvirostra. Temm. Man. d'Orn. I. 328. III.

Length about seven inches, wing from flexure four, bill from four and a half to six and a half twelfths in height at the base, longer than the tarsus, much curved, the point of the lower mandible seldom reaching so high as the level of the ridge of the upper. Male dull red above, brighter beneath, the rump yellowish-red, the wings and tail dark olive brown. Female greyish-brown tinged with yellow above, the rump yellow, light yellowish-grey beneath, the wings and tail as in the male. Young light brownish-grey, streaked with blackish-brown. Young males brownish-red, or yellowish-red, or wax yellow, or mottled with yellow and red.

THE Common European Crossbill, which is about the size of the Corn Bunting, Emberiza Miliaria, is, like it and the Haw-

finch, Coccothraustes atrogularis, a remarkably stout bird, having a very strong bill, a large head, short thick neck, compact ovate body, short feet of considerable strength, rather long wings, and moderately large tail. As the specific characters and descriptions of this species contained in most of our best works are very inaccurate, I consider it necessary to give a full account of it, drawn up from a great number of recent individuals, and subsequently revised and compared with stuffed skins. Some time ago, having been presented with several fine specimens by my excellent friend, the Reverend Mr. Adam, of Peebles, I imagined them to be much larger than any individuals that I had ever seen, and conjectured that they might possibly belong to the Parrot Crossbill. The description given by M. Temminck of that species agreed with them in part. Thus the bill was very strong, much curved, and the point of the lower mandible did not extend beyond the dorsal outline of the upper; but the bill was only five instead of seven lines in breadth, and it was longer in place of being shorter than the middle toe, that is, excluding the claw. Neither did they agree with his character of the Curvirostra, for the bill was neither long nor feebly curved, although it was about five lines in breadth, and of about the length of the middle toe, the claw included; moreover, the point of the lower mandible was shorter than it ought to be. Having been accustomed to consider this author as generally very correct, I was much disappointed with the insufficiency of his characters in this instance; and when I referred to other authors, I found them equally defective. Mr. Jenyns, for example, had merely manufactured his descriptions from Temminck, without so much as giving measurements. I therefore resolved to collect as many specimens as possible; and fortunately procured, through Mr. Adam and others, about a dozen, to which I have added a great number of skins. The result of my examination is the following description.

Male in November.—The bill is nearly as long as the head, shorter than the middle toe, the claw included, and a little longer than the tarsus, somewhat higher than broad at the base, compressed towards the end; both its outlines arcuate, the tips

curved, much compressed, rather acute, a little deflected laterally in opposite directions, the lower when the bill is closed ascending to the level of the ridge of the upper, which is considerably longer. The upper mandible is towards the point worn to a sharp edge beneath, beyond this part slightly concave, with a deep central and two shallow lateral grooves; the lower very deeply concave, its edges near the middle elevated

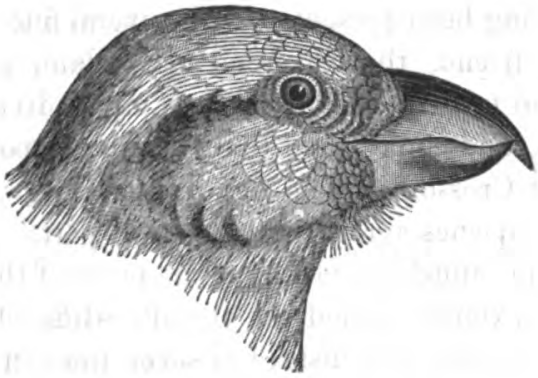


FIG. 70.

into a sharp angular process. The œsophagus, Pl. VIII, Fig. 4, *a*, *b*, *c*, *d*, which is three inches long, very thin, of moderate width, but about the middle dilated on the right side to form a crop, *b*, which, when fully distended, curves round the back of the neck so as almost to reach the other side. It is to be observed, however, that this part is so elastic that a person finding it empty might, without proper examination, suppose it to be but very slightly enlarged. The proventriculus, *d*, is nearly three fourths of an inch long, and is studded with oblong glandules, which are direct, tetragonal, and half a twelfth in length. The stomach, *e*, *f*, *g*, is a strong gizzard, smaller than in birds of nearly the same size belonging to other genera of this family, being only seven twelfths of an inch in its greatest diameter. It is of a subrhomboidal form, with strong transverse lateral muscles, *e*, *f*, inserted into two tendinous spaces, and has a longitudinally rugous epithelium. The intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, which is ten inches long, has in its duodenal portion, *h*, *i*, *j*, a diameter of nearly two twelfths, but towards the cœca of only one twelfth. The rectum, *l*, *m*, *n*, is an inch and a half in length; and the cœca, *l*, are cylindrical, and a twelfth and a half long.

The nostrils are rather small, round, in the fore part of the extremely short nasal membrane, open, but concealed by short reflected feathers. The eyes are rather small; the eyelids feathered. The aperture of the ear is circular, large, being nearly a quarter of an inch in diameter; the meatus oblique.

The legs are short and strong; the tarsi very short, stout, compressed, feathered a short way below the joint, covered anteriorly with six large scutella, behind sharp-edged. The toes are of moderate strength, compressed; the first stronger, rather longer than the two lateral, not taking in the claws, but with its claw about as long as the third; the first has six scutella, the second eight, the third eleven, the fourth nine. The claws are large, arched, compressed, laterally grooved, and taper to a fine point;—in short, are adapted for clinging, like those of the Siskin and Redpoll.

The plumage is moderately full, soft, rather blended; the feathers ovate, with their filaments separated. The wings are long, with eighteen quills; the primaries narrow and rounded, the secondaries rather short and slightly emarginate; the second quill longest, the first scarcely a twelfth shorter, and the third about as much shorter than the first. The tail is rather short and emarginate, the feathers tapering obliquely outwards at the end.

The greater part of the upper mandible, and the ridge and tip of the lower, are dark greyish-brown; the edges of the former and the rest of the latter flesh-coloured. The irides are hazel. The feet are purplish-brown, the claws brownish-black. The feathers of the head, neck, breast, and sides are pale dull vermilion, with an intermixture of grey on the hind-neck, and yellow on the breast; the abdomen greyish-white, the hind part of the sides brownish-grey, the lower tail-coverts greyish-brown, broadly margined with dull white; the middle of the back is dusky red, the hind part bright reddish-yellow; the upper tail-coverts deep brown. The wings and tail are deep brown, the smaller feathers of the former tinged with dull red, the quills and tail-feathers very slightly margined with reddish-yellow; the lower wing-coverts brownish-grey.

Length to end of tail $7\frac{1}{4}$ inches; extent of wings $11\frac{5}{12}$;

wing from flexure $3\frac{10}{12}$; tail $2\frac{1}{2}$, extending one inch beyond the wings; bill in height $\frac{5}{12}$, along the ridge of upper mandible $9\frac{1}{4}$ twelfths, along the edge of lower $\frac{8}{12}$; tarsus $\frac{8}{12}$; first toe $\frac{5}{12}$, its claw $\frac{6}{12}$; second toe $4\frac{1}{2}$ twelfths, its claw $\frac{3}{12}$; third toe $\frac{7}{12}$, its claw $\frac{4}{12}$; fourth toe $4\frac{1}{4}$ twelfths, its claw $\frac{3}{12}$.

Female in November.—The adult female does not differ perceptibly in form or in the texture of its plumage from the male, but its colouring is different. The bill, irides and feet are as in the male. The upper part of the head, the hind-neck, and fore and middle parts of the back, are light yellowish-grey, mottled with dusky brown, the central part of each feather being of the latter colour. The rump is greyish-yellow. The upper small wing-coverts are dusky brown tinged with grey, and slightly margined with the latter; the larger coverts, alula, and quills are blackish-brown, the primaries with a slight edging of yellowish-grey. The tail-feathers are similarly coloured, their upper coverts greyish-brown. The cheeks are brownish-grey, the lower parts dull grey, tinged with yellow, the feathers on the fore-neck and breast with a central faint brown spot; the lower tail-coverts dusky, with broad greyish-white edges.

Length to end of tail $7\frac{1}{4}$ inches; extent of wings $11\frac{7}{12}$; wing from flexure $3\frac{11}{12}$; tail $2\frac{1}{2}$; bill in height at the base $\frac{5}{12}$, in length along the ridge of upper mandible $9\frac{1}{4}$ twelfths, along the edge of lower $\frac{9}{12}$; tarsus $\frac{8}{12}$; middle toe $7\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$.

The individuals described above, and others observed at the same season, were in perfect plumage, indicating the completion of the moult; so that the assertion of this bird's changing its plumage in winter is of a piece with the other fables told of it. Specimens examined in February and March 1836, shewed no appearance of new plumage. A specimen peculiarly interesting, as it shews the summer plumage, with sufficient remains of that of winter to demonstrate that the moult takes place in the usual manner, is now before me.

Male in Summer.—The changes which have taken place in

the plumage, in consequence of friction and the action of the weather, are the abrasion of the tips and edges of the feathers, and the fading of the tints. The red has assumed a paler tint on the head, while on the back it has become darker, the disappearance of the tips of the barbules causing more of the brown of that part to be seen. On the rump it is also lighter, and on the fore-neck, breast, and sides is intermingled with greyish-yellow, the part of the feathers next the tip being of that colour. The dark brown of the wings has become considerably lighter, and their red edgings have faded to greyish-yellow. The following are the measurements of an individual in this state.

Length to end of tail $7\frac{1}{2}$ inches; extent of wings $11\frac{9}{12}$; wing from flexure $4\frac{1}{12}$; tail $2\frac{10}{12}$; bill in height at the base $6\frac{1}{2}$ twelfths, in length along the ridge of upper mandible $10\frac{1}{2}$ twelfths, along the edge of lower $9\frac{1}{2}$ twelfths; tarsus $8\frac{1}{2}$ twelfths; hind toe $4\frac{1}{2}$ twelfths, its claw $\frac{6}{12}$; second toe $4\frac{1}{2}$ twelfths, its claw $3\frac{1}{4}$ twelfths; third toe $\frac{7}{12}$, its claw $\frac{5}{12}$; fourth toe $4\frac{3}{4}$ twelfths, its claw $\frac{5}{12}$.

Female in Summer.—At this season the fading of the plumage is more conspicuous in the female, which exhibits a bleached appearance. The general tint of the upper parts is dull greyish-brown, the central parts of the feathers only slightly darker; the rump yellowish-grey; the wings and tail paler than in winter; the lower parts dull yellowish-grey, the tail-coverts as in winter.

Length to end of tail $7\frac{2}{12}$; extent of wings $11\frac{9}{12}$; wing from flexure 4; tail $3\frac{8}{12}$; bill in height at the base $6\frac{3}{4}$ twelfths; in length along the ridge of upper mandible $10\frac{1}{2}$ twelfths; along the edge of lower mandible $\frac{10}{12}$; tarsus $\frac{8}{12}$; hind toe $4\frac{1}{2}$ twelfths, its claw $5\frac{1}{2}$ twelfths; middle toe $\frac{8}{12}$, its claw $4\frac{1}{2}$ twelfths.

These individuals are what may be called extra-sized, being the largest that I have seen.

Variations.—The variations which I have observed in adult birds are not remarkable, excepting in regard to size, and especially that of the bill, which varies considerably in length, curvature, and the degree of elongation of the lower mandible.

The largest bill which I have seen was six and three-fourths twelfths in height at the base, the smallest four and a half twelfths. In some individuals the curvature of the dorsal outlines of the mandibles is slight, in others very great. Thus, in a specimen in my possession, on drawing a line from the ridge of the upper mandible at the base to the tip, and taking its perpendicular distance to the highest point of the arch, I find it one eighth of an inch, while in another it is two twelfths, and in a third very nearly three twelfths. The distance from the angle of the mouth to the tip of the upper mandible in a right line varies from eight to ten twelfths; the points of the mandibles are more or less compressed and worn; from the latter cause, the lower sometimes reaches the level of the ridge of the upper, but very frequently falls short of it, and sometimes extends a little beyond it. The latter happens in young individuals only, the former in old birds. But a character derived from such a circumstance is obviously of no use. The lower mandible in some individuals is deflected to the right, in others to the left. Mr. Jenyns gives the entire length as "six inches four lines," but I have never seen an individual so small; and it is probable, as he gives no other measurements, that he has not examined specimens, at least recent unstuffed birds, to which conclusion I am the more led as his description of the Common and Parrot Crossbills is evidently translated and condensed from that of M. Temminck.

The following table exhibits the dimensions of a series of specimens carefully measured.

	M.	F.	M.	F.	M.		
Length.....	$7\frac{1}{4}$	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{2}{12}$	$6\frac{3}{4}$	$6\frac{3}{4}$	$6\frac{1}{4}$
Wings.....	$11\frac{5}{12}$	$11\frac{7}{12}$	$11\frac{9}{12}$	$11\frac{9}{12}$	$11\frac{1}{2}$	$11\frac{3}{4}$	$11\frac{1}{2}$
Depth of bill...	$\frac{5}{12}$	$\frac{5}{12}$	$\frac{6\frac{1}{2}}{12}$	$\frac{6\frac{1}{2}}{12}$	$\frac{5\frac{1}{2}}{12}$	$\frac{4\frac{1}{2}}{12}$	$\frac{5}{12}$
Upper mandible	$\frac{9\frac{1}{4}}{12}$	$\frac{9\frac{1}{4}}{12}$	$\frac{10\frac{1}{2}}{12}$	$\frac{10\frac{1}{2}}{12}$	$\frac{9\frac{1}{2}}{12}$	$\frac{9}{12}$	$\frac{6}{12}$
Lower mandible	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{9\frac{1}{2}}{12}$	$\frac{10}{12}$	$\frac{8}{12}$	$\frac{8\frac{1}{2}}{12}$	$\frac{8}{12}$
Wing from joint	$3\frac{10}{12}$	$3\frac{11}{12}$	$4\frac{1}{12}$	4	4	$3\frac{11}{12}$	$3\frac{3}{4}$
Tail.....	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{10}{12}$	$3\frac{8}{12}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$
Tarsus.....	$\frac{8}{12}$	$\frac{8}{12}$	$\frac{8\frac{1}{2}}{12}$	$\frac{8}{12}$	$\frac{8}{12}$		$\frac{8\frac{1}{2}}{12}$
First toe.....	$\frac{5}{12}$		$\frac{4\frac{1}{2}}{12}$	$\frac{4\frac{1}{2}}{12}$	$\frac{5}{12}$		$\frac{5}{12}$

	M.	F.	M.	F.	M.	
Its claw	$\frac{6}{12}$		$\frac{6}{12}$	$\frac{5\frac{1}{2}}{12}$	$\frac{5}{12}$	$\frac{5}{12}$
Second toe	$\frac{4\frac{1}{2}}{12}$		$\frac{4\frac{1}{2}}{12}$		$\frac{4\frac{1}{2}}{12}$	$\frac{5}{12}$
Its claw.....	$\frac{3}{12}$		$\frac{3\frac{1}{4}}{12}$		$\frac{3}{12}$	$\frac{3}{12}$
Third toe.....	$\frac{7}{12}$	$\frac{7}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{7}{12}$	$\frac{8}{12}$
Its claw	$\frac{4}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{4\frac{1}{2}}{12}$	$\frac{4}{12}$	$\frac{4\frac{1}{2}}{12}$
Fourth toe.....	$\frac{4\frac{1}{4}}{12}$		$\frac{4\frac{3}{4}}{12}$		$\frac{4\frac{1}{4}}{12}$	$\frac{5\frac{1}{4}}{12}$
Its claw	$\frac{3}{12}$		$\frac{3}{12}$		$\frac{3}{12}$	$\frac{3}{12}$

I have been induced to be thus particular because a person obtaining a very large individual might, on consulting the descriptions given by authors, be induced to consider it as belonging to L. Pytiopsittacus.

Habits.—Very little with respect to the habits of this Crossbill had until very recently been given by British writers beyond what is stated by Aldrovandus and Willughby, who inform us that it nestles in January and February on fir trees, on the seeds of which it chiefly feeds; is plentiful all the year round in Germany, Bavaria, Sweden, and Norway; is said to split an apple with one or two blows of its bill, in order to get at the seeds, and is thus very injurious to gardens and orchards; has a tolerably pleasant song, and contrary to the nature of other birds, sings in winter only; and lastly, when kept in a cage, creeps upwards and downwards in the manner of a Parrot.

Montagu confirms the fact of its sometimes visiting orchards in autumn, and splitting the apples. "In the year 1791," he states, "we were informed by a bird-catcher at Bath, that he had taken a hundred pairs in the month of June and July. The greater part were males, which were generally sold for five shillings each. Many are taken with a call-bird and bird-lime; others are caught by a horse hair noose fixed to a long fishing-rod. So intent are these birds on picking out the seeds of the cone, that they will suffer themselves to be taken by the noose being put over the head."

The Crossbills make their appearance with us at irregular periods, in different parts of the country, generally confining themselves to the fir plantations, in which they find their fa-

vourite food. Several years may elapse without their being heard of in a large district, when suddenly they arrive often in great flocks; and this at no particular season, for I have received recent specimens in November, February, March, the beginning of June, and October, and have seen them flying about in August.

In the autumn of 1821, when walking from Aberdeen to Elgin, by the way of Glenlivat and along the Spey, I had the pleasure of observing, near the influx of a tributary of that river, a flock of several hundreds of Crossbills busily engaged in shelling the seeds of the berries which hung in clusters on a clump of rowan-trees. So intent were they on satisfying their hunger that they seemed not to take the least heed of me; and, as I had not a gun, I was content with gazing on them, without offering them any molestation. They clung to the twigs in all sorts of positions, and went through the operation of feeding in a quiet and business-like manner, each attending to his own affairs, without interfering with his neighbours. It was indeed a pleasant sight to see how the little creatures fluttered among the twigs, all in continued action, like so many bees on a cluster of flowers in sunshine after rain. Their brilliant colours, so much more gaudy than those of our common birds, seemed to convert the rude scenery around into that of some far distant land, where the Redbird sports among the magnolia flowers. In that year, flocks of these birds were observed in various parts of Scotland; but although I have obtained numerous specimens in a recent state, I have not since had an opportunity of seeing living individuals.

Their ordinary food consists of the seeds of the Scotch fir, larch, and other pines; and in the crops of all those which I have examined, I have found shelled seeds apparently of the first of these trees. In the gizzards were also sand, and small particles of quartz, to obtain which they must of course descend to the ground. Wilson and Audubon state that the American Crossbill often alights, during deep snow, before the door of the hunter, and around his house, to pick off the clay with which the logs are plastered, doubtless in search of sand or pupæ, and not to use it as food, as these authors seem to

think. While feeding they keep up a continued shrill chatter, and in flying from one place to another emit a sharp note. Their flight is undulated, like that of the Buntings.

M. Temminck states that they nestle at all seasons of the year, in the forks of branches, laying four or five eggs of a greenish-grey, of which the large end is marked with a circle of spots, lines, and dots of a red-brown.

A very interesting account of the manners of this species, by J. D. Hoy, Esq. of Stoke Nayland, Suffolk, is published in the number for January 1834 of Loudon's Magazine of Natural History.—" From October 1821 to the middle of May 1822, Crossbills were very numerous in this county, and, I believe, extended their flights into many parts of England. Large flocks frequented some plantations of fir trees in this vicinity from the beginning of November to the following April. I had almost daily opportunities of watching their movements; and so remarkably tame were they, that, when feeding on fir trees not more than fifteen or twenty feet high, I have often stood in the midst of the flock, unnoticed and unsuspected. I have seen them, hundreds of times, when on the larch, cut the cone from the branch with their beak, and holding it firmly in both claws, as a hawk would a bird, extract the seeds with the most surprising dexterity and quickness. I do not mean to assert this to be their general habit; but it was very frequently done when feeding on the larch. I have never seen them attempt the like method with cones of the Scotch or other species of pine, which would be too bulky for them to manage. Their method with these, and, of course, most frequently with the larch, was to hold firmly on the cone with their claws; and, while they were busily engaged in this manner, I have captured great numbers; many with a horse-hair noose, fixed to the end of a fishing-rod, which I managed to slip over the head when they were feeding, and by drawing it quickly towards the body, I easily secured them; others I took with a limed twig, fixed in such a manner in the end of the rod, that on touching the bird it became immediately disengaged from it, adhered to the feathers, rendered the wings useless, and caused the poor bird to fall perfectly helpless on the

ground. In this manner, in windy weather, I have taken several from the same tree, without causing any suspicion of danger. On warm sunny days, after feeding a considerable time, they would suddenly take wing, and, after flying round for a short time in full chorus, alight on some lofty tree in the neighbourhood of the plantations, warbling to each other in low pleasing strains; they would also fly from the trees occasionally for the purpose of drinking, their food being of so dry a nature.

"In captivity they were quickly reconciled, and soon became very familiar. As, at first, I was not aware what food would suit them, I fixed branches of the larch against the sides of the room in which I had confined them, and threw a quantity of the cones on the floor. I found that they not only closely searched the cones on the branches, but, in a few days, not one was left in the room that had not been pried into. I gave them canary and hemp seed; but, thinking the cones were both amusement and employment, I continued to furnish them with a plentiful supply. I had about four dozen of them; and frequently, whilst I have been in the room, they would fly down, seize a cone with their beak, carry it to a perch, quickly transfer it to their claws, and in a very short time empty it of its seeds, as I have very many times witnessed, to my surprise and amusement. As the spring advanced, the male birds in the plantations were frequently singing on the tops of the firs, in low but very agreeable notes; yet they continued in flocks, and were seen in some parts of the county until the beginning of June. I had hopes of their breeding in confinement, and I accordingly kept them in different rooms, fixing the tops of young fir trees on the floor, and against the walls, and supplying them with as great a variety of food as possible; but all to no purpose, as neither those I had confined in this manner, nor those in cages, ever shewed any inclination to breed. They are amusing birds in confinement, as they have some of the habits of the parrot tribe; climbing about the cage with both beak and claws."

Young.—The young when fledged are of a dull greenish-

grey colour, both the upper and lower parts strongly marked with oblong blackish-brown spots, so as to bear a considerable resemblance to the plumage of the Corn Bunting. The rump yellowish. The wings and tail are blackish-brown.

I have reason to suspect that so long as they remain in the nest, the tips of their mandibles are not laterally deflected.

Progress toward Maturity.—The females vary less than the males as they advance in age. The colours become lighter and more tinged with yellow; the rump of a purer tint; and the dark central markings on the feathers gradually fade. The males after the first moult, are, according to M. Temminck, "of a dull red, yellowish-red, greenish-yellow, or dull yellow, shaded with reddish." I have seen individuals of all these tints, but am unable directly to trace the changes which the males undergo, although, judging from analogy, they are probably regular, and not of the miscellaneous character above described.

It appears to me that the males after the first moult have all their feathers tipped with greenish-yellow, that colour being more decided on the rump; the quills and tail-feathers narrowly edged with the same. At the next moult the feathers are tipped with red, the wings and tail edged with the same, the rump yellowish-red. Individuals killed during the change, of course exhibit a varying mixture of yellow and red feathers. At the third moult the red is much brighter. Indeed I feel confident, in consequence of having minutely examined a great number of specimens, that the above is the order of change.

The transition from large and strong-billed individuals of this species to the Loxia Pytiopsittacus, is so direct that I am in great doubt as to the latter being distinct. Not having specimens to compare in all stages, I am obliged to take up the species on the authority of others.

LOXIA PYTIOPSITTACUS. THE PARROT CROSSBILL.

Loxia curvirostra major. Lath. Ind. Orn. I. 371.
Bec-croisé Perroquet ou des Sapins. Loxia Pytiopsittacus. Temm. Man. d'Orn. I. 324. III.

Length about eight inches, wing from flexure four and a third, bill seven twelfths in height at the base, of about the same length as the tarsus, extremely gibbous, its outlines very convex, the points short, that of the lower slightly ascending. Colours and proportions the same as of Loxia europæa.

The only specimen of this alleged species that I have seen is one, supposed to be Scottish, in the museum of the University of Edinburgh. It is in the yellowish plumage considered as designative of the young male, and although it has been many years on its perch, is still in excellent condition, having been originally full-feathered, although damaged in one of the wings and not very neatly stuffed. At first sight it seems very distinct from the common species, on account of the great size and thickness of its bill, especially when a small-billed specimen is placed beside it; but on comparing it with large individuals, such as the four described in the preceding pages, its right to be considered distinct is not so apparent. The curvature of the mandibles, however, is much greater, and all the parts are somewhat larger. The wings and tail are precisely similar in form, and the feathers of the body are of the same texture. The tarsi and toes are somewhat larger, but have the same number of scales. The bill is dusky-brown, the edges of the upper, and part of the lower mandible light horn-colour. The general colour of the upper parts is dull greenish-yellow, lighter on the rump, the

wings and tail deep brown; in short, precisely similar in this respect to a fine specimen of the Common Crossbill beside it.

Length to end of tail 8 inches; wing from flexure $4\frac{5}{12}$; tail $2\frac{10}{12}$; bill in height at the base $7\frac{1}{2}$ twelfths, in length 1, edge of lower mandible $\frac{10}{12}$; tarsus $\frac{9}{12}$; hind toe $5\frac{1}{2}$ twelfths, its claw $\frac{6}{12}$; middle toe $\frac{8}{12}$, its claw $\frac{5}{12}$.

Mr. Selby has figured and described, in his well-known Illustrations, a well-stuffed specimen, "procured by Sir William Jardine from Mr. D. Ross, gunmaker in Edinburgh, to whom it had been sent from Ross-shire, along with several others." The bill is described as "very strong, five eighths of an inch deep, shorter than the middle toe," &c. In the figure it is seven twelfths deep at the base, and about eleven twelfths long. This bird I admit to be of the species, on account of its great size and the shortness of the tips of the mandibles; but after all, it seems to me scarcely doubtful that L. europæa and L. Pytiopsittacus are the same bird. There is no account of other specimens obtained in Britain existing in any collection there; and any thing else relative to the Parrot Crossbill, considered as British, is merely conjectural.

Having embraced the opportunity of comparing our Crossbills with those of America, I may be permitted to say a few words respecting the latter. Wilson first described as a species, to which he gave the name of *Curvirostra americana*, the bird which Bonaparte afterwards pronounced identical with the Common Crossbill of Europe. It will be seen, however, from his description that it is greatly inferior in size, being only $5\frac{3}{4}$ inches long, although the colours are similar to those of the European species. As this species has not been minutely described unless with reference to colour, I subjoin an account of a stuffed male now before me.

Bill about the length of the head, stout, its outlines arched in a much less degree than in the European species, the tips curved, much compressed, rather acute, a little deflected late-

rally in opposite directions, the lower, when the bill is closed, ascending beyond the level of the ridge of the upper, which is much longer. Compared with the bill of European birds, it is slender, its outlines less curved, its sides more convex. The legs are short and strong; the tarsi very short, stout, compressed, feathered a short way below the joint, covered anteriorly with six large scutella, behind sharp-edged. The toes are precisely as in the European species, and their scutella six, eight, eleven, and nine, as in it. The plumage is in all respects similar. The wings long, with eighteen quills; the primaries narrow and rounded, the secondaries rather short and slightly emarginate; the second quill longest, the first scarcely a twelfth shorter, the third slightly longer than the first. The tail also is exactly similar.

Length to end of tail 6 inches; bill in depth at the base $4\frac{1}{2}$ twelfths, along the ridge of upper mandible $8\frac{1}{2}$ twelfths, along the edge of lower $\frac{8}{12}$; wing from flexure $3\frac{3}{4}$; tail $2\frac{2}{12}$; tarsus $7\frac{1}{2}$ twelfths; hind toe $4\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; second toe $4\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$; third toe $\frac{7}{12}$, its claw $\frac{4}{12}$; fourth toe $4\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$.

Fig. 71. is an outline, half-sized, of the head of *L. Pytiopsittacus;* Figs. 72. and 73. of large specimens of *L. europæa;* Figs. 74. and 75. of smaller-billed individuals of the same species; and Fig. 76. of *L. americana.*

Fig. 71.

Fig. 72.

Fig. 73.

Fig. 74.

Fig. 75.

Fig. 76.

The differences between the American Crossbill and the common European species are therefore merely in degree, the former being much smaller, with a proportionally more

slender bill. The same remark applies to the common European and Parrot Crossbills. The plumage of all is alike, their wings and tail are exactly similar, their colours the same. The bill is extremely strong in one, slender in another, and intermediate in the third. In the American birds the point of the lower mandible extends beyond the ridge of the upper; in the common European species, it very rarely extends beyond it, frequently reaches its level, but more commonly falls short of it; and in the Parrot Crossbill it is short. The manners, food, and other circumstances of all the species are similar. It is therefore not inconsistent with reason to consider them merely as races or varieties of a single species. On the other hand, it may be said, may not species sometimes differ merely in size? They may perhaps; but in most cases in which species intimately related have been confounded, differences have been detected in the form and colour of the feathers.

EMBERIZANÆ.

BUNTINGS AND ALLIED SPECIES.

The family of Emberizanæ is composed of species so intimately allied to the Passerinæ, that one might reasonably hesitate in separating the two groups as distinct families. Yet they have clearly as much right to stand apart from the Passerinæ as the Tanagranæ, which many authors place in their systems at a very great distance. The only genera belonging to this family with which I am acquainted are Emberiza and Plectrophanes; but it is probable that several others may be added, when more attention is paid to the peculiar characters by which it is distinguished.

The chief characteristics of the Emberizanæ as compared with those of the Passerinæ, may be seen by inspecting Figs. 6, 7, 8, and 9. of Pl. VIII, the former two representing the head of a Bunting, the latter that of a Linnet. In the Bunting, the upper mandible seems as if it had been cut out from beneath by an angular section, while the lower is proportionally enlarged so as to fill up the deficiency thus left. The gape-line in consequence is much bent, ascending for half its length, and then being straight to the end. In the Linnet, although there is a slight deflection of the gape-line, the upper mandible is broad, convex, and nearly straight-edged. In the Bunting it is very narrow, with inflected edges. Again, in the Linnet and all the Passerinæ the upper mandible and palate are broadly and deeply concave, whereas in the Buntings they are narrow, flat, and at their junction have a prominent hard knob. Fig. 7. shews the roof of the mouth in the Bunting; Fig. 9. the same part in the Linnet. In the former, the horny part is short,

narrow and flat; in the latter large and concave; in the one case, there is a prominent hard part at the commencement of the soft palate, in the other none. Whether these characters be sufficient to constitute a family distinction, or merely that of a group or subdivision of the same family, may be questioned. But the Tanagranæ, which are generally held to occupy the rank of a family, differ much less from the Passerinæ; for the circumstance of their having a notched mandible is of comparatively slight importance. The general characters of the Emberizanæ then are the following:

The bill is short, stout, conical, its sides convex; the upper mandible smaller and narrower, its dorsal outline nearly straight, its sides convex, its edges inflected, the tip acute; the lower mandible with the angle short, broad, and rounded, the dorsal outline nearly straight, the back rounded, the sides convex, the edges sharp and much inflected. The gape-line ascends obliquely for nearly half its length, and is then direct. Internally the upper mandible is very narrow, not concave, but having a hard knob generally of an oblong form, and towards the end flat, with three prominent lines and four grooves. The lower mandible is very deeply concave. The tongue is sagittate and denticulate at the base, compressed, deep, with two bristly points. The posterior aperture of the nares is linear. The pharynx is of moderate width. The œsophagus, Pl. VIII, Fig. 2, *a*, *b*, *c*, *d*, is dilated on the middle of the neck into a crop, *b*, lying on the left side; the proventriculus, *d*, is oblong and studded with oblong or cylindrical glandules. The stomach, *e*, *f*, *g*, is a strong gizzard, roundish, compressed, with two powerful lateral muscles, *e*, *f*, a distinct lower muscle, *g*, and central tendinous spaces. The intestine, *h*, *i*, *j*, *k*, *l*, *m*, *n*, is of moderate length, its duodenal portion, *h*, *i*, *j*, wider. The cœca, *l*, are very small, adnate, and cylindrical. In all essential respects these organs are similar to those of the Passerinæ, which is also the case with the skeleton and the dermal or tegumentary system, the wings being of ordinary length, with the first, second, and third quills longest, the tail generally more or less emarginate.

These birds are in certain respects intermediate between the

Passerinæ and Alaudanæ. The genus Plectrophanes has the bill intermediate between those of the Linariæ and Emberizæ, and in the form of the wings resembles the Larks, to which it further manifests an affinity by having the hind claw elongated and little curved. But the Larks, although some of them have the bill strong, and thus resemble the Emberizanæ and Passerinæ, yet generally have that organ much more slender and less conical, while in other respects they are most intimately connected with the Pipits, which, again, are allied to the Wagtails. Further, the Larks have the digestive organs similar to the Thrushes, Pipits, and other slender billed birds, inasmuch as they are destitute of a crop, as may be seen in Fig. 5. of Pl. VIII, which represents the intestinal canal of the Field Lark, Alauda arvensis. For these reasons, and others which will afterwards be given, I think they ought not to be associated with the Deglubitores. Indeed, although some of them feed much on seeds, they are not huskers, but swallow their food unpeeled.

Our Buntings are so few that it is scarcely necessary to mention the circumstances in which they agree as to habits, further than that in most respects they resemble the Passerinæ, but are more strictly terrestrial. They have a strong, undulated, and rather rapid flight; move on the ground by short leaps; frequent the open fields, retreating to trees and bushes when disturbed, and at night reposing, some on the ground, others on plants, or in bushes. The nest is rather bulky, deep, and compact, placed on the ground, or in bushes. The eggs vary from four to six, and are spotted, clouded, or lined. The young are born blind, and the males generally assume a different colour from the females. These birds are generally distributed over the country, frequenting in winter the open fields in large flocks.

SYNOPSIS OF THE BRITISH GENERA AND SPECIES.

GENUS I. EMBERIZA. BUNTING.

Bill short, conical, the upper mandible very narrow, and having a compressed angular knob beneath; the gape-line much deflected at the base; wings of moderate length, the second quill longest; claws extremely compressed, rather long, arched.

1. *Emberiza Miliaria. Corn Bunting.* Upper parts light yellowish-brown, streaked with black; fore-neck and sides pale yellowish-grey, marked with triangular black spots.

2. *Emberiza Citrinella. Yellow Bunting.* Back and wings bright red, streaked with black; male with the head and throat yellow, the feathers of the upper part tipped with black; female with the yellow of the head obscured by dusky and brown.

3. *Emberiza Cirlus. Cirl Bunting.* Back and wings bright red, streaked with black; male with the head and throat black, a yellow band over the eye, and another beneath it; female with the head greenish-brown, streaked with black.

4. *Emberiza Schœniculus. Reed Bunting.* Back chestnut, streaked with black; male with the head and throat black, and a white line on each side from the lower mandible down the neck; female with the head of the same colour as the back.

5. *Emberiza Hortulana. Ortolan Bunting.* Head and neck greenish-grey, spotted with dusky; throat, space around the eye, and a band from the bill downwards, yellow.

GENUS II. PLECTROPHANES. LARK-BUNTING.

Bill short, conical, the upper mandible narrow, and having a compressed slightly prominent knob beneath; the gape-line deflected at the base; wings rather long, the first quill longest; claws slender, slightly arched, deeply grooved on the sides, that of the hind toe elongated.

Plectrophanes nivalis. Snow Lark-Bunting, or *Snowflake.* Male with the top of the head, cheeks, and a band on the breast, light reddish-brown, the lower parts, small wing-coverts, and a patch on the quills and their coverts, white. Female with the head dark chestnut, the lower parts white, a broad band of reddish on the breast, the small wing-coverts dusky. In summer the plumage chiefly black and white.

Plectrophanes Lapponica. Lapland Lark-Bunting. Male with the top of the head and fore-neck black, the feathers edged with greyish-white; a white line over the eye; wings chestnut, with two white bands. Female with the head reddish grey, spotted with black. In summer the black parts of a pure tint.

EMBERIZA. BUNTING.

Bill short, strong, subpentagonal, and about as broad as deep at the base, conical, compressed towards the end. Upper mandible smaller and narrower, its dorsal outline slightly convex, the ridge rounded, the sides convex, the edges sharp and inflected, the tip scarcely deflected. Lower mandible with the angle very short, broad, and rounded, the dorsal outline slightly convex, the back rounded, the sides convex, the edges sharp and very much inflected. Gape-line ascending obliquely for nearly half its length, then direct.

The mouth is rather narrow; the upper mandible internally has a sudden bend about the middle, anterior to which is a prominent knob, towards the end flat, with three prominent lines and four grooves; the lower mandible very deeply concave. The tongue is sagittate and denticulate at the base, fleshy, compressed, and terminates in two short bristly points. The œsophagus is of moderate width, dilated about the middle; the proventriculus oblong. Gizzard roundish, compressed, with very strong lateral muscles, a prominent inferior muscle, and dense, tough, and rugous epithelium. Intestine of moderate length, wider in its duodenal portion, and having two very small cœca near its extremity.

Nostrils oblong, in the lower and fore-part of the short nasal depression, and having a horny arched operculum. Eyes of moderate size; eyelids feathered. Aperture of ear broadly elliptical, rather large.

Body moderately stout; neck short; head rather large. Legs rather strong, of ordinary length, or shortish; tarsus

compressed, covered anteriorly with seven scutella, laterally and posteriorly with two plates meeting at a very acute angle; toes covered above with long scutella, papillar beneath, the second and fourth nearly equal, the third much longer, the first considerably shorter than the third, which is united with the fourth as far as the second joint; claws arched, compressed, acute, indistinctly grooved on the sides.

Fig. 77.

Plumage more or less blended, the feathers ovate or lanceolate, with a long slender plumule of from five to eight filaments. Wings of ordinary length, semicordate, rounded, the quills eighteen; the second and third longest. Tail of moderate length, or rather long, straight, more or less emarginate.

M. Lesson remarks of the Buntings that they "live in the woods, on seeds furnished with a pericarp, generally a horny one; they nestle in trees. The females have duller colours than the males. M. Cuvier," he adds, "depicts them in a word by saying that they are granivorous birds which possess little prudence, and fall into all the snares that are set for them." The only correct character here given is that of the colours of the females being duller, but it is common to all the Deglubitores and many groups besides. The rest is trash. Do the Corn Bunting and the Reed Bunting nestle in woods, or even bushes? And as to their imprudence, they are not a whit more easily caught than the Finches, Sparrows, Linnets, or Larks.

The distinction between this genus and Plectrophanes is very slight, insomuch that the latter might with propriety be considered merely a section of it. Species belonging to it occur in all parts of the world. In Britain there are four: the Corn Bunting, the Yellow Bunting, the Cirl Bunting, and the Reed Bunting; to which, as a very rare straggler, may be added the Ortolan.

EMBERIZA MILIARIA. THE CORN BUNTING.

BUNTING. COMMON BUNTING. SPARROW. SPARIG. GEALAG BHUACHAIR.

FIG. 78.

Emberiza Miliaria. Linn. Syst. Nat. I. 308.
Emberiza Miliaria. Lath. Ind. Orn. I. 402.
Bunting. Mont. Orn. Dict.
Bruant Proyer. Emberiza Miliaria. Temm. Man. d'Orn. I. 306.
Common Bunting. Emberiza Miliaria. Selb. Illustr. I. 286.
Emberiza Miliaria. Common Bunting. Jen. Brit. Vert. An. 130.

Upper parts light yellowish-brown, each feather blackish-brown along the shaft; lower parts pale yellowish-grey, each feather of the fore-neck tipped with a triangular spot of brownish-black.

MALE.—The Corn Bunting is a remarkably full and robust bird, which in colour bears a most intimate resemblance to the Field Lark. Its bill is in all respects as described in the generic character, as are the feet and organs of sense. The plumage is ordinary, rather compact, the feathers ovate; the wings rather short; the primary quills broad, and rounded, the second longest, the third next, the first and fourth about equal; the secondaries broad, slightly emarginate, excepting the inner, which are tapering; the tail slightly emarginate.

The œsophagus is three inches long, its ordinary diameter two twelfths, but on the neck dilated to four twelfths. The gizzard is elliptical, compressed; its greatest diameter three fourths of an inch, its cuticular lining thick and rugous. The intestine, which is nine inches long, has a diameter of three twelfths in its duodenal portion. The cœca are two and a half twelfths long, cylindrical, and adnate.

The upper mandible is dark brown, excepting on the edges towards the base, which, with the whole lower mandible, are ochre-yellow. The iris is dusky brown. The feet are ochre-yellow tinged with red; the toes dusky yellow; the claws deep brown. The general colour of the plumage above is light yellowish-brown, on the head tinged with reddish, on the rump with grey, each feather blackish-brown along the shaft towards the extremity. The quills, alula, and larger wing-coverts are dusky brown, margined with pale yellowish-brown; the first row of smaller coverts dark-brown, tipped with light yellowish-brown. The cheeks are of the same colours as the upper part of the head. The edges of the eyelids and a faint line over the eye pale yellowish-grey, of which colour are the throat and a patch under the ear-coverts. The general colour of the lower parts is pale yellowish-grey, the fore part of the neck having each feather tipped with a triangular spot of brownish-black; the spots being larger and darker along a line on each side of the neck. On the fore part of the breast and on the sides the spots are elongated and fainter. The abdomen and lower tail-coverts are unmarked, but the latter are dusky on the shafts. The tail-feathers are dusky brown, margined and tipped with pale yellowish-grey, the outermost quill with an obscure oblique band of pale brown.

Length to end of tail $7\frac{1}{4}$ inches; extent of wings 13; bill along the ridge of upper mandible $5\frac{1}{2}$ twelfths, along the edge of lower mandible $\frac{8}{12}$; wing from flexure 4; tail $2\frac{3}{4}$; tarsus $\frac{11}{12}$; first toe $5\frac{1}{2}$ twelfths; its claw $5\frac{1}{2}$ twelfths; second toe $\frac{6}{12}$, its claw $2\frac{1}{2}$ twelfths; third toe $\frac{10}{12}$, its claw $3\frac{1}{2}$ twelfths; fourth toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths.

Female.—The female resembles the male so closely that I

am unable to point out any distinctive marks. The œsophagus is three inches long; the gizzard three fourths in diameter; the intestine ten inches long; the cœca two and two and a half twelfths, and an inch and a quarter from the vent.

Length to end of tail $7\frac{1}{4}$ inches; extent of wings $12\frac{3}{4}$; bill along the ridge $\frac{3}{4}$, along the edge of lower mandible $\frac{8}{12}$; wing from flexure 4; tail 3; tarsus $\frac{11}{12}$; first toe $\frac{5}{12}$, its claw $\frac{5}{12}$; second toe $\frac{6}{12}$, its claw $2\frac{1}{2}$ twelfths; third toe $\frac{10}{12}$, its claw $2\frac{1}{2}$ twelfths; fourth toe $\frac{1}{2}$, its claw $\frac{5}{12}$.

Variations.—The plumage is said to be sometimes white, and I have seen it variegated with that colour. It is in winter, when the feathers are perfect, that the tints are deepest; and in summer a considerable change has taken place, from the fading of the colours and the abrasion of the tips, in consequence of which many of the spots on the lower parts are obliterated. The colours thus, as in other birds of the class, tend to become purer and lighter towards the period of change.

Habits.—The Common Bunting, which is a permanent resident, is generally distributed, although it is not very common in many districts. It frequents open pastures, grass and corn fields, and in its distribution seems peculiar to cultivated land or its vicinity, scarcely ever appearing on moors or on mountain pastures. It is more abundant in the outer Hebrides than in any other part of the country that I have visited, and there is generally known by the name of Sparrow. Towards the end of autumn the Buntings collect into small flocks, and search the stubble for seeds of various kinds, especially oats and wheat. Frequently at this season they sit close, like the Larks, and allow a person to come near before they fly off; but for the most part they are shy and not easily approached. In winter, especially in cold or boisterous weather, they appear near houses, and mingle in the stack-yards with Sparrows, Yellow Buntings, Larks, and other small birds; but they are not so gregarious as these species, and are very seldom met with in large flocks. Their flight is strong, capable of being long protracted, undulated, being performed by alternate beatings and

cessations, but heavier and more steady or direct than that of the Yellow Bunting. When surprised in a field, or roused from a corn-yard, they fly off with a direct rapid motion; but often when an individual, which has been resting on a twig or wall-top, starts away, it allows its feet to hang for a short time before it commences its bounding flight. I believe there is no other bird of the order with us that has this habit.

The common note of the Corn Bunting is a strong *chuck* or *chit*, and its song consists of a hurried repetition of short unharmonious notes terminated by a protracted one. Although somewhat similar to the song of the Yellow Bunting, it is by no means so lugubrious; but if not sufficiently melodious to call forth exclamations of delight from him whose delicate ear is hurt even by the jingle of the Lark, yet to those who love to study nature in all her variety, it forms a pleasing counterpart or contrast to the sweet notes of the mellow-throated warblers, which, were there no harsh sounds, croaks, and screams, would soon cease to afford us pleasure. We cannot live on dainties. To the ornithologist the scream of the Heron and Eagle, the croak of the Raven, the protracted howl of the Northern Diver, the wail of the Kittiwake, the chatter of the Magpie, and the chirp of the Sparrow, are as interesting as the clear, mellow, and modulated song of the Thrush, filling the lone valley at eventide with its soft echoes, and inspiring a love of solitude and quiet musing. The song of the Bunting, such as it is, may be heard occasionally at all seasons, especially in calm weather; but during the breeding time it is more frequent, and then the male, perched on a wall, a stone, a twig, or a tall herbaceous plant, especially a dock or a bur, continues to utter at short intervals his singular cry, which although not loud extends to a great distance.

The food of this species consists of seeds of grasses, polygona, rumieces, Cereal plants, and coleopterous insects. In winter it becomes remarkably fat, and is superior as an article of food to most of our small birds. It is usually shy, at all times much more so than the Chaffinch, Yellow Bunting, or Lark; so that it is not very easily approached unless during the breeding season.

About the middle of spring the flocks break up, and towards the end of April the Buntings begin to form their nests, which are composed of dry stalks and blades of grass, with a lining of fibrous roots and hair, and are placed at the base of some strong plant, beside a grassy tuft, under a bush, or in an open pasture or cultivated field. The eggs are four or five, regularly oval, ten and a half twelfths long, with a transverse diameter of from seven and a half to eight twelfths, greyish or purplish-white, patched and spotted with pale greyish-purple, and marked with spots, dots, and curved streaks of blackish-brown.

Young.—The young when fledged are nearly of the same colours as their parents, the upper parts lighter, the lower pale grey, with oblong dark spots.

Progress toward Maturity.—At the first moult the colours deepen, but the young may still be distinguished from the old by their having the dark markings more elongated.

Remarks.—Having before me two fine specimens shot by myself to-day (15th March), which exhibit a very remarkable difference as to size, I am induced to offer a few remarks on this subject. One of them in fact appears a giant compared with the other. Their dimensions are as follows. Length to end of tail $8\frac{1}{12}$, $7\frac{1}{4}$; extent of wings $13\frac{1}{2}$, $11\frac{2}{12}$; bill along the ridge $\frac{6\frac{1}{2}}{12}$, $\frac{5\frac{1}{2}}{12}$; wing from flexure $4\frac{1}{12}$, $3\frac{7}{12}$; tail $3\frac{1}{2}$, $2\frac{11}{12}$; tarsus 1, $\frac{11}{12}$; hind toe $\frac{5}{12}$, $\frac{4\frac{1}{2}}{12}$; its claw $\frac{6}{12}$, $\frac{5}{12}$; third toe $\frac{10}{12}$, $\frac{3}{4}$; its claw $\frac{4}{12}$, $\frac{3\frac{1}{2}}{12}$. Similar differences exist in most of our native birds; but it would manifestly be absurd to found specific distinctions upon them. These two Buntings are precisely similar in colouring, only the bill of the large individual has the lower mandible more yellow.

EMBERIZA CITRINELLA. YELLOW BUNTING.

YELLOW HAMMER. YELLOW YELDRING OR YOLDRING. YELLOW YOWLEY. YELLOW YITE, YOLKRING, OR YELDROCK. SKITE. DEVIL'S BIRD. BUIDHEIN. BUIDHEAG-BHUACHAIR.

FIG. 79.

Emberiza Citrinella. Linn. Syst. Nat. I. 309.
Emberiza Citrinella. Lath. Ind. Orn. I. 400.
Bruant Jaune. Emberiza Citrinella. Temm. Man. d'Orn. I. 304.
Yellow Bunting. Emberiza Citrinella. Selb. Illustr. I. 288.
Emberiza Citrinella. Yellow Bunting. Jen. Brit. Vert. An. 131.

Back and wings bright red, the central parts of each feather brownish-black. Male with the head and throat bright yellow, the feathers of its upper part tipped with black, the breast brownish-red. Female with the yellow of the head obscured by dusky and brown, the breast pale greyish-brown.

MALE.—The Yellow Bunting, although neither inelegant in form, nor deficient in richness of colouring, is so common that it attracts little attention. It is smaller and proportionally more slender than the species already described, which it accordingly excels in liveliness and activity. The body is ovate, the neck short, the head oblong and of moderate size, the feet rather short, the wings of ordinary length. The bill is very

short and rather slender. The tongue is sagittate and denticulate at the base, narrowed towards the end, and terminates in two short bristly points. The œsophagus is two and a half inches long; the gizzard eight twelfths in diameter; the intestine eight inches; the cœca two twelfths.

The plumage is soft and blended, the feathers lanceolate, with a long slender plumule of about eight filaments. Those about the base of the bill are terminated by short bristles. The frontal feathers encroach on the nasal groove and cover the nostrils, which are oblong, with a horny plate above. The wings are broad and rounded; the quills eighteen, the first, second, third, and fourth almost equal, but the third longest; the primaries narrow and obtuse; the secondaries broader, truncato-retuse. The tail is rather long, a little emarginate.

The upper mandible is brown, the lower light greyish-blue. The iris is light brown. The feet are ochre-yellow tinged with red, the claws dusky. The head, cheeks, fore-neck, breast, belly, and lower tail-coverts are gamboge yellow, the head and neck of a richer tint; the tips of the feathers of the head brownish-black or deep brown, forming a line of that colour on either side from the forehead, over the eye, to the occiput, which is darkish; those of the lower and lateral cervical greenish. The breast and sides are yellowish-red, each feather darker in the centre; the tail-coverts with a central streak of reddish-brown, the feathers of the anterior part of the back, and the scapulars, are yellowish-red on the sides, with a brownish-black central streak; those of the hind part of the back and the upper tail-coverts are bright chestnut, margined with yellowish. The alula, primary coverts, and quills are dusky; the primaries narrowly margined externally with yellow, the secondaries and upper wing-coverts broadly margined with yellowish-red, the latter having a brownish-black centre. The tail-feathers are brownish-black, the four middle rather broadly edged with yellowish-red, the rest narrowly with yellowish-grey, the two outer on either side with an elongated somewhat conical spot of white on the inner web, that of the outermost larger; the outer margin of the lateral feather yellowish-white. The concealed part of the plumage is dark-bluish grey.

Length to end of tail $7\frac{1}{8}$ inches; extent of wings 11; bill along the ridge $4\frac{1}{2}$ twelfths; along the edge of lower mandible $\frac{6}{12}$; wing from flexure $3\frac{1}{2}$; tail 3; tarsus $\frac{9}{12}$; first toe $4\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$; second toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths; third toe $\frac{7}{12}$, its claw $\frac{4}{12}$; fourth toe $\frac{5}{12}$, its claw $2\frac{1}{2}$ twelfths.

Female.—The colouring of the female is similar to that of the male; but the yellow parts are more obscured, the head being nearly dark, excepting its fore-part, and the lower neck assuming a dull greenish tint. The fore part of the breast and the sides are merely streaked with yellowish-red; the chestnut of the rump is a little paler, and the quills and tail-feathers are of a lighter tint. The white spots on the latter are smaller.

Length to end of tail $6\frac{11}{12}$; extent of wings $10\frac{3}{4}$; bill along the ridge $4\frac{1}{2}$ twelfths, along the edge of lower mandible $\frac{6}{12}$; tarsus $\frac{3}{4}$; middle toe and claw $\frac{10}{12}$; hind toe and claw $\frac{8}{12}$.

Variations.—The males differ considerably in the tints of the plumage, the yellow of the head and neck being more or less pure, the red of the breast and rump more or less deep. In very old birds, the yellow is more extended but paler. I have seen a specimen, shot in the county of Linlithgow by Mr. Weir of Boghead, of a greyish-white colour, the margins of the feathers pale brownish-red, the bill and feet pale.

The principal changes which take place in the plumage during winter and spring consist in the wearing of the points and margins, by which the yellow is rendered more extended, the fading of this colour, and that of the brown and red. It is an erroneous idea which many or most people seem to entertain, that birds assume *richer* tints in the breeding season, the fact being the reverse, unless when new feathers are produced in spring, which is not the case with any bird of this order.

Habits.—The Yellow Bunting is very widely distributed, but does not occur in those parts of the country which are destitute of wood. In most districts it is a very common and familiar bird, and a permanent resident. After the breeding season these birds collect into loose flocks, and as the winter

approaches, often mingle with Chaffinches, Green Linnets, Sparrows, and other species, in open weather resorting to the fields, and perching at intervals in the hedges and bushes, as well as on trees. When the ground is covered with snow, they congregate about houses, and frequent corn-yards, along with other birds, retiring to the trees and hedges in the vicinity when alarmed. Their flight is undulated, light, strong, and graceful, and they alight abruptly, jerking out their tail-feathers. It is indeed surprising to see with what velocity they descend at once from a considerable height to settle on the twigs of a tree which has attracted their notice as they were flying over it, and with what dexterity all the individuals of a flock perch in their selected places.

During winter they utter a kind of rather harsh low chirp; but in spring and summer the male chants a doleful sort of ditty, somewhat more musical than that of the Corn Bunting, but similar in character, being composed of a few short shrill notes concluding with a protracted one. Their food consists of seeds of the cereal plants, especially oats, grasses, chickweeds, polygona and others. In hard weather they may often be seen on the roads picking horse dung, and in summer they also eat insects and larvæ.

Towards the beginning of April the winter associations break up, and they choose their partners without the manifestation of angry feelings, they being less addicted to quarrelling than most small birds. When vegetation has advanced, they repair to bushy places, and the willowy sides of brooks and streams, and commence the construction of their nests, which are bulky, composed externally of coarse grasses and small twigs, and neatly lined with fine grass, fibrous roots, and hair. The nest is usually placed on the ground, under a bush, or among the twigs close to the ground, or sometimes in a clump of thick grass or herbage. The eggs, four or five in number, are of a regular oval form, purplish white, marked with linear and angular streaks, and a few irregular dots of black, their length about ten-twelfths, their greatest transverse diameter eight twelfths of an inch.

These Buntings evince much anxiety about their charge,

and when deprived of their eggs or young, continue some days about the place, chanting at intervals their dolorous ditty, which, although unaltered in its notes, must doubtless be meant as an expression of their grief. In some parts of Scotland it is interpreted as signifying "Deil, deil, deil take ye," that is, the cruel nesters; and for this reason, probably, the Yellow Bunting is named the Devil's Bird.

When perched on a tree, especially in windy weather, they crouch close to the twigs, draw in their neck, and keep the tail declined. After pairing, the male is frequently seen on a bush or tree, moving his tail by sudden jerks, by which it is raised, and at the same time slightly expanded. His notes are then usually two chirps followed by a harsher note: *chit, chit, chirr*, with considerable intervals. When feeding in the stubble fields, they advance by very short leaps, with their breasts nearly touching the ground; when apprehensive of danger, crouch motionless; and when alarmed give intimation to each other by means of their ordinary short note. They are generally more shy than Chaffinches, but less so than the Corn Buntings.

Young.—The young when fledged are dull yellowish-brown, streaked with black above, yellowish-grey beneath, the breast and sides streaked with brown.

Progress toward Maturity.—In young birds after the first moult, no yellow is observable on the head, it being entirely concealed by the brown tips of the feathers, each being streaked with dark brown. The streaks of the back are much broader than in the adult, and the red of the rump less pure, most of the feathers there being centrally streaked. The yellow margins of the quills are less bright, the white spots of the lateral tail-feathers much smaller than in the female. The throat yellow, the cheeks and sides of the neck yellowish-grey, the lower part of the neck, the breast, and the sides dull yellowish-brown, streaked with dusky; the middle of the abdomen dullish yellow; the lower tail-coverts dusky in the centre.

EMBERIZA CIRLUS. THE CIRL BUNTING.

FIG. 80.

Emberiza Cirlus. Linn. Syst. Nat. I. 311.
Emberiza Cirlus. Lath. Ind. Orn. I. 401.
Cirl Bunting. Mont. Orn. Dict.
Bruant Zizi ou de Haie. Emberiza Cirlus. Temm. Man. d'Orn. I. 313.
Cirl Bunting. Emberiza Cirlus. Selb. Illustr. I. 292.
Emberiza Cirlus. Cirl Bunting. Jen. Brit. Vert. An. 131.

Male with the back and wings bright red, the central part of each feather brownish-black, the head and throat black; a band over the eye, another beneath it, and a crescent-shaped patch on the fore-neck, bright yellow; lower part of neck all round dull-green; fore part of breast and sides yellowish-red, the rest yellow. Female with the head greenish-brown streaked with black, the upper parts as in the male, the lower yellowish, the breast and sides streaked with brown.

MALE.—The Cirl Bunting is precisely similar in form to the species last described, which it also very closely resembles in colour, although the male is always readily distinguishable by the black of its throat. The plumage is soft and blended, the feathers lanceolate; those about the base of the bill terminated by short bristles. The wings are broad and of moderate length;

the quills eighteen, the first, second, and third nearly equal, but the second longest; the primaries obtuse, the secondaries retuse. The tail is rather long, and somewhat emarginate.

The upper mandible is brown, the lower greyish-blue; the feet ochre-yellow tinged with brown, the claws dusky. The feathers of the head and throat are black, edged with dusky-green, of which there appear several longitudinal bands on the upper part of the head. A bright yellow band passes over the eye, another beneath it, and on the middle of the fore-neck is a crescent-shaped patch of the same colour. The lower part of the neck all round is of a dull greyish-green. The back and scapulars are bright chestnut, each feather brownish-black in the centre. The quills are dusky-brown, the primaries narrowly edged with greenish-yellow, the secondaries broadly with brownish-red. The tail-feathers are dusky, edged with light reddish-brown, the two lateral on each side with an oblique white longitudinal band on the inner web; the greater part of the outer web of the outermost feather also white. The fore part of the breast is bright red mingled with pale brownish-yellow, the sides of the latter colour faintly streaked with dusky; the rest of the breast, the abdomen, and the lower tail-coverts yellow, the latter with a central dusky streak.

Length to end of tail $6\frac{5}{12}$ inches; bill along the ridge $\frac{4}{12}$, along the edge of lower mandible $\frac{6}{12}$; wing from flexure $3\frac{1}{4}$; tarsus $\frac{7}{12}$; first toe $3\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$; third toe $\frac{8}{12}$, its claw $\frac{5}{12}$.

Female.—The female is somewhat smaller, and according to Montagu presents the following characters. "The upper part of the head is olivaceous brown, streaked with dusky; over the eye a dull yellow streak, passing down the side of the head; cheeks brown, on which is a yellowish spot; on each side of the lower mandible is a broken streak of dusky, passing downwards; chin and throat dull yellow, the latter streaked with dusky; the back part and sides of the neck and breast olivaceous brown, with dusky streaks; belly and sides pale yellow, with large dusky streaks on the latter; the upper part of the body and wings like the other sex, but the colours less bright."

Habits.—The deservedly celebrated ornithologist above named was the first who discovered the Cirl Bunting in Britain, having in the winter of 1800 procured several specimens killed in different places in the neighbourhood of Kingsbridge. He subsequently observed it between Glastonbury and Bridgewater, and states that it had been traced westward to Falmouth, in Cornwall. Individuals have since been met with in various parts of England; but Devonshire and the neighbouring counties appear to be its more peculiar residence, and there it breeds and remains throughout the year. He states that "it generally builds in furze, or some low bush; the nest being composed of dry stalks, roots, and a little moss, and lined with long hair and fibrous roots. The eggs are four or five in number, cinereous white, with irregular long and short curved dusky lines, terminating frequently with a spot at one end; size rather inferior to those of the Yellow-hammer, to which it bears great resemblance. These birds pair in April, and begin laying early in May. Having taken the young, it was found that insects were their most partial food, especially the common Grasshopper. When they could peck, the smaller seeds were acceptable, and canary the favourite; of grain, wheat and barley were rejected, but oats were greedily devoured after they had dexterously and quickly deprived them of the outer coat. The monotonous song of the male was incessant, and so shrill and piercing as to be offensive. The female has only a simple plaintive note."

The Cirl Bunting inhabits the southern parts of the European continent, and does not migrate into the colder regions.

EMBERIZA SCHŒNICULUS. THE REED BUNTING.

BLACK-HEADED BUNTING. REED SPARROW. WATER SPARROW. RING-BIRD. RING BUNTING. CHINK. BLACK-BONNET.

Emberiza Schœniclus. Linn. Syst. Nat. I. 311.
Emberiza Schœniclus. Lath. Ind. Orn. I. 402.
Emberiza passerina. Lath. Ind. Orn. I. 403.
Reed Bunting. Mont. Orn. Dict.
Bruant de roseau. Emberiza Schœniculus. Temm. Man. d'Orn. I. 307.
Reed-Bunting. Emberiza Schœniculus. Selb. Illustr. I. 290.
Emberiza Schœniculus. Reed-Bunting. Jen. Brit. Vert. An. 130.

Male with the head and throat black; a line from the lower mandible down the neck, a broad band over the back of the neck, and the lower parts, white; the back bright chestnut, each feather brownish-black in the middle. Female with the upper parts as in the male, but paler; a band of yellowish-grey across the neck; the head of the same colour as the back; the lower parts greyish-white.

Male.—The Reed Bunting is a much smaller and more slender bird than the Yellow Bunting, which however it resembles in form. Its plumage is soft, rather blended, slightly glossed; the feathers lanceolate, those about the base of the bill terminated by short bristles. The wing is broad and of ordinary length; the second, third, and fourth quills almost equal, the first slightly shorter, and equal to the fifth; all these excepting the first slightly cut out on the outer web towards the end; the primaries obtuse, the secondaries truncato-retuse, the proximal tapering. The tail is rather long, straight, and emarginate.

The bill is brownish-black above, paler beneath; the iris brown; the feet flesh-coloured, the toes dusky, the claws black-

ish-brown. The head and throat are deep black, the feathers of the former with reddish, of the latter with greyish tips. A line of white passes down the neck from the lower mandible. A broad band of greyish-white crosses the back of the neck, margins the black of the fore-neck, and blends with the white of the lower parts, which on the breast is tinged with blue, and elsewhere with ochre-yellow; the sides streaked with dusky. The general colour of the upper parts is bright chestnut, each feather with brownish-black in the centre; the rump bluish-grey, streaked with black. The quills are blackish-brown, margined with light red, as are the larger and smaller coverts. The two middle tail-feathers like those of the back, the rest brownish-black, slightly margined with reddish, excepting the two outer on each side, which are obliquely marked with white, their shafts black, and their tips pale brown. The entire length of the intestinal canal is eleven inches, of which the œsophagus is two and a quarter, the intestine eight and three fourths. The cœca are two twelfths of an inch in length, and about half an inch distant from the vent.

Length to end of tail $6\frac{1}{4}$ inches; extent of wings $9\frac{3}{4}$; bill along the ridge $\frac{4}{12}$; along the edge of lower mandible $5\frac{1}{2}$ twelfths; tarsus $\frac{9}{12}$; middle toe and claw $\frac{7}{8}$; wing from flexure $3\frac{2}{12}$; tail $2\frac{9}{12}$.

Female.—The upper part of the head is pale reddish, each feather brownish-black in the centre; a pale yellowish-grey streak over the eye; auricular coverts dark brown margined with paler; a band of pale yellowish-grey over the back and sides of the neck; the fore-neck of the same colour; the lower parts in general brownish-white; the fore-neck with two irregular bands of blackish-brown, the breast and sides streaked with light reddish-brown; the back, wings, and tail as in the male, but paler; the rump pale greyish, tinged with red.

Length to end of tail $5\frac{1}{2}$ inches; extent of wings 9; bill along the ridge $\frac{4}{12}$, along the edge of lower mandible $5\frac{1}{2}$ twelfths; wing from flexure 3; tail $2\frac{8}{12}$; tarsus $\frac{9}{12}$; middle toe and claw $\frac{10}{12}$.

Variations.—I have not observed any remarkable variations in old birds.

Changes.—The effect of the abrasion of the tips of the feathers is very apparent in this species. In summer the plumage of the head and throat is pure black; the white band on the neck unmixed; but in other respects the colouring is nearly the same.

Habits.—The Reed Bunting is a very active bird, which frequents marshy places, where it is seen perching on willows, reeds, sedges, and other aquatic plants. Although shy, it is easily shot, as it seems to consider itself safe at the distance of thirty yards or so. Its flight is rapid and undulatory, like that of the Yellow Bunting, and it alights abruptly, like it, expanding its tail to break the descent, when the white of that part becomes conspicuous. Its food consists of seeds, chiefly of grasses, and of insects of various kinds. Although stationary in England, this species is migratory in most parts of Scotland, departing in October and reappearing about the beginning of April. Individuals however are occasionally met with in the southern parts during winter, and I have shot it near Edinburgh in December, and again in the middle of March. Its song, which can scarcely be called pleasant, consists of several short notes succeeded by a long one, being in character similar to that of the Yellow Bunting, although less harsh, and is heard at frequent intervals, the bird in the meantime perched on a twig and remaining in a listless sort of attitude. In winter these Buntings form small loose flocks, which break up towards the end of March, when the different pairs betake themselves to their summer haunts.

It places its nest among aquatic plants, in a tuft of grass or reeds, often fastening it to the stems of the latter, but as frequently depositing it on the ground. At Ravelrig Bog, eight miles from Edinburgh, celebrated for Corallorhiza innata, I found a nest placed among sphagna, and overshadowed by the stems and leaves of Comarum palustre; and by Duddingston Loch, another fastened at the height of more than half a foot,

among stems of Arundo Phragmites. The nest is composed of dry stalks and blades of grasses, bits of rushes, and other similar materials, and is neatly lined with finer grasses and hair. The eggs, four or five in number, are of a short ovate form, nine and a half twelfths of an inch long, seven and a half twelfths broad, of a dull yellowish-grey colour, marked chiefly on the larger end with tortuous or angular lines, and irregular spots of black.

Young.—The young when fledged are similar to the adult female, but with duller tints, and the cheeks of a brownish-grey colour. The males may be distinguished by having the head and throat faintly marked with black.

EMBERIZA HORTULANA. THE ORTOLAN BUNTING.

Emberiza Hortulana. Linn. Syst. Nat. I. 309.
Emberiza Hortulana. Lath. Ind. Orn. I. 399.
Bruant Ortolan. Emberiza Hortulana. Temm. Man. d'Orn. I. 311.
Ortolan-Bunting. Emberiza Hortulana. Selb. Illustr. I. 294.
Emberiza Hortulana. Ortolan Bunting. Jen. Brit. Vert. An. 132.

Head and neck greenish-grey, spotted with dusky; throat, space around the eye, and a band from the bill downwards, yellow; the upper parts reddish, with black spots.

A FEW individuals of this species having been obtained in England, it has been admitted into the Catalogue of British Birds by Messrs. Selby, Jenyns, and other ornithologists. Not having seen any of these, I can only give here the distinctive characters of the species, from M. Temminck's Manual.

MALE.—" Throat, space around the eyes, and a narrow band proceeding from the angle of the bill, yellow; these two yellow spaces separated by a blackish-grey mark; head and neck olivaceous-grey with small brown spots; feathers of the upper parts of a reddish-grey on their borders, and black in the middle; breast, belly, and abdomen, bay red, all the feathers of these parts tipped with grey; tail blackish; the two outer feathers having their inner webs white to a great extent; bill and feet flesh-colour; iris brown. Length 6 inches 3 lines."

FEMALE.—" The female is smaller; the band over the eyes and the throat pale yellow; the breast marked with large brown spots; the other lower parts of a whitish-red; a great number of brown spots on the head and neck; all the upper parts more faintly coloured."

PLECTROPHANES. LARK-BUNTING.

Bill short, strong, subpentagonal, and about as broad as deep at the base, conical, somewhat compressed towards the end. Upper mandible smaller and narrower, its dorsal outline slightly convex, the ridge rounded, the sides convex, the edges sharp and slightly inflected, the tip direct. Lower mandible with the angle very short, broad, and rounded, the dorsal outline slightly convex, the back rounded, the sides convex, the edges sharp and very much inflected. Gape-line ascending obliquely at first, then direct.

The mouth is rather narrow; the upper mandible internally has a sudden bend about the middle, anterior to which is a narrow knob, flattened towards the end, with three prominent lines and four grooves; the lower mandible very deeply concave. The tongue is sagittate and denticulate at the base, fleshy, compressed, and terminates in two short bristly points. The œsophagus is of moderate width, dilated about the middle; the proventriculus oblong. Gizzard roundish, compressed, with very strong lateral muscles, a prominent inferior muscle, and dense, tough, and rugous epithelium. Intestine of moderate length, wider in its duodenal portion, and having two very small cœca near its extremity.

Nostrils oblong, in the lower and fore part of the short nasal depression, and having a horny arched operculum. Eyes of moderate size; eyelids feathered. Aperture of ear broadly elliptical, rather large.

Body moderately stout; neck short; head of moderate size. Legs rather short; tarsus compressed, covered anteriorly with

seven scutella, laterally and posteriorly with two plates meeting at a very acute angle, and inferior rugæ; toes covered above with long scutella, papillar beneath, the second and fourth nearly equal, the third much longer, the first considerably longer than the third, which is united with the fourth as far as the second joint; claws long, slightly arched, compressed, rather stout at the base, but abruptly attenuated, with deep lateral grooves, and pointed; the hind claw longer than the first joint of the pollex.

Plumage more or less blended, the feathers ovate, with a long slender plumule of about eight disunited barbs. Wings long, semicordate, acute, and tapering, the quills eighteen, the first longest. Tail rather long, emarginate.

The distinctions between this genus and Emberiza, although slight, are yet easily perceived. The upper mandible in Plectrophanes is broader, the wings longer and more pointed, the hind claw proportionally more elongated, and the knob on the palate less angular and elevated. In the form of the bill it approaches to the Linnets, and in that of the feet to the Larks, at least with reference to the elongation of the claw of the hind toe.

Only one species of this genus, which, however, is composed of very few species, is of regular occurrence in Britain, visiting the north of Scotland towards the end of autumn, and spreading over the whole of England. Individuals, however, in all probability remain to breed on the mountains of the northern districts. A very small number of specimens of another species has been seen in England in winter.

PLECTROPHANES NIVALIS. THE SNOW LARK-BUNTING, OR SNOWFLAKE.

SNOW BUNTING. SNOW FOWL. OAT FOWL. IAN-ANT'SNEACHD.

FIG. 81.

Emberiza nivalis. Linn. Syst. Nat. I. 308.
Emberiza nivalis. Lath. Ind. Orn. I. 397. Adult in summer.
Emberiza montana. Lath. Ind. Orn. I. 398. Young in winter.
Snow Bunting. Mont. Orn. Dict. Suppt. Adult in summer.
Tawny Bunting. Mont. Orn. Dict. Suppt. Adult in winter.
Mountain Bunting. Mont. Orn. Dict. Young Female in winter.
Bruant de niege. Emberiza nivalis. Temm. Man. d'Orn. I. 319.
Snow Bunting. Plectrophanes nivalis. Selb. Illustr. I. 279.
Emberiza nivalis. Snow Bunting. Jen. Brit. Vert. An. 129.

Male in winter, with the upper part of the head, cheeks, and a band on the lower neck light reddish-brown, the lower parts white, the upper black, the feathers edged with yellowish-brown; a patch of white on the wing, including the smaller coverts, and some of the secondary coverts and secondary quills; the three outer tail-feathers nearly white. Female in winter similar to the male, but darker, and with more reddish-brown on the head and breast, and less white on the wings.

Male in summer, with the head, neck, lower parts and a patch on the wings pure white, the rest black. Female with the same parts white, but the head, cheeks, and a band on the neck tinged

with reddish; the black feathers of the upper parts edged with reddish-white. Young male and female in winter, with the head dark reddish-brown, the upper parts yellowish-brown spotted with brownish-black, the lower parts dull white, the fore-neck, breast, and sides tinged with reddish-brown, the male with the small wing-coverts reddish-white, while in the female they are dusky.

Male.—The Snowflake is a neat and lively little bird, readily distinguished by its peculiar colouring, in which white is very conspicuous, conjoined with its gregarious habits, and its appearance along the coast during the cold season. It is about the size of the Yellow Bunting, and nearly of the same form, the body compact, the head of ordinary size, the wings rather long. The tarsi are short, compressed, with seven scutella; the first toe, which, including the claw, is scarcely shorter than the third, has seven, the second eight, the third ten, the fourth nine scutella. The claws are slightly arched, compressed, very acute, with deep lateral grooves at the base only.

The upper mandible within has the edges projecting more than in any of the Buntings, but is still very narrow, and having a central elongated hard prominence anterior to the deflection of the palate. The lower mandible is deeply concave and narrowed by the inflexion of its edges. The œsophagus, which is dilated on the middle of the neck, is two and a half inches long; the stomach nine twelfths in its greatest diameter; the intestine eight inches in length; the cœca a twelfth and a half; the rectum one inch.

The plumage is soft and blended, the feathers ovato-lanceolate, with loose margins; those at the base of the bill are terminated by short bristles. The wings are rather long and straight, the first quill longest, the second scarcely shorter, the other primaries graduated, all more or less rounded; the secondaries, excepting the inner three, emarginate. The tail of moderate length, and deeply emarginate.

The bill is deep yellow, its tip brownish; the irides brown; the feet black. The upper part of the head, space below the eye, and a gorget on the lower part of the neck, are bright chestnut mixed with white, the latter colour predominating

over the eye. The hind-neck is greyish-brown. The feathers of the back are deep black, broadly margined with yellowish-grey; those of the rump similar, but margined with reddish. The smaller wing-coverts are white, as are the edges and tips of the secondary coverts, and a broad band, enlarging inwards and including the basal portion of all the quills, excepting the three inner secondaries, the other secondaries being almost entirely white; the rest of the wing brownish-black, the feathers slightly edged with white. The middle tail-feathers are blackish-brown, edged with brownish-white, the three lateral on each side almost entirely white, having only a dark streak along the shaft some way down from the tip. The lower parts are pure white, excepting the throat and sides, which are tinged with chestnut. The concealed part of the plumage is greyish-black.

Length to end of tail $6\frac{7}{12}$ inches; extent of wings 13; bill along the ridge $\frac{5}{12}$, along the edge of lower mandible $\frac{6}{12}$; wing from flexure $4\frac{5}{12}$; tail $2\frac{10}{12}$; tarsus $9\frac{1}{2}$ twelfths; first toe $\frac{4}{12}$, its claw $5\frac{1}{2}$ twelfths; second toe $4\frac{1}{2}$ twelfths, its claw $3\frac{1}{2}$ twelfths; third toe $\frac{7}{12}$, its claw $4\frac{1}{4}$ twelfths; fourth toe $4\frac{1}{2}$ twelfths, its claw $3\frac{1}{2}$ twelfths.

Female.—The female has the colours duller, with less white. The head is dark chestnut-brown, the hind-neck yellowish-grey; the black of the dorsal feathers is not nearly so pure, and their margins are light yellowish-brown; the small wing-coverts are dusky, the first row tipped with dull white. The white band on the wing is tinged with dusky, and of much less extent, being conspicuous only on seven of the quills. The tail is brownish-black, the white of its lateral feathers very dull, and of less extent. The sides of the neck are dark yellowish-grey, the throat paler, the fore-neck dull chestnut, the breast, abdomen, and lower tail-coverts greyish-white, the sides tinged with chestnut.

Length to end of tail $6\frac{1}{4}$ inches; extent of wings $12\frac{1}{4}$, wing from flexure $4\frac{4}{12}$; tail $2\frac{9}{12}$; bill along the ridge $4\frac{1}{2}$ twelfths, along the edge of lower mandible $5\frac{1}{2}$ twelfths; tarsus $9\frac{1}{2}$ twelfths; hind toe and claw $\frac{9}{12}$; third toe and claw $\frac{10}{12}$.

Variations.—The individuals of this species, especially the males, vary exceedingly in colour, the white being more or less extended, the black more or less deep, and the reddish-brown of the head, rump, throat and sides, varying in extent and in depth of tint. The bill is sometimes pure yellow, but in general there is a touch of brownish-black or light brown on the tips of both mandibles. The females differ less than the males. Some of the latter are very conspicuous in the flocks, on account of the great quantity of pure white on their wings and tail, and are usually selected by "gunners." In March 1835, I shot near Prestonpans, in East Lothian, an individual which was all over of a cream colour, the head and rump tinged with red, the iris light red, the bill, feet, and claws pale yellow. The skin of this individual, now before me, is very similar to that of Mr. Weir's Yellow Bunting formerly mentioned.

Changes.—When the loose margins of the feathers are worn off in summer, the male assumes a very different appearance.

Male in Summer.—Bill yellow; feet black. The head, neck, and lower parts, pure white; those parts of the wings and tail which were of that colour in winter remain so; the back, alula, primary coverts, and three inner secondaries, pure black, as is the tail excepting the three outer feathers. In this state I observed in the beginning of August 1830, two individuals, one on the summit of Ben-na-muic-dui, another on Lochnagar, two of the highest mountains of the Grampians. Not having procured either of these individuals, however, I subjoin the description of a male from Winter Island, shot on the 10th May 1822, and examined at Dr. Richardson's in Edinburgh, on the 16th December 1823.

The feathers of the back acuminate, as are those of the tail, especially the central. The head, neck, breast, abdomen, sides, rump, proximal half of the primaries, all the secondaries excepting the last three, and the greater part of the lower surface of the wing and tail, are pure white. The anterior and middle part of the back, the three proximal secondaries, the alula, and the terminal half of the quills, deep black. The hind part of the back

mottled with white and black. The three lateral tail-feathers, and the proximal half of the outer web of the fourth, white; a black streak on their outer web, at the end, close to the shaft; the other tail-feathers black.

Habits.—The earliest period at which, according to my note-books, I have observed the Snowflake in the outer Hebrides, was on Sunday, the 28th of September (1817), on which day it is recorded that "on the ridge between Maodal and Ronaval I saw a Snow-bunting, and in returning along the shore by the low hills of Drimafuind saw another." In another place, dated Luachar, in Harris, I find the following statement. "Eagles are very numerous here. The Snow-bunting is frequently met on the hills in small flocks. I am told they are never seen in summer." Nor have I ever met with them there beyond the end of April. Yet the little flocks which I have often observed, were apparently family groups; nor do these birds appear in large congregations, such as we often see along the shores of Scotland and England. On the 4th of August 1830, being on the summit of Ben-na-muic-dui, the highest mountain in Scotland, I observed a beautiful male flitting about in the neighbourhood of a great patch of snow. It was also seen by Dr. Greville at the same time. Some days after, having descended from the top of Lochnagar, to its corry, along with Dr. Martin Barry, in quest of plants, I met with a flock of eight individuals, flying about among the blocks of granite. They were evidently a family, the male and female being easily distinguished from the young. It is therefore very probable that the Snowflake breeds on the higher Grampians; and possibly in considerable numbers, although it is not likely that the vast flocks seen in the lower grounds in winter are exclusively of Scottish origin.

Mr. Audubon states that "the Snow Birds enter the eastern portions of the United States sometimes early in November, and remain in such parts as suit them best until the month of March." He further asserts that only a single nest of this species had hitherto been found within the limits of the Union. "It was seen by Wright Booth, Esq. of Boston, on a declivity of the White Mountains of New Hampshire, in the month of

July 1831. It contained young ones." Although it remains only about four months in the country, it extends as far south as Louisville in Kentucky.

Dr. Richardson says that "it is only during the months of December and January that it retires to the southward of the Saskatchewan. It usually reaches that river again about the middle of February; two months afterwards it attains the sixty-fifth parallel of latitude, and in the beginning of May it is found on the coast of the Polar Sea." Again, "on the 22d July 1826, in removing some drift timber lying on the beach of Cape Parry, we discovered a nest on the ground, containing four young Snow-birds."

Now, from these statements, we learn that the young are not abroad until the end of July; and that the species does not leave its breeding places until the beginning of November, or even later. If its habits are similar in Europe, we have reason to conclude that the individuals seen in Scotland in August and September, were indigenous.

It is not until the end of October that the Snowflake makes its appearance along the coasts, or on the higher grounds, of the south of Scotland; and about the same period in the south of England, although there it is of much less frequent occurrence. It is not uncommon on the sands to the north of Aberdeen, and on the shores of the Frith of Forth, especially in time of snow or frost; but when the weather is mild, it generally betakes itself to the inland parts. A large flock has for several years past continued all the winter between Leith and Portobello, where before the end of March it is usually much thinned, the males especially being destroyed by boys and other idlers. When the flocks first arrive, I have not observed in them any deficiency of males; but the longer they continue in a place, the more do they seem to be composed chiefly of females and young birds, as persons shooting at them naturally select the most beautiful.

Assembled in large straggling flocks, or scattered in small detachments, these birds may be seen flying rather low along the shore, somewhat in the manner of Larks, moving in an undulated line by means of repeated flappings and short intervals

of cessation, and uttering a soft and rather low cry, consisting of a few mellow notes, not unlike those of the Brown Linnet, but intermixed at times with a sort of stifled scream or chirr. When they have found a fitting place, they wheel suddenly round, and alight rather abruptly, on which occasion the white of the wings and tail becomes very conspicuous. They run with great celerity along the sand, not by hops, like the Sparrows and Finches, but in a manner resembling that of the Larks and Pipits; and when thus occupied, it is not in general difficult to approach them, so that specimens are easily procured. Indeed it frequently happens that they allow a person to walk up within five yards, or even less.

When a large flock has remained for several weeks on a particular part of the coast, where the birds have been much disturbed, it commonly breaks up into small parties, and even then they are not remarkably shy. On the 12th of March 1835, I found them thus scattered along the tide-line, and in the fields between Prestonpans and Cockenzie, as well as on the extensive flats at the mouth of the Esk, at Musselburgh. They were more shy than usual, but I obtained seven specimens. What they pick up on the shore I have not been able to ascertain; for, although I have opened many individuals shot there, I have never found any shells or other marine animals in their stomach. I should therefore be inclined to think that they resort thither merely for sand and gravel, were it not that various respectable authors allege that small mollusca form part of their food. At intervals, they make excursions into the neighbouring fields, alight in corn-yards, at barn-doors, or even on the roads, where they obtain seeds of oats, wheat, polygona, and other plants, which I have found in them. The only other objects found by me in the gizzard or crop, besides gravel or sand, were small pupæ.

Although the American ornithologists speak of their alighting on trees, I have never seen them perch on even a bush, or on any other high place than a crag, the top of a wall, or a corn-stack, in which respect they resemble our Field Lark. It is not often, however, that they alight on the stacks, for they prefer searching the ground around them. In the villages

along the coast of East Lothian, they are sometimes, in spring, nearly as common as Sparrows, and almost as familiar. About Leith, where they are generally found in winter on the beach, even close to the pier, they have a very different appearance from that which they present in parts of the country remote from towns, for their plumage is as much soiled as that of the London sparrows.

About the middle of April, or sometimes a week later, these birds disappear, and betake themselves to their summer residence. The nest and eggs of this species are unknown to me, and indeed have not hitherto been detected in Britain.

Young.—The young, apparently unable to perform a long flight, and flitting from crag to crag, I have once met with, as above mentioned; but as I had not a gun at the time, I can only say that they seemed to resemble the young females in their second plumage, but with more grey and less white.

Progress toward Maturity.—When the flocks appear towards the end of autumn, the males and females are coloured as follows:—

Male.—The bill is dull brownish-yellow, darker at the point; the feet brownish-black. The upper part of the head dark chestnut, the cheeks and hind part of the neck light chestnut, mixed with grey, the upper parts mottled with brownish-black and reddish-brown, the centre of each feather being of the former colour. The small wing-coverts are brownish-white, with a central dusky streak; the outer secondary coverts also brownish-white; alula and primary quills brownish-black, edged with greyish-white; base of the latter white, that colour extending on the inner, and occupying almost the whole of several of the secondaries, although all of them have either dusky or light brown towards the end, the three inner without white, and like the back. Tail brownish-black, edged with brownish-grey; the three outer feathers almost entirely white, there being only a streak from the tip, including part of the outer web. The lower parts are greyish-white, the throat, sides of the neck, a band across the fore part of the

breast, and the sides, reddish-brown; the sides of the band under the edge of the wing brownish-black.

FEMALE.—The female has the head and cheeks of a lighter chestnut, the hind-neck more grey, the upper parts with brownish-grey in place of reddish margins. The small wing-coverts are blackish-brown, the first row broadly tipped with greyish-white. The secondary coverts only tipped with white. There is much less white on the quills, the secondaries having all a large proportion of brownish-black. Only two of the tail-feathers on each side have white, the next being generally only paler on the inner web. The lower parts are light grey or greyish-white, with a band of reddish-brown on the fore part of the breast, the lateral feathers of this band streaked with dusky.

In this state the bird is the Mountain Bunting of Montagu. His Tawny Bunting is the present species adult in winter plumage.

REMARKS.—Montagu having remarked that "so rarely does the Snow Bunting migrate to the southern parts of England, that in the many years we have attended to the subject, no one instance has occurred," and that the Tawny Bunting is by no means so rare there as either the Snow Bunting or the Mountain Bunting, various persons have forthwith asserted that the males of the species here described are rarely met with in the south, although the females and young are not unfrequent there. They forget that by "Snow Bunting" Montagu means the bird in its summer plumage. In all parts of Scotland, the flocks that I have met with had their due proportion of adult males and females, unless the season be advanced, in which case the males are diminished, simply by being shot on account of their superior beauty. Montagu states among other reasons for separating the young and old of this species, that the second quill is the longest in the Tawny Bunting, while in the Mountain Bunting the two first are nearly the longest. Now, it does happen that these feathers vary in length, but not as stated, the first sometimes being longest in both. Thus of eight "skins," which I have preserved in memorial, six have the first quill decidedly longest, one has the second longest, and the eighth has the first but very slightly longer than the second.

PLECTROPHANES LAPPONICA. THE LAPLAND LARK-BUNTING.

LAPLAND FINCH.

Fringilla lapponica. Linn. Syst. Nat. I. 317.
Fringilla lapponica. Lath. Ind. Orn. I. 440.
Bruant montain. Emberiza calcarata. Temm. Man. d'Orn. I. 322.
Lapland Lark-Bunting. Plectrophanes Lapponica. Selb. Illustr. I. 283.
Emberiza Lapponica. Lapland Bunting. Jen. Brit. Vert. An. I. 128.

Male in winter with the top of the head black spotted with red, the fore part of the neck greyish-white spotted with black, the wings with two transverse white bands. Female with the top of the head reddish-grey, spotted with black; the throat white; the breast grey, spotted with black.

Male in summer with the top of the head, the cheeks, fore-neck, and part of the breast pure black, the lower parts white.

Male.—The Lapland Lark-Bunting is nearly of the same size as the Snowflake, which it resembles in form and proportions, the wings, however, although rather long and pointed, being shorter, and the bill more like that of a Finch, being short, conical, with the upper mandible nearly as large as the lower, its marginal outline but slightly angulate, but the palate furnished with a prominent knob, which is attenuated anteriorly. The feet are short and of moderate strength; the claws long, slightly arched, laterally grooved, compressed towards the end, that of the hind toe much elongated. The plumage is soft and blended in winter, in summer rather compact above. The first quill is longest; the primaries have their points rounded; the secondaries, except the inner three, emarginate. The tail is rather long, and distinctly emarginate.

The bill is brownish-yellow, tipped with dusky; the feet brown, the claws black. The upper part of the head is black,

the feathers edged with brownish-red; those along the base of the bill black; the cheeks reddish, spotted with black; the throat, fore part of the neck, and a portion of the breast black, the feathers edged with greyish-white. A reddish-white band passes from the eye down the side of the neck; the hind part of the neck is reddish-brown mixed with greyish; the back and scapulars brownish-red with black spots. The quills and coverts are blackish-brown, edged with reddish; the tips of the secondary coverts, and first row of small coverts, white, there being thus two bands of that colour across the wing. The tail is brownish-black, the feathers edged with reddish, the two outer with a wedge-shaped white spot at the end.

Length to end of tail $6\frac{9}{12}$; wing from flexure $3\frac{10}{12}$; tail $2\frac{9}{12}$; bill along the ridge $\frac{6}{12}$; hind toe $\frac{4}{12}$, its claw $5\frac{1}{2}$ twelfths; third toe $7\frac{1}{2}$ twelfths, its claw $3\frac{1}{2}$ twelfths.

Female.—"The female has the top of the head, the neck, the back, and the scapulars of a reddish-grey, with black spots; a band of reddish-white follows the same direction as in the male, and unites with a white line, which proceeds from the angle of the bill; throat white, bordered on the sides by a brown band; the breast marked with numerous grey and black spots; the rest of the lower parts white, with longitudinal spots on the sides."—*Temminck.*

Male in Summer.—"All the black of the plumage velvet black; the whole head, the face, the region of the ears, the fore part of the neck, and the breast, are of that colour; the red crescent on the hind-neck of a pure and very bright tint; and all the colours of the plumage abruptly defined, and pure; the bill is of a fine yellow, with the point brown."—*Temminck.*

Female in Summer.—The upper parts are dusky, darkest on the back, the edges of the feathers reddish; the feathers of the hind-neck edged with red; the ear-coverts deep brown; space about the eyes, especially above, yellowish-red, a streak of that colour proceeding backwards and joining the

red of the hind-neck; the throat greyish-white; the lower anterior and lateral parts of the neck, and the upper part of the breast, brownish-grey, tinged with red, and longitudinally streaked with blackish; the sides similarly marked; the middle and lower part of the breast, the abdomen, and lower tail-coverts whitish, tinged with grey and a little red; tail blackish-brown, the outer edge, and part of the inner web at the end of the lateral feathers, brownish-white, of which there is a small oblique mark at the end of the second feather.

Young in Second Plumage.—"Head, hind-neck, and all the upper parts of the body cream-coloured, with longitudinal streaks and spots of blackish; the broad space of chestnut brown already exists on the wings; all the quills and tail-feathers are bordered with deep red; throat white, marked with small longitudinal spots; a small blackish spot at the orifice of the ears; lower parts reddish-white, deeper on the breast and sides, which have spots of blackish-brown; a reddish conical spot on the outer tail-feather, and a longitudinal spot on the next."—*Temminck.*

Remarks.—The Lapland Lark-Bunting is an inhabitant of the colder regions of both continents, whence it migrates southward on the approach of winter, proceeding in Europe as far as Germany, France, and Switzerland, and in America appearing in the higher parts of the states of Maine and Michigan. The Prince of Musignano remarks that it does not ordinarily occur in maritime countries, but prefers the elevated tracts of the interior, which may account for its having so seldom been met with in Britain. Only four individuals, I believe, are recorded as having been shot there, all young birds or females in winter plumage. Mr. Selby has described and figured one which was found in Leadenhall Market among larks that had been sent from Cambridgeshire, and of which the preserved skin is in the Museum of the Zoological Society. Another, in the possession of Mr. Yarrell, was caught near Brighton. In September 1828, a third was obtained near London; and in October 1833, a fourth near Preston. Not having seen any of

those specimens, I have been obliged to have recourse to American skins; and as these were of the male in winter and female in summer only, I have copied M. Temminck's characters for the rest. According to the noble and illustrious author above named, and the celebrated Dr. Richardson, the Lapland Lark-Buntings live in large flocks, and frequently intermingle with Larks, with Alauda arvensis in Europe, and Alauda alpestris in America, as well as several other birds of similar habits. Their food consists chiefly of seeds of arctic or alpine plants, especially of willows and Arbutus alpina. They breed in marshy places, or moist meadows; form their nest of dry stalks of grass, lining it with hair or feathers; and lay six or seven eggs, of a yellowish colour, spotted with brown.

This species is one of those that more evidently indicates the many affinities by which a particular bird is connected with others of different genera. Its bill, considered with respect to external form, allies it to the Finches and Linnets; the knob on its palate evinces an alliance with the Buntings; its feet connects it with the Larks; and these organs and its wings assign it an intimate relation to the Snowflake. As its upper mandible is considerably larger and broader than that of the bird just named, and the gape-line little deflected at the base, some authors have referred it to the genus Fringilla. Another, judging it to be neither Finch nor Bunting, forms of it a genus apart, under the name of Passerina. The palatal knob, however, is decisive as to its family, and the claws and wings present the peculiar characters of Plectrophanes, to which it was first referred by Mr. Selby, although M. Temminck had long before indicated its connection with the Snowflake, by placing these birds in a separate section of Emberiza.

The form and habits of the Lark-Buntings shew that they constitute the link which connects the Buntings, Finches, and Larks. The latter birds are perhaps as much granivorous as the former; but owing to the circumstances already mentioned, and their still greater affinity to the Pipits and Thrushes, I have judged it expedient to remove them from the order of Huskers, and bring them into connection with the genus Anthus, which resembles them much more than they resemble the Finches.

PRACTICAL ORNITHOLOGY.

THIRD LESSON.

GENERAL VIEW OF THE MIDLAND PARTS OF THE MIDDLE DIVISION OF SCOTLAND. BIRDS OBSERVED THERE. BEAULY FRITH. DESCRIPTION OF CROMARTY FRITH. SEA BIRDS FOUND ON IT. FRITHS OF TAY AND FORTH. WANDERERS.

Few things can be more delightful to a person capable in some measure of apprehending the varied phenomena of nature than a rapid survey of a large extent of country, such as may be made in a vehicle proceeding at the rate of ten miles an hour over a succession of plains, valleys, and mountainous tracts, and along rivers, estuaries, and arms of the sea. But I must correct myself: the true naturalist travels outside, and is not content with observing nature through a square foot or so of dim glass. In summer no doubt such a ride would be more pleasant than in the midst of winter, when the leafless trees shoot up against the clear cold sky, when the hills are clad with their snowy mantle, and the biting wind feels as if it penetrated through flesh and sinews; yet to the ornithologist the warm season would afford less gratification, for then the birds are dispersed over the fields and hills, scattered among the thickets and woods, and concealed by the dense foliage.

In the middle of March, I had the pleasure of performing such a journey from Edinburgh to the town of Cromarty, situated on the eastern coast of the northern division of Scotland. At Queensferry, where we crossed the Frith of Forth, over whose placid waters gleamed from afar the white ridge of the southern Grampians, were seen flocks of the Common and Black-headed Gulls, Larus canus and L. ridibundus, with a few individuals of the Great Black-backed species, L. marinus, and some Ducks too distant to be distinguished. Between this place and Kinross were observed numbers of the more common

small birds, some Partridges, two Pheasants feeding in a ploughed field, and a male Hen-harrier, Circus cyaneus, the flight of which afforded a most interesting sight. First, it came skimming over a field, almost close upon the ground, then glided along a hawthorn hedge, now on one side, then on the other, turned abruptly to follow another hedge, never flying higher than three or four yards, and lastly passed over a large ploughed field and disappeared. Its mode of flying was almost precisely similar to that of the Sparrow Hawk, which, in like manner, I have sometimes seen almost in the dusk taking a last survey for the day of its hunting grounds, in quest of some poor bird that, having imprudently perched in an exposed place, might be within reach of its talons.

It was eight when we entered Perth, and the journey by Dunkeld and Blair, into the central group of the Grampians, having been performed under night, little could be seen, although it was clear moonlight, excepting woods and plantations in the lower tracts, and in the higher hills covered with heath, of which the dark colour contrasted with the patches of snow that remained unmelted, with bare valleys in which not a hut was to be seen for many successive miles. Day dawned when we arrived at the commencement of the wooded part of the strath or valley of the Spey, which, covered with heath, and straggling trees of stunted birch and alder, presented a most desolate aspect, no doubt enhanced by a heavy fall of snow and a piercing north-east wind. Farther on, the valley expanded, the long ranges of low hills were covered with natural forests of pine, the flanks of the higher mountains to the south presented patches of dark woodland amidst a waste of snow, and the clear streams glided over their pebbly beds amidst scraggy bushes of birch. To the Celtic Scot there is something in the sight of a forest of native pines, that have sprung up spontaneously in the wilderness, stunted and rugged as they may be, that affords as much delight as the scent of a distant oasis yields to the faint and wearied camel in the sandy desert. In those wild woods of Badenoch once roamed the wolf and the bull, and on the slopes of those heathery hills browsed the stately stag, while amidst the thickets glided the gentle and graceful roe.

In huts of turf like these, with a hole in the roof that answered the double purpose of allowing the light to enter and the smoke to escape, resided the rude clansmen, active, hardy, and daring, who followed their warlike lords to the raid of the lowland plains, but who at home, gentle and affectionate, as all true Highlanders have ever been, lived in the enjoyment of happiness, such as is not always possessed by those whose comforts are more apparent. Amid the smoke and soot of many a Highland hut there is yet more real happiness than is to be found in the stately mansions of milder climes. Look at those boys, "just let loose from school," who have gathered to gaze upon us. "The rose of England" blooms not on their cheeks, which, young as they are, have already been blanched by the cold blasts, and freckled by the summer heats; but their sinews are firm, their limbs are clean, and their "step is light on the heath." Their clothing is scanty as well as homely, some of them even have merely a bit of blanket wrapt around their loins in place of trowsers; but is there one among them that shrinks from the "bitter biting blast," for fear of which our inside passengers scarcely allow themselves air enough for respiration? What a difference between these young mountaineers, unencumbered with superfluous fat, and the massive younglings of the Lancashire yeomen! But again we proceed amid the snow, and passing a small lake, partially frozen, observe on it a large flock of Ducks, which are certainly Golden-eyed Garrots, although the driver calls them Teal, a name which he would probably give to every species of duck excepting the Mallard. By the houses and in the corn-yards are seen the Sparrow, Chaffinch, Yellow Bunting, Robin, Hedge Chanter, Wren, Magpie, Rook, Thrush, and Lark; but there are no Fieldfares or Redwings, and the Blackbird is rarely met with. All along are scattered at wide intervals pairs of Hooded Crows, Corvus Cornix, in place of which would be found in the interior of the south of Scotland, the Carrion Crow, Corvus Corone. On the dreary descent of the Monagh-leadh mountains no other birds were seen, excepting a single specimen of that last mentioned, a Buzzard, and a Heron. But now, the prospect changes; the Moray Frith is stretched out before us,

and the horizon is bounded by the snow-clad mountains of Ross-shire, among which is conspicuously preëminent the massive Benwyvis. The influence of the sea air is perceptible as we approach Inverness: the ground is clear of snow, the small birds become numerous, flocks of Fieldfares are met with, and vegetation is awakening to life.

Leaving Inverness, we pass along the Beauly Frith, of which the shores are low and cultivated. On it are seen various species of birds:—A large flock of Geese, probably the Brent, Anser Bernicla; the Golden-eye, the Mallard, the Long-tailed Duck, the Common and Black-headed Gull in large flocks, the Black-backed Gull, and the Redshank. Rooks became very abundant, and Lapwings plentiful, especially on the plain at the top of the frith, which is bounded by hills covered with plantations and cultivated fields, succeeded by higher eminences, until the view is terminated by the lofty snow-clad mountains that bound the horizon.

From Beauly to Dingwall, over the low, partially cultivated Black Isle, on which the juniper generally usurps the place of the furze and broom of the south, there were seen only the common land birds, including the Hooded Crow; nor did any other occur until, in the evening, while examining the shores of Alness Bay, on the Cromarty Frith, I observed great numbers of Ducks, Lapwings, and Ringed Plovers.

Next day, having taken a boat from Invergordon, I proceeded to the Sutors of Cromarty, two steep rocks or headlands between which is the narrow and deep channel by which the waters of the frith communicate with the ocean. But first let us take a general view of this beautiful estuary, and ascend an eminence behind the ancient town of Dingwall, in a lovely summer morning, such as that, in July 1821, on which I first saw it. On the left hand is the entrance to the valley of Strathpeffer, beyond which are rounded hills, rising gradually toward the north, and surmounted by Benwyvis. Their flanks are covered with wood, the thin haze floats along their sides, and toward the east they slope into a cultivated plain that extends toward the sea. Here on the right enters the Conon, a river of considerable size; you see it winding among banks

and shoals, through an expanse of mud, until it is lost in the basin of placid water that extends for twenty miles eastward, having an average breadth of a mile and three quarters, and bounded on the southern side by a low bank from which the country rises gently to form what is called the Black Isle, brown with heath, and unwooded, but having patches of cultivation scattered over its surface. The hills of the north screen the country at their base from the cold winds, which sweep uncontrolled over the moors of the southern side, producing a remarkable change of climate between the two sides of the inlet, which you perceive is first contracted at that little town about twelve miles distant, named Invergordon, and again beyond Cromarty, at the channel of the Sutors, which affords a free entrance to ships of the largest burden. Is this expanse of water, capable of anchoring the entire British navy in security, and glittering from afar in the beams of the morning sun, any thing else than an arm of the sea? Surely not. But let us descend, and now that the tide is fast receding, pursue our way along the northern shore. Behind that yair which runs out into the mud is stationed a solitary Heron, while beside it you observe two or three Redshanks busily occupied in searching the mud. Some sea-birds are seen floating on the water, and a few gulls are hovering over its surface; but as it is summer, the birds are now at their breeding places. Here are four miles of mud and sand, a stream pursuing its way in the midst, separating into two currents, between which intervenes the Finden Bank, and all down to Invergordon, broad margins and flats laid bare by the receding waters. Is it now the open sea, or the estuary of the Conon? Surely an estuary. And were you to see the mighty torrent, swollen with the autumnal floods from those long ranges of lofty mountains that stretch toward the north, even to the confines of Loch Carron, Loch Ewe, and Loch Broom, carrying on its turbid waters the wrecks of the land, ploughing for itself a channel in the tide waters of the frith, and discharging itself into the ocean at the Sutors, you would have little doubt that if at one time the basin presents the appearance of an inlet of the sea, at another it becomes an outlet of a river.

But summer and autumn too are gone, and here we are, in the cold month of March, coasting the North Sutor of Cromarty, in a small boat manned by no less a personage than the King, —at least his companions give him that title—and a crew of active, intelligent, and most obliging young men ; you observe on those crags a flock of Cormorants, and as they fly off, you perceive on the side of one of them the white spot distinctive of the larger species, Phalacrocorax Carbo. There, a Rock Dove shot into one of those low caves that occur here and there along the base of the red gneiss cliffs, whose perpendicular or slightly inclined strata exhibit in several places the most fanciful contortions. But the tide is ebbing, and the current will presently be strong ; so let us return, and as we proceed endeavour to obtain a shot at those flocks of beautiful Sea-Ducks. Observe that fine male, with the white head and neck, his small taper tail raised out of the water. They are off, but multitudes are scattered over the channel, and especially along the edges of this expanded part, which is named Cromarty Bay. A seal shews his glittering round head in our wake, while the Black-backed Gull floats high over us. Hark ! what can be the cause of that outcry among the small gulls ? Two pirates, Lestris parasiticus, are in pursuit. If you follow one of them with your eye, you will see it plunge through the air after a gull, which attempts in vain to escape, being closely followed in all its windings, until at length, finding no means of eluding its pursuer, it disgorges a small fish, which as it falls is dexterously caught by the bold jager. Now, we are near the great sand flats of the Bay of Nigg, which at low water fill up more than half the breadth of the basin. Vast meadows of Sea Grass, Zostera marina, cover these shoals, and afford an abundant supply of food to the Brent Geese, which you see here and there in large flocks, some on shore, and others floating amidst multitudes of Common and Black-headed Gulls. It is a sight worth coming all the way from Edinburgh to see, and in truth such as I have never seen before, although familiar enough with these same geese, which are abundant in some parts of the outer Hebrides. On the water, they are easily distinguished from ducks and other birds, not by their size and colour merely, but

by the manner in which they erect their necks. The number in view at this moment cannot be less than five or six thousand. In the pools, and among the scattered fuci, are small fishes, shells and echini, which are daily gleaned by the gulls. Auks and Guillemots are flying out to sea, where they will remain until the tide begins to flow again, and here and there is seen a Red-throated Diver, stemming the waves like a gallant bark, or pursuing his seaward flight on rapid pinions. But it is already seven o'clock, and before we get to Invergordon harbour, even with this favourable breeze, it will be quite dark.

Next day, I sailed to the head of the Frith, landing alternately on both sides to observe the rocks, which are of red sandstone and conglomerate, of the oldest series, or that called by some Primitive Sandstone, being composed of fragments and detritus of primitive rocks. Long-tailed Ducks, and Mallards occur plentifully towards low water along the edges of the mud banks, on which are also seen Curlews, Redshanks, and Lapwings, while on the gravelly and pebbly beaches are numerous small flocks of Ringed Plovers, Charadrius Hiaticula. Hooded Crows, Corvus Cornix, are very plentiful; Rooks still more so; but I met with no Carrion Crows, Ravens, or Jackdaws. In the woods and fields I observed the small birds common in almost all parts of Scotland; the Field Lark carolled its ever-pleasing song; the Meadow Pipit was seen here and there; the beautiful White Wagtail occurred in considerable numbers; and the Sparrow, although by no means common, was seen in the villages. The salmon fishers on the Conon informed me that seals often make their way as far as the bridge, and are sometimes caught in the nets; but that the porpoises, although they enter the frith, never ascend the fresh water.

Let us now hurry southward as fast as four steeds can carry us; and as we have undergone considerable fatigue these three days, and have little to see by the way that we have not seen before, let us get within, and between dozing, dreaming, and concocting fanciful systems of ornithology, forget if possible how the time passes until, pine forest and birch wood, mountain ranges clad with snow, barren moors covered with heath

and arbutus, grim rocks and pebbly streams, being all past, we find ourselves driving over the Carse of Gowrie, having the Sidlaw Hills on one side, and the estuary of the Tay on the other. It freezes so hard that the exhalations from our blood are formed into beautiful crystalline shoots of ice on the windows. In one corner, cased and muffled to the mouth, with woful face and closed eyes sits a thin-ribbed and slight-limbed traveller, while beside him, occupying more than an equitable breadth of the coach, is a portly dame, whose florid cheeks bid defiance to the cold. Anon, the clattering of hoofs, and the clang of the horn, announce our arrival in Dundee, where, after due refreshment, we proceed to the harbour, and got on board the "Modern Athens," which is to carry us to Newhaven.

The tide is nearly out. In the estuary we observe the same mud and sand flats, as in the Cromarty and Beauly Friths; and on the rocks and stones the same sea-weeds and shells; the piers are covered with them up to high-water mark. Gulls of various kinds are hovering around, Guillemots and Divers flying seaward; Curlews and Redshanks pacing the mud. The paddles are in motion, and as we pass Broughty Castle and Parton-Craig, we observe that the promontories and low rocks are of trap. The channel widens, and on its sandy shores gleam flocks of Sanderlings and other small birds, with Gulls and Curlews. Terrific breakers rush over the long-extended sand-banks, on one of which lies a dismasted hulk, and long billows roll in from the ocean, on which are seen at intervals Ducks, Divers, and Guillemots. At length we cross the bar, stretch over the bay of St. Andrews, having the Bell Rock light-house on the eastern horizon, coast the point of Fife, pass the Isle of May, and enter the Frith of Forth. On the southern side are the Lammermoor Hills, covered with snow, the Bass Rock, Guillon Point, and Aberlady Bay; on the north the rocky and sandy shores of Fife, with its numerous small towns; while right ahead is Inchkeith, beyond which old Arthur's Seat keeps his solitary watch over the fair city of the north, where bright eyes will become brighter when the wanderer enters his happy home. Between Inchkeith and Newhaven

were seen great numbers of Velvet Ducks, which, while flying, have a very singular appearance, owing to the great size of their head and bill. The other species observed were those already enumerated; and as our journey is now ended, and our third fit of practical ornithology brought to a close, let us seriously consider how we may best narrate the history of that very important tribe of birds, to which the name of Vagatores or Wanderers may be applied.

Joyous in action, pining in idleness, ever on the alert, even in sleep pursuing, as the hound dreams of the chase, irregularly migratory, and settling for a time only to narrate their adventures, there is a tribe of naturalists very similar in character to these sagacious and enterprising birds. A friend of mine, for example, who writes to me from Charleston, that he is about setting out to explore the shores of the Mexican Gulf and the south-western limits of the United States, and return to Edinburgh by the end of autumn, is typical of this family. Hunting by sight, not by scent, now sweeping along the Alleghanies, anon searching the mud-flats of the Mississipi, feasting to-day on an old gobbler on the banks of the Red River, to-morrow picking up a water-hen from among the reeds of the St. John's, he represents, as Le Vaillant formerly represented, the dark-winged Raven, Corvus Corax. The Carrion Crow, Corvus Corone, has its analogue in some other wanderer, who is fond of kicking alligators' ribs, and strangling rattle-snakes. The Hooded Crow, Corvus Cornix, clamorous before rain, feeding on small fry, keeping a good look-out when pilfering, but, being pied, easily recognised, represents another; while a fourth resembles the industrious Rook, Corvus frugilegus, that gleans in the fields, on the hills, and by the shores, finding in common and neglected objects much that is not less nutritious than savoury. The Jackdaw, pert, and fond of perching on pinnacles, has many representatives; and the chattering, thievish, and handsome Magpie, is not without admirers and imitators. Indeed, it affords a striking proof of the perfect naturality of the arrangement proposed by me at p. 17, that in the human species individuals and families may be found that form a complete counterpart in all essential respects to the species and

orders of the feathered tribes. Plunderers, Robbers, Snatchers, Scrapers, Watchers, Gropers, Cooers, and Songsters, are characters well known to everybody. Nothing in fact can be more beautiful than the accordance thus presented between men and birds; but as it is unnecessary to insist upon what all enlightened naturalists must at once admit, I leave my theory in their hands, confident that they will readily perceive many curious analogies, which it would not be complimentary to their sagacity in me to explain.

IV. VAGATORES. WANDERERS.

OR CROWS AND ALLIED GENERA.

Continuing our survey of the land birds, after separating from the mass the orders Rasores, Gemitores, and Deglubitores, we might next detach a group consisting of the Crows, Jays, Starlings, and other allied genera, possessing a certain not difficultly perceived affinity of form, with a corresponding agreement of character and manners. To this group, considered as an order, I would give the name of Vagatores, or Wanderers, by which term may be designated a habit different from the migratorial or periodical removal from one country to another, namely, that of visiting a large extent of surface in procuring their daily subsistence. It is true that the Raptores are equally Vagatores, as are Gulls, Gannets, and other birds; but it is utterly impossible to give an unexceptionable name to a group, and that which I have selected appears to me more applicable than that of Omnivorous, applied by M. Temminck to nearly the same section, since in reality only the genus Corvus is of the character implied by the term, and even of it some species are more properly vermivorous.

The order Vagatores is composed of five groups: the Bucerinæ or Hornbills, Corvinæ, Thremmaphilinæ, Paradiseæ, and Lampratorninæ. The Quiscalinæ, composed of the genera Icterus, Cassicus, Quiscalus, and some others, which various authors have associated with the Corvinæ, I should refer to the Conirostral order. It is only of the second and third of

these families, the Corvinæ and Thremmaphilinæ, that we have representatives in Britain, and even of these not more than eleven species, of which two only belong to the latter. The general characters of these two groups will be found in their proper places in the present volume. Of the order generally, the following brief characters will suffice.

The bill is stout, nearly straight, compressed towards the end, tapering, pointed, sharp-edged, the upper mandible with a slight notch or sinus. The tongue, Pl. IX, Figs. 1, 4, 6, *a*, is oblong, emarginate at the base, horny towards the end, thin-edged, slit or lacerated. The œsophagus, *b*, *c*, *d*, is rather wide, uniform; the proventriculus, *d*, bulbiform, with a complete belt of oblong or cylindrical glandules. The stomach, Figs. 4, 6, *f*, *g*, is a gizzard of moderate power, with a thin, slightly rugous inner coat or cuticular lining. The intestine, *h*, *i*, *j*, *k*, *l*, *m*, is of moderate length and diameter, slightly contracting downwards. Two very small, cylindrical adnate cœca, Fig. 3, *c*, *d*. Rectum, *a*, *b*, wider, with an oblong dilatation towards the end. Body compact, ovate; neck generally rather short or of moderate length. Legs of moderate length, rather stout; tarsus moderately long, with from seven to ten anterior scutella. Toes four, three anterior moderately spreading, first of the same length as the second and fourth, stout; third much longer; third and fourth united at the base. Claws arched, stout, compressed, acute, laterally grooved. Wings of moderate length, oblong, much rounded, the primaries narrowed towards the end, and separated when the wing is expanded; the first very short, the fourth and fifth longest.

Birds of this order are found in all parts of the globe. They are frequently gregarious; those which feed chiefly on larvæ, worms, or seeds, are always so, and the larger species, which prefer animal food, associate occasionally without quarrelling. Almost every eatable substance that can be mentioned enters into their bill of fare, although each species has its own limited range of food. The Crows are the most general eaters, the Starlings the most limited. They walk with ease, leap under excitement, or even run with considerable speed. Their flight is strong, often rapid, generally performed by regularly-timed

beats, and capable of being much protracted. They nestle and rest in high places, never on the ground, although sometimes under it, in the holes of rabbits and other small animals. Their nest is generally rude, frequently nearly flat, but of various forms according to the species. Both sexes incubate. The eggs, which vary from three to ten, are never covered when the bird leaves them. The young bird is born blind, at first thinly covered with down, and in many genera has its first plumage similar to that of the adult.

The genera of which this order is composed are Buceros, Corvus, Pica, Garrulus, Fregilus, Nucifraga, Buphaga, Gracula, Ptilonorhynchus, Sturnus, Pastor, Paradisea, Lamprotornis, and several others. They pass into those forming the next order, of which the genera Turdus, Oriolus, Cinclus, Sylvia, and Saxicola are examples.

In several respects the Vagatores are to be accounted among the most perfectly organized birds. Their digestive organs enable them to derive nutriment from a great variety of esculent substances, the stomach being intermediate between the membranous or thinly muscular kind peculiar to the carnivorous families, and the gizzards or extremely muscular kind characteristic of those strictly phytophagous. Their gressorial powers are in accordance with this character; for their moderately long and stout tarsi, with their proportionally developed toes, of which three are equal in length, enable them to search the fields and pastures, and with the aid of their arched, compressed, and acute claws, to perch with perfect security on trees, as well as to make their way among the branches. Their wings are of that form which ensures a powerful and regular flight, steady without being heavy, and buoyant without wavering, for they are broad, of moderate length, and either rounded or not pointed. The tail, which is chiefly useful for enabling birds to execute rapid turns, is short in the species which seek their food entirely on the ground, and long in those which reside chiefly in trees and bushes. Their sight is keen, and their observation not confined to objects at short distances. From their habits, they are exposed to numerous enemies; and both for this reason, and because they require to visit a

variety of scenes in the course of their daily occupations, they are endowed with mental faculties of considerable extent, so that although bold and daring on occasion, they are at the same time extremely vigilant and cautious; and although restricted by instinct to a certain course of action, are yet enabled to profit by experience. It is when domesticated that their faculties are best perceived; and then they exhibit more sagacity, and more power of adapting themselves to circumstances than perhaps any other race of birds, while their docility, always indicative of high mental power, is exceeded only by that of a very few quadrupeds.

The British species of this order belong to the families Corvinæ and Thremmaphilinæ.

CORVINÆ.

CROWS AND ALLIED SPECIES.

The extensive and generally distributed family of the Corvinæ, composed of the genera Corvus, Pica, Garrulus, Nucifraga, Fregilus, and a few others, has only nine representatives among the species that occur in Britain, and of these one is merely an occasional straggler. These birds agree in the following circumstances. They are all of considerable size, the smallest, the Jay, being about as large as a common Pigeon, while the Raven, which is the largest, equals the Domestic Cock. Their body is ovate, compact, and moderately stout; their neck short; their head large or of moderate size, oval and rather flattened above; their wings generally rather long, and much rounded.

The bill is in most cases about the length of the head, robust, nearly straight, compressed towards the end; the upper mandible with its outline more or less arched, its tip slightly deflected, the edges sharp with a slight notch or sinus close to the end. The palate is flat or concave, and the upper mandible internally is marked with several longitudinal ridges. The internal aperture of the nares is narrow and edged with small papillæ. The aperture of the glottis is defended behind by numerous papillæ, directed backwards. The tongue, Pl. IX, Fig. 1, *a*, is oblong, emarginate at the base, flat above, horny on both sides and thin-edged towards the tip, which is slit, and more or less lacerated on the margin. The fauces are of moderate width, as is the œsophagus, *b*, *c*, *d*, which is of nearly uniform diameter. The proventriculus, Fig. 4, *d*, bulbiform and encircled by a broad band of oblong or cylindrical glandules. The stomach, Fig. 2, *b*, *c*, *d*, *e*, is a gizzard of moderate power,

oblong, a little compressed; its muscular coat, *b*, *c*, *d*, thick, with two round rather large central tendons, *e*; the cuticular lining of moderate thickness, and more or less, generally slightly, rugous. The intestine is of moderate length, wider in its duodenal portion, gradually contracting as far as the cœca, Fig. 3, *c*, *d*; which are cylindrical, adnate, longer than in the diurnal rapacious birds, but in no case exceeding an inch in length, and therefore forming a complete contrast with those of the Rasores. The rectum, *a*, *b*, which is very short, scarcely a twelfth of the whole length of the intestine, is wider, and towards the end has a globular dilatation.

The eyes are of moderate size; the eyelids feathered, with a narrow crenate margin, and without ciliary bristles; the lower much larger. The nostrils are of moderate size, round or broadly elliptical, in the fore part of the very broad, short, rounded, nasal depression, and covered by reversed bristly feathers. The aperture of the ear is rather large or of moderate size, and nearly circular.

The feet are of moderate length, generally stout; the tarsus compressed with from eight to ten anterior scutella, and two longitudinal plates forming a thin edge behind. The toes are four, articulated on the same level, the first directed backwards, and stronger, but about the same length as the second and fourth, which are considerably exceeded by the third; all covered above with large scutella, padded and granulated beneath; the fourth or outer united to the third as far as the second joint. The claws are rather large, arched, compressed, more or less acute, the sides erect, and generally with an obscure groove.

The plumage is various. The feathers at the base of the upper mandible are always linear, with disunited filaments, reversed, adpressed, and covering the nostrils. The wings are long, or of moderate length, much rounded; the first quill about half the length of the fourth or fifth, which are longest; the primary quills ten; the secondary from nine to twelve, broad, and abruptly rounded. The tail varies from moderately long to very long; and presents no general character beyond being composed of twelve broad feathers.

The skeleton of these birds is of moderate strength; the

cranium proportionally large, the neck of moderate length, the thorax short and deep. The skull is broad and convex above and behind, with the septum between the orbits incomplete; the maxillary bones moderately elongated and compact; the nasal vacuity large and elliptical; and the crura of the lower jaw with an oblong vacuity near the condyle. The cervical vertebræ are generally nine; the dorsal nine, of which the two anterior have no ribs; the united lumbar and sacral ten; the coccygeal seven. There are seven very slender depressed ribs, the first incomplete, and, as well as the last, without the posterior processes. The scapula is ensiform. The furcula slender, hyoid, rather narrow, with the curve rounded. The sternum short, as in hawks, with an equally prominent ridge, the posterior part with a deep sinus on each side. Humerus of moderate length; cubital bones a fourth longer; the rest of the same length as the cubitus, consisting of two carpal bones, one large metacarpal having an oblong incomplete space towards its inner edge, a thin pollical, and three digital, of which latter there are two to the first phalanx. The femur is short, the tibia twice as long, with a slender incomplete fibula, extending only one-third down. The tarsal bone is three-sided, and a little longer than the femur. The toes are four; the hind toe composed of a distinct metatarsal bone and two phalanges; the second of three, the third of four, the fourth of five phalanges; the extreme phalanges rather long, conical, slightly arched, laterally grooved.

Their muscular system is moderately developed. The pectoral muscles are large, as are those of the legs. The skin is tough, with little subcutaneous fat.

The digestive organs are of a kind adapted for seeds, grain, and fruits, as well as flesh. The bill, a strong, pointed forceps, is capable of separating the muscles from the bones of animals, of tearing up their skin, of penetrating the ground to extract worms, or of laying hold of and breaking vegetable substances of various kinds. Although the œsophagus has no median dilatation or crop, it is yet rather wide, and capable of holding a considerable quantity of food. The stomach being a true gizzard, although not so powerful as in the Gallinæ, Perdicinæ,

or Columbinæ, it triturates grain and farinaceous or oleaginous kernels, with the aid of fragments of quartz or other hard substances. The fluid secreted by the proventricular glands acts alike on animal and vegetable substances. The intestine being of moderate length and diameter, its inner surface delicately and copiously villous, the chyle derived from the heterogeneous aliment is sufficiently absorbed without requiring large cœca, as in the Gallinæ, those organs being in the Crows merely rudimentary. The fœces and urine are deposited in the enlargement of the very short rectum, and voided in a semifluid state.

The moral characteristics common to all are cautiousness, vigilance, and considerable sagacity manifested in various ways. They are easily tamed when obtained young, can be taught to pronounce some words, and make amusing but troublesome pets, as they have a propensity to carry off and conceal anything glittering. Some, as the Rook and Jackdaw, are gregarious; others, as the Raven and Carrion Crow, unsocial.

Their flight varies, and their manners are in some respects very different. Thus, while the Raven boldly searches the mountains, the moors, the open fields, and the shores, for carrion, young birds, dead fish, and other articles of food, not disdaining larvæ, worms, and grain, the Jay glides stealthily among the trees and along the hedges, sometimes stealing into the gardens, and feeding on fruits of various kinds, pease, beans, corn, larvæ and worms. The larger species resemble the Vultures and some Gulls in their habits, while the smaller are allied to the birds of which the next family, the Starlings, are composed.

Their vision is certainly very acute, as is their hearing; but the marvellous power of smelling carrion which some species are supposed to possess is very improbable, although there is no reason for supposing that their sense of smell is not as acute as that of most other birds.

The particular form of foot which they possess, that is, a foot composed of four nearly equal toes, the third considerably longer, the first stronger and directed backwards, all with rather

long, arched, compressed and acute claws, enables them to walk on the ground with considerable ease, and even in some cases to run, although in general, when disposed to quicken their pace, they are obliged to leap. They also perch very securely on trees or stones.

They all breed very early in the season, forming a bulky and generally rather flat nest, composed of sticks and lined with soft materials. The eggs, which vary from three to seven, are marked with dark spots or freckles on a light bluish, greenish, or whitish ground. The young are born blind, and are at first slightly covered with loose dusky down. Their first plumage is coloured as in the adults, but with less gloss. The males and females are alike in external appearance; the latter somewhat smaller.

The plumage is changed once in the year, always very gradually, in summer and autumn. The feathers when old fade considerably and become more or less ragged on the edges, although much less so than in many other families. All the species are liable to albinism.

These birds are for the most part generally distributed over the country. Being more or less destructive to game, they are all proscribed, excepting the Rook, which being now better known, is not so much molested as formerly.

SYNOPSIS OF THE BRITISH GENERA AND SPECIES.

GENUS I. CORVUS. CROW.

Bill about the length of the head, straight, strong, deep, compressed towards the end; both its outlines a little convex; tarsi of moderate length, with about eight anterior scutella; wings long, straight, the fourth quill longest; tail of moderate length, rounded.

1. *Corvus Corax. Raven.* Black, splendent with purplish-blue and green; feathers of the fore-neck elongated, and lanceolate.

2. *Corvus Corone. Carrion Crow.* Black, glossy, with blue and green reflections; feathers of the fore-neck short, ovato-lanceolate.

3. *Corvus Cornix. Hooded Crow.* Grey, the head, neck, wings and tail black.

4. *Corvus frugilegus. Rook.* Black, splendent with purplish-blue and green; feathers of the neck blended, of the fore part of the head abraded.

5. *Corvus Monedula. Jackdaw.* Greyish-black, the hind-neck light grey.

GENUS II. PICA. MAGPIE.

Bill about the length of the head, straightish, strong, deep, compressed towards the end, both outlines convex; tarsi of moderate length, with about eight anterior scutella; wings rather short, slightly concave, the fourth quill longest, tail very long, graduated.

1. *Pica melanoleuca. Common Magpie.* Head, neck, back and fore-breast black; the rest, and the scapulars, white; tail splendent with green and purple.

GENUS III. GARRULUS. JAY.

Bill shorter than the head, straight, strong, compressed towards the end, both outlines convex; tarsi of moderate length, rather slender, with about eight anterior scutella; wings of moderate length, the fourth and fifth quills longest; tail rather long, rounded.

1. *Garrulus Glandarius. Blue-winged Jay.* Brownish-red; primary coverts bright blue banded with black.

GENUS IV. NUCIFRAGA. NUTCRACKER.

Bill rather long, straight, moderately strong, tapering, slightly compressed, but with the tip depressed; tarsi of moderate size, with ten anterior scutella; wings of moderate length, much rounded, the fourth quill longest; tail of moderate length, nearly even.

1. *Nucifraga Caryocatactes. Nutcracker.* Plumage brown, with numerous oblong whitish spots.

GENUS V. FREGILUS. CHOUGH.

Bill longish, slightly decurved, rather slender, tapering, of nearly equal height and breadth; tarsi rather short, with eight anterior scutella, of which the upper are blended; wings long, the fourth quill longest; tail of moderate length, nearly even.

1. *Fregilus Graculus. Common Chough.* Black, highly glossed with blue and green; wings about the same length as the tail; bill and feet vermilion.

CORVUS. CROW.

Bill rather long, straight, strong, tapering, of nearly equal height and breadth at the base, compressed towards the end. Upper mandible having the dorsal outline slightly arched, towards the end declinate, the ridge rather narrow but obtuse, the sides sloping at the base, convex towards the end, the edges direct, sharp, with a slight notch or sinus close to the tip, which is somewhat declinate, rather sharp, and projects a little; lower mandible with the angle medial, of moderate width, rather acute, the dorsal outline slightly convex, towards the end ascending, the edges sharp and slightly inflected, the tip rather acute; the gape-line straightish, towards the tip declinato-decurvate.

Mouth of moderate width; upper mandible concave within, generally with seven longitudinal prominent lines; lower mandible deeply concave, with a prominent central line; palate flat; aperture of the posterior nares edged with small papillæ directed backwards; aperture of the glottis similarly margined, and with numerous papillæ behind. Tongue oblong, at the base emarginate and papillate, flat above, horny on both surfaces, thin-edged, the point slit and slightly fimbriated. Œsophagus wide, nearly uniform in diameter, slightly contracted on entering the thorax. Proventriculus bulbiform, its glandules oblong, oblique. Stomach a gizzard of moderate size, oblong, compressed, its tendons rather large; the muscular coat thick, the cuticular lining thick, with a few deep longitudinal grooves. Intestine of moderate length, wider at the upper part, after the second turn continuing of nearly uniform diameter to the cœca, which

are very small and cylindrical; rectum enlarged, very short, with a globular dilatation at the end.

Nostrils in the fore part of the short nasal groove, which is filled up by a membrane, roundish, open, but concealed by the narrow reversed feathers, which cover a large portion of the bill. Eyes of moderate size; eyelids feathered, having a narrow crenate bare margin, but without ciliary bristles, the lower much larger. Aperture of the ear roundish, of moderate size.

Head large, oblong, rather convex above; neck rather short, strong; body ovate, compact. Legs of moderate length, strong; tarsi rather short, compressed behind, covered anteriorly with eight scutella, posteriorly with two longitudinal plates, meeting behind with a rather sharp edge; toes of moderate size, the outer adherent as far as the second joint; hind toe comparatively large, lateral toes nearly equal, third considerably longer; all covered above with a few large scutella, beneath rather flattened, granulate, and transversely sulcate; claws strong, arched, compressed, rather sharp, the first with an obscure groove on the sides, the third with the inner edge rather dilated.

Fig. 82.

Plumage generally dense, but soft, and highly glossed; the feathers of the body ovate, rounded, with longish plumules composed of a few downy filaments. Feathers on the head short; those at the base of the upper mandible linear, stiff, with short discrete barbs, directed forwards and adpressed; there is also a series of decurved bristles at the base of the rictus. Wings long, much rounded, the outer primaries separated when the wing is extended; primary quills ten, the first very short and narrow, the fourth generally longest, the third and fifth little shorter, the first five having both webs narrowed towards the end; secondary quills twelve, very broad, the outer truncato-emarginate, the inner rounded, all with a minute point.

Tail of moderate length or long, rounded in various degrees, of twelve broad, rounded feathers.

The species of this genus bear so strong a resemblance to each other that the most unpractised observer can scarcely fail to distinguish a crow. They manifest a corresponding similarity of instinct, being shy, easily alarmed, vigilant and cunning. Omnivorous in the fullest sense, they devour flesh, fish, mollusca, grubs, insects, grain, seeds, and other animal and vegetable substances; and although each species has a predilection for particular kinds of food, their choice is in no instance confined even to a few different substances. When searching for food, they betake themselves to open places, walk in a sedate manner, keep a good look-out, and on the least appearance of danger fly off to a distance. Their flight is also sedate, moderately rapid, and performed by regular beats. Their cry varies from a hoarse croak to a caw or chatter, and none of them are musical. They nestle in high places, trees, towers, buildings of various kinds, or rocks, and produce from three to nine eggs, which are deposited very early in the season. They repose at night in similar places, and when alarmed by day generally betake themselves to heights. Some species are gregarious, others unsocial, the latter being the more carnivorous; but even they are observed to associate together, when a large quantity of food attracts them to a particular place. The sexes do not differ much in external appearance, the male however being in general more robust and having the plumage more glossy. Moulting takes place in the summer months, and is very gradual. Those which are more carnivorous have the faculty of discovering carrion at a great distance, in the same manner as the Vultures, which they in some degree resemble in their habits. They are all easily tamed, and may be taught to imitate the human voice so far as to produce a few articulate sounds. In a state of domestication they are much addicted to pilfering, their depredations not being confined to articles of food, but extending to objects in no respect useful to themselves.

The affinities of this genus are various. It is allied to Pitta, Paradisæa, Glandarius, Caryocatactes, Fregilus, and many

others, according as the general aspect, the bill, the feet, or the plumage, are made objects of comparison. The Jays connect the Crows with the Titmice, which, however, are so small that the affinity is not readily perceived. The Nutcracker allies them to the Starlings, which in one direction approach the Larks; and the Fregili to Upupa, Promerops, and other allied genera. Some authors, among the rest Cuvier, consider the Crows as intimately connected with the Conirostral genera, such as Fringilla, Loxia, and Emberiza; but they are certainly much more closely allied to the Thrushes and other genera, having the bill of a more slender compressed form than the granivorous birds. It is very obvious, however, that in the arrangement of the species of land birds, excluding the Rapacious, the Gallinaceous, the Psittaceous, and a few other groups, no two persons could possibly agree, if acting separately, and trusting to their own judgment; and therefore my purpose is rather to present an intelligible account of our different species, than to enter much into critical disquisitions respecting the value and affinities of genera.

Five species of the genus Corvus occur in Britain:—the Raven, the Carrion Crow, the Hooded Crow, the Rook, and the Jackdaw. They are all permanently resident. The Magpie differs so much from the rest in the elongation of the tail, the comparative shortness of the wings, and some other circumstances, that several writers have referred it to a separate genus; but the bill, the feet, and the organs in general, are so similar, that there would be little reason for setting it apart, were there not other species having more dissimilar features. Each species differs greatly in many of its habits, so that I am unable, from my own observation, to arrive at more general conclusions than those given above. In fact, every species in existence has peculiarities both in habits and structure, which render extended generic characters, applicable to all the beings in an assumed group, impossible.

CORVUS CORAX. THE RAVEN.

RAVEN. CROW. CORBY. FIDHEACH. BIADHTACH.

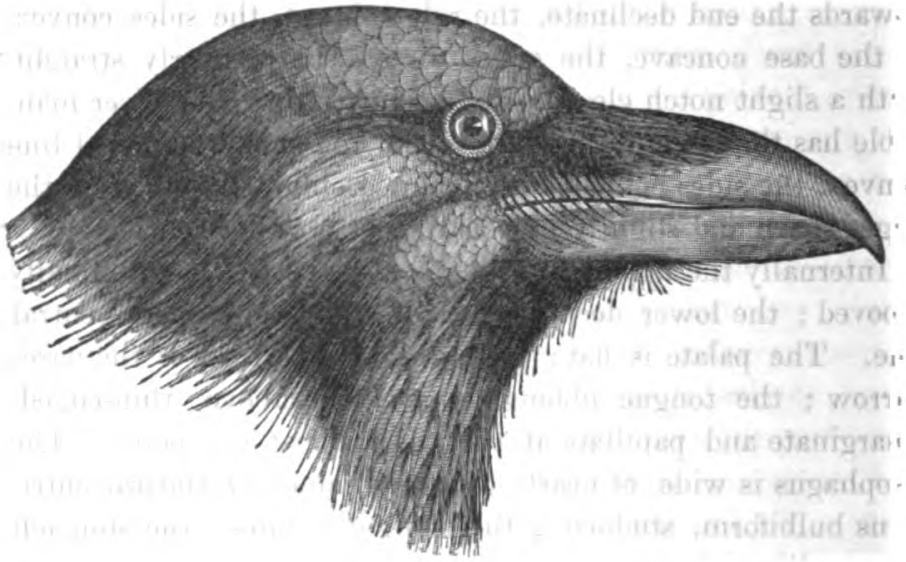


FIG. 83.

Corvus Corax. Linn. Syst. Nat. I. 155.
Corvus Corax. Lath. Ind. Orn. I. 150.
Raven. Mont. Orn. Dict.
Corbeau noir. Corvus Corax. Temm. Man. d'Orn. I. 107; III. 56.
Raven. Corvus Corax. Selb. Illustr. I. 346.
Corvus Corax. Raven. Jen. Brit. Vert. An. 145.

Of the adult male and female, the plumage black, splendent, with purplish blue reflections on the upper, and green on the lower parts; the tail much rounded, slightly bent up towards the end; the feathers of the throat lanceolate, distinct, compact, with elongated points. Of the young the colours similar, but with less lustre.

MALE.—The Raven, which is the largest species of the Crow family, is one of the most remarkable of our native birds, both

on account of its habits, and its historical, superstitious, and economical relations. With a grave and dignified air it combines great sagacity, and in courage is not much inferior even to some of the rapacious birds.

Its body is of an ovate compact form, rather bulky, the neck strong, and of moderate length; the head large, oblong, convex above. The bill is rather long, deep, and nearly straight; the upper mandible having the dorsal outline slightly arched, towards the end declinate, the ridge obtuse, the sides convex, at the base concave, the edges direct, sharp, nearly straight, with a slight notch close to the declinate tip; the lower mandible has the angle rather narrow but rounded, the dorsal line convex, the sides convex, and inclined obliquely upwards, the edges sharp and slightly inflected, the tip rather acute.

Internally the upper mandible is concave and longitudinally grooved; the lower deeply concave, with a prominent central line. The palate is flat; the posterior aperture of the nares narrow; the tongue oblong, horny, flat above, thin-edged, emarginate and papillate at the base, slit at the point. The œsophagus is wide, of nearly uniform diameter; the proventriculus bulbiform, studded with oblong glandules; the stomach oblong-elliptical, compressed, moderately muscular, its cuticular lining thin and longitudinally rugous; the intestine much wider along the extent of its first double fold, then continuing of nearly uniform diameter as far as the adnate cylindrical cœca, which are half an inch long; the rectum much wider, gradually enlarged towards the ovate dilatation. In an individual examined in May 1836, the tongue was an inch and four twelfths long; the œsophagus 7; the proventricular glandules $\frac{5}{12}$; the intestine 46, its greatest diameter about $\frac{6}{12}$, the smallest $\frac{3}{12}$; the cœca $\frac{1}{2}$; the rectum $1\frac{3}{4}$.

The eyes are of moderate size, as are the external apertures of the ears. The nostrils are also of moderate size, round, in the fore part of the short nasal space, and concealed by the reversed stiff feathers which cover nearly half the length of the mandible.

The legs are of moderate length and ordinary strength; the tarsi are covered anteriorly with eight scutella, posteriorly

with two plates. The toes are of moderate strength; the third longest, the rest nearly equal in length, but the hind one much stronger. On the first are nine, on the second ten, on the third twelve, on the fourth eleven scutella. The claws are rather large, arched, compressed, rather obtuse; those of the first and second toes slightly grooved on the sides.

The plumage is moderately full, compact, and highly glossed, the feathers with longish plumules composed of a few downy filaments. Over each side of the upper mandible, and extending beyond the nostrils, are numerous adpressed, stiff bristly feathers, with disunited filaments; and at the base of the rictus is a series of strong deflected bristle-like feathers, having a few filaments at their base. There are similar but shorter feathers at the base of the crura of the lower mandible. On the anterior part of the forehead is a transverse line of very short compact feathers; those of the fore part of the head are compact and highly glossed; on the hind part and sides of the neck the barbs are disunited; the anterior cervical are elongated and lanceolate; the rest of the feathers are ovate, rounded, and highly glossed, except the abdominal, which are loose, and softer. The wings are long and much rounded; the quills twenty-two; the primaries straight, tapering, the first short, the fourth longest, the third scarcely shorter, the fifth almost as long as the fourth, and longer than the second; the first five cut out on both webs, the outer from near the base; the secondary quills very broad, the outer abrupt, the inner rounded, all with a small tip. The tail is of moderate length, ample, and considerably rounded.

The bill, tarsi, toes, and claws are glossy black. The iris is dark brown. The general colour of the plumage is deep black, with splendent reflections of rich purplish-blue; the quills, alula, and lower parts with green tints; the abdomen tinged with brown, and without gloss.

Length to end of tail 26 inches; extent of wings 52; bill along the back 3, along the edge of lower mandible 3, depth at the base $1\frac{1}{10}$; tarsus $2\frac{3}{4}$; middle toe and claw $2\frac{7}{8}$. Of another individual, the length was 27 inches, the extent of wings 50, the bill 3, the tarsus $2\frac{1}{4}$, the middle toe and claw $2\frac{3}{4}$.

Female.—The female is similar to the male, but somewhat smaller, and having the gular feathers less elongated.

Length 25 inches; extent of wings 49.

Variations.—I have not observed any remarkable variations in the individuals which I have handled; but I once saw a raven in Harris, that was patched with white. Another entirely white was credibly reported to me to have been seen in the island of Pabbay. Messrs. Vieillot and Temminck have distinguished as a species a raven having the head, throat, abdomen, lower tail-coverts, and the greater part of the wings, white, the other parts as described above. This alleged species, which M. Temminck, however, admits only "provisoirement," is also said to have been found entirely white. "It is with some doubt," he remarks, "that I introduce this species into the catalogue of the birds of Europe. The individuals which I have seen have a more powerful bill, and are altogether of a larger size than our Raven."—"The circumstance which leads me to consider it provisorily as a species is, that Iceland abounds in Ravens, and that M. Faber asserts that the variegated individuals seen in the Feroe Isles do not occur there. Were it merely a variety of Corvus Corax peculiar to the northern regions, Iceland, Norway, the Orkneys, and the north of Asia, which are stocked with black Ravens, would supply examples of it. All the individuals alluded to, and those seen by me, have come from Feroe." I am not aware that any variegated Ravens have ever been seen in Britain, except the one mentioned above, which I frequently saw on the sand banks at Northtown, in the island of Harris; but it, and the white individual seen in Pabbay by the late Mr. Macniel, and many other persons, tend to counteract the tendency of M. Temminck's reasoning.

When new, the feathers of the upper parts are glossed with steel-blue, which by exposure changes to purplish-blue. Towards the period of moulting, the plumage in general becomes tinged with reddish-purple.

Habits.—The Raven is a remarkably grave and sedate bird,

and, unlike many men who assume an aspect of dignity, is equally noted for sagacity and prudence. It is crafty, vigilant, and shy, so as to be with great difficulty approached, unless in the breeding season, when its affectionate concern for its young in a great measure overcomes its habitual dislike to the proximity of man,—a dislike which is the result of prudence more than of mere timidity, for under particular circumstances it will not hesitate to make advances which a timorous bird would no doubt deem extremely hazardous. Either from natural instinct, or from observation and reflection, it appears to know in some measure the power of its arch enemy; and finding that its own faculties are insufficient to enable it to counteract his destructive propensities, carefully avoids coming within his reach. On the other hand it eats from off the same carcase as a dog, and takes its station close to an otter devouring its prey, doubtless because its vigilance and activity suffice to enable it to elude their efforts to inflict injury upon it; and while it yields to the Eagle, it drives away the Hooded Crow and the Gull. It knows the distance too at which it is safe from a man armed with a gun, and allows the shepherd and his dogs to come much nearer than the sportsman.

Many birds evince little dread of man. The Golden-crested Regulus, when feeding, seems to take no notice of him, and permits him to approach within a few yards or even feet; the Black Guillemot perches on the rocks within perhaps ten paces of him; and the Penguin stands stupidly looking on until he comes up and knocks it on the head. In all these cases it is not courage, but want of consideration, that is manifested. The Skua and the Iceland Falcon will boldly attack a man, when excited by the apprehension of danger to their eggs or young; even the tiny Blue Titmouse will attempt to bite his fingers when they approach its nest. There certainly is courage in the act, but in this case the courage is misapplied, being inadequate to the object. The Golden Plover, the Ring Dottrel, and the Titling, act more wisely when they feign lameness to draw him from their treasures, which they often secure in this manner; for although they may not thus impose upon a shepherd, a farmer, a sportsman, or a "field naturalist," they

often beguile boys, who can seldom resist the temptation. The Raven never ventures to attack a man plundering its nest, and rarely pretends to be crippled in order to draw him away from it, but stands at a distance, looking extremely dejected, or flies over and around him, uttering now and then a stifled croak indicative of grief and anxiety. I have, however, on such an occasion seen a Raven fly off to a considerable distance, and alighting in a conspicuous place, tumble about as if mortally wounded.

When searching for food on the ground, it generally walks with a steady and measured pace, like the Carrion Crow, the Hooded Crow, and the Rook; but under excitement it occasionally leaps, using its wings at the same time, as when driven from carrion by a dog, or when escaping from its fellows with a fragment of flesh or intestine. Its flight is commonly steady and rather slow, and is performed by regularly-timed beats of its extended wings, the neck and feet being retracted; but it can urge its speed to a great degree of rapidity, so as to overtake an Eagle or even a Hawk, when passing near its nest. In fine weather it often soars to a vast height, in the manner of the birds just mentioned, and floats as it were at ease high over the mountain tops. Some naturalists observing birds thus engaged, have imagined them to be searching for food, and have consequently amused their readers with marvellous accounts of the distances at which the Eagle can spy its prey; but had they patiently watched, they might have found that the quiet soarings of the Raven and the rapacious species have no reference to prey. On the other hand it may sometimes be observed gliding along, and every now and then shifting its course, in the heaviest gales, when scarcely another bird can be seen abroad. Although there is not much reason for calling it "the tempest-loving raven," it would be a severe storm indeed that would keep it at home when a carcase was in view.

Having enjoyed ample opportunities of cultivating an acquaintance with this species in the outer Hebrides, I shall describe its manners as observed by me in those dreary, but to the naturalist highly interesting islands. There the Raven, in search of food, may be seen, either singly or in pairs, in all

sorts of situations, along the rocky shores, on the sand fords, the sides of the hills, the inland moors, and the mountain tops. It flies at a moderate height, proceeding rather slowly, deviating to either side, sailing at intervals, and seldom uttering any sound. When it has discovered a dead sheep, it alights on a stone, a peat bank, or other eminence, folds up its wings, looks around, and croaks. It then advances nearer, eyes its prey with attention, leaps upon it, and in a half-crouching attitude examines it. Finding matters as it wished, it croaks aloud, picks out an eye, devours part of the tongue if that organ be protruded, and lastly attacks the subcaudal region. By this time another raven has usually come up. They perforate the abdomen, drag out and swallow portions of the intestines, and continue to feast until satiated or disturbed. Sometimes, especially should it be winter, they are joined by a Great Black-backed Gull, or even a Herring Gull, which, although at first shy, are allowed to come in for a share of the plunder; but should an eagle arrive, both they and the gulls retire to a short distance, the former waiting patiently, the latter walking backwards and forwards uttering plaintive cries, until the intruder departs. When the carcase is that of a larger animal than a sheep, they do not however fly off, although an eagle or even a dog should arrive. "Feris convivialis" observes Linnæus, and the fact is proverbial in the Hebrides, where this bird is named Biadhtach, and where biadhtachd, which etymologically is analogous to ravening, signifies associating for the purpose of eating and making merry. These observations I have made while lying in wait in little huts constructed for the purpose of shooting eagles and ravens from them. The latter I have allowed to remain unmolested for hours, that they might attract the former to the carrion; and in this manner I have been enabled to watch their actions when they were perfectly unrestrained.

Although the raven is omnivorous, its chief food is carrion, by which is here meant the carcases of sheep, horses, cattle, deer, and other quadrupeds, dolphins and cetaceous animals in general, as well as fishes that have been cast ashore. In autumn it sometimes commits great havock among the barley,

and in spring it occasionally destroys young lambs. It has also been accused of killing diseased sheep by picking out their eyes; but of this I have obtained no satisfactory evidence. It annoys the housewives by sometimes flying off with young poultry, and especially by breaking and sucking eggs which the ducks or hens may have deposited, as they frequently do, among the herbage.

In these islands, should a horse or a cow die, as in my younger days was very frequently the case in the beginning of summer, after a severe winter or spring, or should a grampus or other large cetaceous animal be cast on the shore, the ravens speedily assemble, and remain in the neighbourhood until they have devoured it. A large herd of Grampuses, Delphinus Orca, having been driven by the inhabitants of Pabbay on the sand beach of that island, which is one of those in the Sound of Harris, an amazing number of ravens soon collected from all quarters, and continued for several weeks to feast upon the carcases. By the time when this supply of food was exhausted, autumn was advancing, and the inhabitants became alarmed lest, should the ravens prolong their stay, they should attack their barley, which was their main stay, as they depended chiefly upon it for the means of paying their rents, a regular system of illicit distillation having, for reasons not difficult to be guessed, been permitted for many years. Various expedients were tried in vain, until at length a scheme was devised by one Finlay Morison which produced the desired effect. The ravens retired at night to a low cliff on the east side of the island, where they slept crowded together on the shelves. Finlay and a few chosen companions, intimately acquainted with the principal fissures and projections of the rock, made their way after midnight to the roosts of the ravens, caught a considerable number of them, and carried them off alive. They then plucked off all their feathers excepting those of the wings and tail, and in the morning when their companions were leaving their places of repose, let loose among them these live scare-crows. The ravens terrified by the appearance of those strange-looking creatures, which it seems they failed to recognise as their own kinsfolk, betook themselves to flight in

a body, and did not return to the island. It was in this numerous congregation of ravens that the white individual of which I have already made mention occurred, and which the people, considering it as the royal bird, regarded with a kind of superstitious reverence. On another occasion, when a whale had been cast ashore on the farm of Big Scarista, I have seen these birds impatiently waiting on the rocks around, until the people who were flencing it went home, carrying creels full of the flesh with them for domestic consumption, when the ravens descended to the carcase, and gorged themselves with all haste.

Whatever may be said by closet-naturalists as to the unrivalled adaptation of the point of the upper mandible of the Rapacious Birds for tearing flesh, I can assert from observation that the bill of the Raven is quite as efficient in this point of view. That bird can not only with great ease tear off morsels of flesh, but can pick the smallest fragments from the bones, and rend the intestines in pieces. When engaged upon a large carcase, they conduct themselves very much in the manner of the North American Vultures, as described by Wilson and Mr. Audubon. I well remember standing when a boy for a long time to observe the proceedings of about a dozen ravens devouring a dead cow that had been dragged to the sand banks on the farm of Northtown. Some were tearing up the flesh of the external parts, others dragging out the intestines, and two or three had made their way into the cavity of the abdomen. It was amusing, and perhaps might be disgusting to a delicately organised snuff-taking and clean-fingered gentleman-inspector of birds' skins, to see them drag out the intestine to the distance of several feet. While one endeavoured to separate a morsel, another pulled it from him, when a third seized it in his turn. They allowed me then to come within twenty yards or so; but when some years after I carried a gun on my rambles, I could in no instance get within shot of ravens thus occupied unless by creeping up under cover of a bank, and indeed very seldom even then, as those flying about or stationed on an eminence gave warning to the rest.

It has seemed to me strange that in a country where, under

ordinary circumstances, few ravens are seen, so many as from twenty to two hundred or more should collect in a few days. In perambulating these islands, one scarcely meets with more than a pair in the space of a mile or so; and in Harris, where their breeding places were pretty generally known to me, I could not count a dozen pairs along a coast-line of as many miles. In Pabbay, as mentioned above, several hundreds had come together, so that the people naturally marvelled whence they had arrived. If along a coast-line of ten miles there are ten pairs of ravens, with five young birds to each, or seventy in all, on one of a hundred and forty there might be nearly a thousand. Pabbay is two miles distant from Berneray, and six from Harris. Even should the wind blow in the latter direction, it is not likely that a raven should smell carrion six miles distant, and in Berneray, which the effluvia might reach, there are not usually more than three or four resident pairs. The birds of the west coast of Lewis, South Uist, and Barray, could not be guided a distance of fifty miles or more by the smell. How then did they arrive in Pabbay? It seems to me that the phenomenon may be explained thus.

The two pairs of ravens residing in Pabbay itself, would, with their broods, first perceive the carcases. Those of Berneray might stroll over, as they often do, or they might see the prey, as might those on the Harris coast. Ravens have character in their flight, as men have in their walk. A poet sauntering by a river, a conchologist or fish-woman looking for shells along the shore, a sportsman searching the fields, a footman going on a message, a lady running home from a shower, or a gentleman retreating from a mad bull, move each in a different manner, suiting the action to the occasion. Ravens do the same, as well as other birds; and so, those at the next station, perhaps a mile distant, judging by the flight of their neighbours that they had a prize in view, might naturally follow. In this manner, the intelligence might be communicated over a large extent of country, and in a single day a great number might assemble. We know from observation that ravens can perceive an object at a great distance, but that they can smell food a quarter of a mile off we have no proof whatever; and as we

can account for the phenomenon by their sight, it is unnecessary to have recourse to their other faculties.

The Raven sometimes nestles at no great distance from the Eagle, in which case these birds do not molest each other; but in general the former is a determined enemy to the latter, and may often be seen harassing it. "What a brave soldier the raven is! he fights the eagle who is four times his size," I remember hearing an old highlander say to me more than twenty years ago. But let us consider the matter.

There goes the White-tailed Eagle! Launched from the rock of Liuir she advances along the cliffs on her way to the inland hills, where she expects to find a supply of food for her young. Now she is opposite the promontory of Ui, whence, croaking in fierce anger, rush two ravens. The eagle seems not to heed them; but they rapidly gain upon her, and, separating as they come up in her wake, one ascends, the other glides beneath, menacing her, and attempting to peck at her. While she regards the one below, that above plunges towards her, but perceiving that she is ready to meet him, he reascends a few feet, the other in the meantime threatening vengeance below. I never observed however that they actually came in contact with the object of their pursuit, which seemed to regard them as more disagreeable than dangerous, and appeared to hurry on merely to avoid being pestered by them.

The shepherds and farmers, so far from molesting the ravens, are pleased when a pair of them breed on their ground, because they help to keep off the eagles; and I was once seriously reprimanded by one for shooting a raven on his grounds in the breeding season. In general, they keenly pursue all intruders that seem in any way formidable, while on the other hand they allow the Cormorant, the Rock Pigeon, and the Black Guillemot, to nestle in their immediate vicinity. I have seen pigeons' nests within thirty yards of a raven's, and although the raven might with impunity carry off the eggs or young of these birds, I have no reason to believe that it ever does.

The voice of the Raven is a hoarse croak, resembling the syllable *Crock* or *Cruck*; but it also emits a note not unlike the sound of a sudden gulp, or the syllable *Cluck*, which it seems

to utter when in a sportive mood; for although ordinarily grave, the Raven sometimes indulges in a frolic, performing somersets and various evolutions in the air, much in the manner of the Rook.

I have frequently seen Ravens perch on the roofs of huts in the Hebrides, more especially on the pole that projects at each end, and supports the heather ropes by which the thatch is secured. They also frequently visit the dunghils at their doors in the summer mornings, before the people are out of bed. They are not there, as in some parts of the country, viewed as boding death to the inmates; but it is considered unlucky for a marriage party to meet a raven, unless it should be killed, in which case the omen is good. I have no faith in the faculty which ravens, crows, and magpies, are alleged by some to possess, of discovering by the sense of smell or otherwise the existence in a house of disease or death. It is certain that ravens can have no experience in this matter; and if their natural instinct or sagacity should enable them to discover approaching death in a human being, how does it happen that they never settle on the back or in the neighbourhood of a sickly animal, until it has presented visible indications of decay?

The character of the Raven accords well with the desolate aspect of the rugged glens of the Hebridian moors. He and the eagle are the fit inhabitants of those grim rocks; the red grouse, the plover, and its page, of those brown and scarred heaths; the ptarmigan of those craggy and tempest-beaten summits. The red-throated diver and the merganser, beautiful as they are, fail to give beauty to those pools of dark-brown water, edged with peat banks, and unadorned with sylvan verdure. Even the water-lily, with its splendid white flowers, floating on the deep bog, reflects no glory on the surrounding scenery, but selfishly draws all your regards to itself. There, on the rifted crag, let the dark raven croak to his mate, while we search for the species in distant parts of the land.

According to Mr. Edmonston, Mr. Forbes, Low and others, the species is very abundant in the Orkney and Shetland Islands. In Sutherland, as I am informed by my friend Mr. Alexander MacGillivray, it is also not uncommon. In most of

the Highland districts, especially along the western shores, I have met with it here and there. In the lower parts of the middle division of Scotland it is of much rarer occurrence; nor is it plentiful even in the higher and more central portions of the southern division, although I have seen it in many places there, as among the hills of the counties of Dumfries and Peebles, the Pentland Hills, and the Lammer Moor. Not many years ago a pair of ravens used to build in the rocks of Arthur's Seat, close to Edinburgh. In England, it is much less frequently met with than in Scotland, although it seems to be generally distributed there.

If we take the whole range of the island as its residence, we must add to its bill of fare many articles not mentioned above, so as to include young hares and rabbits, other small quadrupeds, as rats, moles, and mice, young poultry, and the young of other birds, as pheasants, grouse, ducks, and geese; eggs of all kinds, echini, mollusca, fruit, barley, wheat, and oats; insects, crustacea, grubs, worms, and probably many other articles, besides fish and carrion of all sorts. The raven is therefore certainly the most typical pantophagist that exists among our native birds.

My esteemed friend, Mr. William Hogg, Stobo Hope, Peebles-shire, has favoured me with the following observations on the Raven, which are of great value, as coming from a respectable and intelligent individual, whose lot, as he says, has always been to dwell in a wild and mountainous district, where he has had opportunities of attending to many of the phenomena of nature.

"In the place where I reside at present the Ravens are seldom seen, except in their passage from one mountainous district to another. I know them by their size, by their hoarse and hollow croak, and by the height at which they fly. Their sight and smell are very acute, for when they are searching the wastes for provision, they hover over them at a great height, and yet a sheep will not be dead many minutes before they will find it. Nay, if a morbid smell transpire from any in the flock, they will watch it for days till it die. I think the Ravens which traverse the wilds of Dumfries, Peebles, Roxburgh, and

Selkirk shires, are mostly bred about the head of Moffat water, especially on the three farms of Chapelgill, Chanfren, and Polmoody. There, on the face of tremendous linns and rocks, there often juts out a dwarfish birch or mountain-ash. The same cleft of the same tree has borne a Raven's nest for centuries. No human creature can get at them. It is with difficulty the shepherd can break their eggs at a distance; but some young are always reared every year. They manifest a great hatred to the Eagle. Often have I seen, in a serene summer evening, when the noble bird set out, in her spiral course, for the higher tracks of the atmosphere—often have I seen her attacked by the Raven; but the Eagle does not mind her much, and all that she does when the crow comes near her, is to throw herself on her side, still keeping her wings extended, give two or three sharp *wheeks*, and then proceed on her journey. She soon reaches the height to which the Raven goes, who then leaves her, returns, and with great diligence reconnoitres the glens and mosses in search of plunder. Toward the Goshawk and Fox the Raven also shews great antipathy, diving through the air, and croaking in a furious manner. The Fox, if not hurried, will stand still, look up as if he would say, 'I value you not,' and then pass on; but the Goshawk* is not so passive, for though he suffers him a while, he becomes enraged at his clamour and repeated attacks, and turns to meet him, when the Raven utters a hurried *gorbel*, and leaves him abruptly. I once heard a man, whose veracity I had no reason to doubt, relate how when the Raven was diving at the Goshawk, as above related, the latter came in contact with him in the air. The Raven fell dead to the ground, and when the man went up and lifted him, his throat was found to be torn open, as if with a knife. I apprehend that all this malevolence proceeds from the circumstance that these creatures feed on the same garbage with the Raven (for the Goshawk also, as well as the Eagle, will eat of a sheep when newly dead), who is often forced away, or kept at a distance, till these more powerful plunderers are satisfied. The Raven also plunders the nests

* The bird to which Mr. Hogg here gives the name of Goshawk, is the Peregrine Falcon.

of moorfowls (Red Grouse), and carries away the contents, whether eggs or young chicks; and as he is strong, as well as sly and sagacious, he no doubt kills many of the moorfowls themselves after they are full grown. But the Raven is a magnanimous bird compared with the Hoddie or Carrion Crow, which descends to the most despicable shifts, and employs the most cruel methods to support itself that can well be imagined."

In the northern parts of Scotland, the Hebrides, the Orkney and Shetland Islands, according to my own observation and that of other individuals, the raven constructs its nest on high cliffs, both in the interior, and, more especially, along the sea-shore. But in the southern parts of the island, where rocks are not so common as tall trees, it is said frequently to nestle in the latter. According to the locality, it begins to repair its nest, or to collect materials for forming a new one, as early as from the beginning to the end of February. In the Hebrides, it is composed of twigs of heath, dry sea-weeds, grass, wool, and feathers. It is of irregular construction, and very bulky, not unlike that of the eagle, but with a deeper cavity. The eggs are from four to seven, of a rather elongated oval form, pale green, with small spots and blotches of greenish-brown and grey, having an oblong form. They vary in length from two inches and one twelfth to one inch and eleven twelfths, and in their largest transverse diameter from one inch and five twelfths to one and four twelfths, or somewhat less.

White, the historian of Selborne, gives the following account of a raven's nest in his neighbourhood. "In the centre of a grove, stood an oak, which, though shapely and tall on the whole, bulged out into a large excrescence about the middle of the stem. On this a pair of ravens had fixed their nest for such a series of years, that the oak was distinguished by the name of the Raven's Tree. Many were the attempts of the neighbouring youths to get at the eyrie; the difficulty whetted their inclinations, and each was ambitious of surmounting the ardent task. But when they arrived at the swelling, it jutted out so in their way, and was so far beyond their grasp, that the most daring lads were awed, and acknowledged the undertaking to be too hazardous. So the ravens built on, nest upon

nest, in perfect security, till the fatal day arrived in which the wood was to be levelled; it was in the month of February, when they usually sit. The saw was applied to the trunk; the wedges were inserted into the opening; the woods echoed to the heavy blows of the mallet; and the tree nodded to its fall; but still the dam sat on. At last, when it gave way, the bird was flung from the nest; and though her parental affection deserved a better fate, was whipped down by the twigs, which brought her dead to the ground."

The Reverend Edward Stanley mentions a similar "venerable establishment." "Ours," he says, "is a noble beech about ninety feet in height, in the centre of a beautiful wood, —from time immemorial called the Raven Tree. At one extremity of this wood, a noisy troop of Jackdaws have long been accustomed to rear their progeny unmolested, provided they venture not too near the sacred tree of the Ravens,—in which case, one or other of the old birds dashes upon the intruder, and the wood is in an uproar, till the incautious bird is driven off. Few have dared to scale the height of this famed tree; but the names of one or two individuals are on record, who have accomplished the perilous undertaking, and carried off the contents of the nest."

The young are at first of a blackish colour, scantily covered with soft loose greyish-black down. They are generally abroad, even in the Hebrides, by the middle of May. It has been remarked that when, during incubation, or even when the young have left the nest, one of the old birds is killed, the survivor soon finds a mate. Ravens, if unmolested, breed in the same spot year after year; but it seems strange that although they have a numerous brood, their number in any particular district does not appear to increase; nor, in so far as I have observed, do two pairs ever breed near each other.

Young.—The first plumage is of the same colour as that of the adult, but of looser texture, and less glossed. The feathers on the throat are less elongated; but there is otherwise little remarkable difference between the old and the young. After leaving the nest they continue for many weeks together, and

are fed and assisted by their parents, the flock living in great harmony, until they separate about the middle of autumn. In fact the raven is a very affectionate bird, and it is most pleasing to see an old patriarch and his mate leading their young about, warning them of impending danger, and teaching them how to search for their food.

Remarks.—Taken from the nest when nearly able to fly, the Raven is easily reared, very soon learns to feed by itself, and becomes an amusing, although occasionally mischievous pet. It defends itself against dogs and cats with great courage and success, and may be taught to pronounce words with considerable accuracy. Numerous stories are told of its thieving propensities; but let one suffice: "We have been assured," says Montagu, "by a gentleman of veracity, that his butler having missed a great many silver spoons and other articles, without being able to detect the thief for some time, at last observed a tame raven with one in his mouth, and watched him to his hiding-place, where he found more than a dozen."

Many anecdotes illustrative of the habits of the Raven in a domesticated state, and indicative of faculties superior to those of almost every other bird, might be gathered from various works; but I shall content myself with one related by the Reverend Edward Stanley, in his "Familiar History of Birds," "It occurred many years ago, at the Red Lion Inn, Hungerford; a gentleman who lodged there thus tells the story:—'Coming into the inn-yard,' says he, 'my chaise ran over and bruised the leg of a favourite Newfoundland dog, and, while we were examining the injury, Ralph, the Raven, looked on also, and was evidently making his remarks on what was doing; for, the minute my dog was tied up under the manger, with my horse, Ralph not only visited him, but brought him bones, and attended him with particular marks of kindness. I observed it to the ostler, who told me that the bird had been brought up with a dog, and that the affection between them was mutual, and all the neighbourhood had been witnesses of the many acts of kindness performed by the one to the other. Ralph's friend, the dog, in course of time, had the misfortune

to break his leg, and during the period of his confinement, the Raven waited on him constantly, carried him his provisions, and scarcely ever left him alone. One night, by accident, the stable door had been shut, and Ralph had been deprived of his friend's company all night; but the ostler found, in the morning, the door so pecked away, that had it not been opened, in another hour Ralph would have made his own entrance. The landlord not only confirmed the ostler's account, but mentioned many other acts of kindness shewn by this bird to all dogs in general, but more particularly to maimed or wounded ones.'"

I know no British bird possessed of more estimable qualities than the Raven. His constitution is such as to enable him to brave the fury of the most violent tempests, and to subsist amidst the most intense cold; he is strong enough to repel any bird of his own size, and his spirit is such as to induce him to attack even the eagle; his affection towards his mate and young is great, although not superior to that manifested by many other birds; in sagacity he is not excelled by any other species; and his power of vision is at least equal to that of most others, not excepting the birds of prey, for he is generally the first to discover a carcase. To man, however, he seems to be more injurious than useful, as he is accused of killing sickly sheep, sometimes destroys lambs, and frequently carries off the young and eggs of domestic poultry. For this reason he is generally proscribed, and in many districts a price is put upon his head; but his instinct and reason suffice to keep the race from materially diminishing. As his flesh is not palatable, it is not probable that he could be useful in the domestic state. He seems to have fewer feathered enemies than most other birds; for although he may often be seen pursuing gulls, hawks, and eagles, I have never observed any species attacking him, with the exception of the domestic cock, which I have seen give battle to him, and even drive him off. It has been alleged, however, that rooks assail him in defence of their young, and there is nothing incredible in this, for the weakest bird will often in such a case attack the most powerful and rapacious.

CORVUS CORONE. THE CARRION CROW.

CROW. GOR CROW. BLACK CROW. BLACK-NEB. CORBY CROW. HODDY. BRAN.

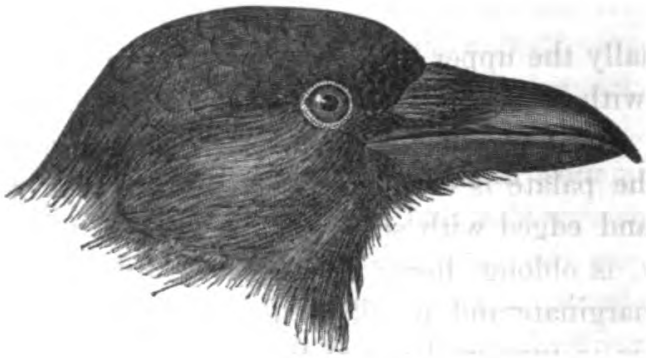


FIG. 84.

Corvus Corone. Linn. Syst. Nat. I. 155.
Corvus Corone. Lath. Ind. Orn. I. 151.
Carrion Crow. Mont. Orn. Dict.
Corneille noir. Corvus Corone. Temm. Man. d'Orn. I. 108.
Carrion Crow. Corvus Corone. Selb. Illustr. I. 349.
Corvus Corone. Carrion Crow. Jen. Brit. Vert. An. 145.

Of the adult male and female, the plumage black, highly glossed, with purple reflections above, and green beneath, the tail slightly rounded, straight; the feathers of the throat short, ovato-lanceolate, compact. Of the young the colours similar, but with less lustre.

MALE.—The Carrion Crow is so intimately allied to the Raven, that, without considering its inferior size, and some differences in the forms of the feathers, one might be apt to confound the two species. Its proportions are almost the same as those of the raven, the body being ovate, rather full and compact; the neck short and strong; the head large, oblong,

and somewhat convex above. The bill is proportionally smaller than that of the raven, but of the same form, being rather long, deep, and nearly straight; the upper mandible having its dorsal outline arcuato-declinate, the ridge obtuse but narrow, the sides convex, the edges sharp, direct, slightly arched towards the end, with a slight notch close to the declinate tip; the lower mandible with the angle of moderate width, rather acute, the dorsal line slightly convex, the sides erect and convex, the edges sharp and slightly inflected, the tip rather acute.

Internally the upper mandible is concave and longitudinally marked with seven prominent lines and intermediate shallow grooves; the lower deeply concave, with a prominent central line. The palate is flat; the posterior aperture of the nares narrow and edged with small papillæ. The tongue, Pl. IX, Fig. 1, *a*, is oblong, horny, flat above, thin-edged, slit at the point, emarginate and papillate at the base. The aperture of the glottis is margined and terminated by numerous papillæ. The œsophagus, *b*, *c*, *d*, is wide, of nearly uniform diameter, a little dilated previous to its entrance into the thorax, then slightly contracted. The proventriculus, Fig. 2, *a*, *a*, is of the ordinary form, studded all round with oblong glandules. The stomach, Fig. 2, *b*, *c*, *d*, *e*, is a moderately strong gizzard, of an irregular oblong or elliptical form, a little compressed, an inch and three quarters long; its muscular coat thick, and indistinctly separated into two lateral muscles, *b*, *c*, and an inferior, *d*; its tendons large; the middle coat thin and tough; the cuticular lining of moderate thickness, tough, with few deep longitudinal rugæ. The intestine, Fig. 1, *m*, *n*, *o*, *p*, *q*, is three feet three inches long, wider in its upper part, gradually contracting as far as the cœca, Fig. 3, *c*, *d*, which are adnate, cylindrical, five eighths of an inch long; the rectum, *b*, *c*, *d*, short, dilated towards the end.

The eyes are of moderate size, as are the external apertures of the ears; the nostrils roundish, in the fore part of the short nasal space, and concealed by the feathers.

The legs are of moderate size; the tarsi covered anteriorly with eight scutella, posteriorly with two plates meeting so as

to form an acute angle. The toes are of moderate strength; the third longest, the rest nearly equal in length, the first much stronger: the first has nine, the second eight, the third ten, the fourth nine scutella. The claws are arched, compressed, rather acute, flat beneath, that of the middle toe with an inner sharp edge, those of the first and second obscurely grooved on the sides.

The plumage is moderately full, compact, and highly glossed. On each side of the base of the upper mandible, extending beyond the nostrils, are stiff bristly feathers, with short disunited filaments, directed forwards and adpressed; and there are similar but shorter feathers at the base of the lower mandible. At the base of the rictus is a series of strong deflected bristles, having a few filaments. The feathers of the head are rounded; of the hind-neck oblong and rather blended; of the rest of the upper parts rounded and imbricated; of the throat ovato-lanceolate and rather compact; of the rest of the lower parts rounded and rather compact, unless on the abdomen, where they are loose and tufty; on the legs short, rather blended, abrupt. The wings are long, straight, and much rounded; the primary quills ten, straight, tapering, the first half the length of the fourth, and equal to the ninth, the fourth longest, the third almost equal, the fifth scarcely shorter than the third, the second one inch shorter than the fourth, and equal to the sixth; the second, third, fourth, fifth, and sixth slightly cut out on the outer, the first, second, third, and fourth on the inner web. The secondary quills, twelve in number, are large, slightly incurved, abruptly rounded and acuminate.

The bill, feet, and claws are glossy black; the iris deep brown. The general colour of the plumage is black, glossed with purplish-blue; the secondary coverts and outer secondaries with purple; the alula, primary coverts, and primaries with green; the lower parts with blue and green, excepting the abdominal feathers, which are dull and tinged with brown.

Length to end of tail 22 inches; extent of wings $41\frac{1}{4}$; wing from flexure 14, longest quill 12; tail 8; wings one inch shorter than tail; bill along the back $2\frac{1}{4}$, along the edge of

lower mandible $2\frac{2}{12}$; tarsus $2\frac{3}{8}$; hind toe 1, its claw $\frac{3}{4}$; middle toe and claw $2\frac{1}{4}$.

Female.—The female is similar to the male, but somewhat smaller. The following particulars refer to an individual sent to me from Peebles-shire, in February 1836, by the Reverend Mr. Adam.

Œsophagus $6\frac{1}{4}$ inches long, wide, slightly enlarged about the middle, at which place its diameter is $\frac{8}{12}$. Proventriculus $\frac{8}{12}$ long, its diameter less than that of the œsophagus. Stomach a moderately strong gizzard, of which the fibres are much less firm than those of the Rasores and Conirostres. It is of an irregular oblong form, a little compressed. The tendons are large, the posterior one much larger; the middle coat is thin and tough; the inner, or cuticular, of moderate thickness, with longitudinal rugæ. Intestine 46 inches long; its greatest diameter at the upper part $\frac{5}{12}$, at the middle $4\frac{1}{2}$ twelfths, at the cœca $\frac{4}{12}$. The cœca are $\frac{7}{12}$ long, their diameter $1\frac{1}{2}$ twelfth; they are cylindrical and adnate.

Length to end of tail $18\frac{1}{4}$; extent of wings 38; bill along the back 2, along the edge of lower mandible $2\frac{1}{12}$; tarsus $2\frac{1}{4}$; first toe $\frac{10}{12}$, its claw $\frac{10}{12}$; second toe $1\frac{2}{12}$, its claw $\frac{7}{12}$; third toe $1\frac{1}{2}$, its claw $\frac{8}{12}$; fourth toe 1, its claw $\frac{6}{12}$; wing from flexure $12\frac{1}{2}$; tail $7\frac{2}{12}$. Ear in its largest diameter, including the elevated margin, $\frac{5}{12}$, within the edge $4\frac{1}{2}$ twelfths.

Of another individual the dimensions were as follows:—Length to end of tail 20; extent of wings 40; wing from flexure $12\frac{1}{2}$; tail $7\frac{1}{4}$; bill along the back $2\frac{1}{12}$, along the edge of lower mandible $2\frac{1}{12}$; tarsus $2\frac{1}{12}$; first toe $\frac{3}{4}$, its claw $\frac{10}{12}$; second toe 1, its claw $7\frac{1}{2}$ twelfths; third toe $1\frac{1}{4}$, its claw $\frac{8}{12}$; fourth toe $\frac{11}{12}$, its claw $\frac{6}{12}$.

Habits.—The Carrion Crow is very uncommon in the northern and middle parts of Scotland; but in the southern division of that country, and in England, is much more numerous than the Raven or the Hooded Crow. It roosts in trees and on rocks, betakes itself in search of food to the open moors, hilly pastures, fields, and shores, and preys on small quadru-

peds, young hares and rabbits, young birds, eggs, crustacea, mollusca, worms, grubs, and grain. Its principal food however is carrion of all kinds; and it not unfrequently destroys young lambs and sickly sheep. Montagu states that he has seen it pursue a pigeon, and strike one dead from the top of a barn. As a proof of its being occasionally granivorous like the raven, I may mention that I found the stomach of one that had been trapped in Linlithgowshire in November 1834, filled with oat seeds.

The Crow is in general a solitary bird, or rather keeps in pairs, although, when there is an abundant supply of food, several individuals may occasionally be seen together. Its flight is similar to that of the raven, being generally sedate and direct, performed by regularly-timed flaps, the wings stretched out to their full extent, so that the outer primaries are separated for nearly half their length. Its mode of walking is also similar, and its cry is a croak, clearer and less sonorous than that of the Raven. At a distance it is not easily distinguishable from the Rook; but one who attends to small differences of form and habits may readily distinguish the two species. The Rook is less compact, and the feathers of its abdominal region project more, while its mode of walking is quicker, and it keeps its bill more inclined towards the ground. At hand, the species are very easily distinguished, the Rook having a bill of a different form, and the feathers at its base being abraded. Although it is said by several ornithologists to breed with the Carrion Crow, and has even been considered by some to be of the same species, I have never seen it consorting with that bird, even casually.

It nestles in rocks and tall trees, beginning as early as February to construct or repair its nest, which is bulky, composed of twigs, and lined with moss, straws, wool, hair, and other soft materials. The eggs are from four to six, of a rather elongated ovate form, pale bluish-green, spotted and blotched with dark umber or clove-brown and purplish-grey. Sometimes the eggs are nearly destitute of spots, and occasionally they are closely freckled all over with light brown. Their length varies from $1\frac{9}{12}$ to $1\frac{7}{12}$, their greatest transverse diame-

ter from $1\frac{2}{12}$ to $1\frac{4}{12}$. The young are at first scantily covered with blackish down.

I am happy in being enabled to add to the above account of a Crow, with the habits of which I am less acquainted than with those of any other British species, the following very interesting observations of my excellent friend Mr. Hogg.

" Stobo Hope, 7th January 1837.—I think I had been saying in my last that the Raven, though he often feeds on garbage, is a magnanimous bird compared with the Carrion Crow. This bird descends to the most dishonourable expedients, to support itself, of any creature that I am acquainted with. Take a short history of its conduct during the lambing season, and it will give you some idea of its deportment through life. Only two Carrion Crows constantly reside within the bounds of the farm on which I now herd; and it is seldom that I pass through the glen, at whatever season of the year, without seeing them winnowing about, or wrangling with some stranger hawk; but during the lambing season our hills swarm with them. The ewe, when about to lamb, has an aversion to the sight of any human being, and to prevent being disturbed generally retires to some distant and lonely spot. This exactly suits the villanous designs of the Crows, who no sooner perceive that the pains of parturition have seized the poor perplexed creature, than two or three pairs assemble within sight, each individual taking its station on some small eminence in the neighbourhood. When the pains are very sharp, the ewe in her struggles will sometimes throw herself on her back, or on one of her sides, from which posture she cannot recover herself, or at least not so readily as is requisite for her safety. This is the time for these relentless creatures to make their attack. They gather round, and, as if actuated by a kind of revenge, first tear out the eyes. Maddened with pain, she opens her mouth for fresh air, and bleats out in agony; when, as if watching the opportunity, they tear away a piece of the tongue, always giving a ravenous and greedy gobble when they swallow. This is not all. By the time the lamb is partially protruded, the strength of the ewe is exhausted, and her natural pains blunted, so that no further progress is made. She cannot

readily get upon her feet, and during her efforts to rise, these foul and rapacious feeders pick out the eyes, and gnaw away the tongue of the lamb; and if the ewe be much exhausted, they destroy her on the spot. Even this is not all. The lamb may be produced strong and vigorous. The hungry harpies, though in close attendance, may have found no opportunity of indulging their appetite. But, after it has won to its feet, and its mother has tenderly cleaned it, they hastily seize it by the umbilical cord, which generally breaks about a finger's length or two from the belly. At the first pull, the small intestines are uncoiled and protruded, on which the lamb directly falls and dies. The Crow is thus furnished with a good repast, and perhaps superadds a spauld from the body, or digs through the ribs for the heart, which she carries to her young, who swallow it, or whatever is brought, with considerable noise and voracity.

"I will here relate a circumstance which strongly certifies the voracious nature of this fowl, and I may add that the facts above narrated have many times come under my observation. Travelling athwart my hill, I came suddenly upon a hawk, or rather a large glede,* killing a moorfowl. How he had got it in his clutches I do not know; probably he had lighted on it by surprise, for he could not seize it in fair flight. The grouse was screeching piteously, and fluttering to get away; the glede striving to retain his hold, and keep himself uppermost. I ran to save the life of the poor thing; but my dogs hearing it to be the noise of a creature in distress, were sooner at the spot than I; the glede was obliged to relinquish his prey; and the moorfowl, when freed from the talons of its enemy, flew straight down the glen,—a direction which it would not have taken had its flight been voluntary, or not under the influence of fear. It had to pass a small clump of firs, among the branches of which a Carrion Crow chanced to rest at the time. In a moment, the Crow saw it was a fowl nearly exhausted, and darted out after it; and it was surprising to see with what rapidity she flapped her wings, and how she stretched

* Probably a Buzzard, *Buteo vulgaris*.

out her neck and beak to reach the moorfowl. But her efforts were in vain. A small ravine abruptly entered the main stream, and the grouse, no doubt balancing itself in the air to enter this hollow, hastily skimmed up its bottom. The Crow, by the rapidity of her flight, was carried quite down the glen. I saw her turn to reconnoitre; but by this time the moorfowl had regained its native heaths. As it passed me, it was now and then uttering a cry of *Uk, uk;* but when struggling with the glede, its screech was like that emitted by a domestic hen when suddenly laid hold of.

"The Carrion Crow never soars to any great height in the air, and I think, very little traverses a mountainous district, the elevated tracts being occupied by the Raven, who, on the other hand, seldom descends into the low country, unless food be scarce, or the hills covered with deep snow. Then they are obliged to scour the low parts, where animal life is more abundant, and where incessant casualties are constantly leaving some carcases on the field. Both the Raven and the Carrion Crow build with us on trees; the former on a withered trunk in the most inaccessible part of a rock or linn. The eggs may be broken, or the young killed, with stones at a distance, but it is seldom that they can be won at and carried away. But the Carrion Crow chooses a crooked birch or mountain-ash, in the bottom of the glen, and not unfrequently an old disbranched fir, in the neighbourhood of the farm-stead. There she knows she is ready for any offal that goes to the dunghil, or for a piece of rejected tripe which the kitchen-maid may leave at the stream. Nay, I have often seen them feeding on the excrement voided by sheep in the stell during the night, but this only when a heavy storm of snow was on the ground, and when the creatures had a presentiment of still more pinching weather. And here I may notice that this bird's internal perception of changes in the weather seems to be very keen and correct. If they feed with greediness, if they fly speedily and along the lower edges of the glen, but especially if they be sitting in a sheltered place when the tempest is beginning, it is a certain indication that it will increase to a hurricane.

"The Raven and the Carrion Crow employ half-rotten twigs

for an external fence to their nest; but as I have seen the Raven's only at a distance, I cannot certainly say of what materials its internal structure consists. The Crow's, however, are small twigs carefully run into each other's openings; then a layer of fresh mould fills up the larger interstices; and, lastly, a thick lining of wool and hair, which last materials I have seen them busy picking from the backs of sheep and cattle. The Carrion Crow carries the refuse of what her young do not choose to eat to a considerable distance from the nest. The other year, that pair which haunts our glen had a low green mound literally strewed with empty egg shells. Among them I noticed eggs of all the birds that resort to our mountains to hatch in the summer months, together with many of the domestic hen. The heads, legs, and bones of lambs were dropped closer to the tree."

The following account of this bird, transmitted to me by another keen and accurate observer, Mr. Weir, will be read with equal interest.

"Boghead, 6th February 1837.—A few years ago, it cost me a good deal of trouble to destroy a pair of exceedingly shy Carrion Crows, which for a long time frequented a narrow stripe of old plantation about a quarter of a mile from my house. As their nest was built at the extremity of one of the top branches of a very old and lofty Scotch fir tree, which projected a considerable way from the trunk, I could not get one of even the most audacious of our tree-climbing youths to venture to destroy it. Indeed, the attempt would have been attended with danger, as the branch upon which it rested was slender and brittle. From her lofty abode, the female, like a trust-worthy sentinel at his watch-tower, observed every thing which passed around. So cunning was she, and so acute in her hearing, that even when she was sitting on her eggs, I could not with the greatest circumspection get within reach of her.

"As I found that all my attempts were unavailing, I waited with patience until her brood were nearly ripe. With the branches of the Scotch fir I built a house within thirty yards of her nest, leaving a small hole on one side of it, in order to observe their motions. I crept into it upon my knees by a

very small aperture, and after remaining for three or four hours, I found that the Crows were fluttering in the air a few feet above my head, making the most fearful croaking, and thereby intimating that they were aware of their enemy being in ambush. I accordingly took the hint, and went home. Next day I took down my house, and built another under a thick hawthorn-hedge; and so closely was it covered with whins and grass, that I am convinced the smallest bird that flitted in the air could not see into it. There I waited with anxiety the return of the birds, but after having remained several hours, I found that they were as shy as ever. They had seen me go in, and therefore they were determined to remain at a distance, until they saw me come out again. I fell upon another plan however, which at length proved successful.

"In the course of a day or two I went back again, and took with me my servant boy. After creeping into my snug retreat, I made him shut up the entrance as carefully as he could. His departure from the place attracted their attention, and they followed him to a considerable distance, croaking very loudly. They then returned and perched on the top of a beech tree, about five hundred yards from the place where I was sitting; and there they remained upwards of an hour, looking around them with most jealous anxiety. At length the female alighted on the top of a tree about twenty yards from her nest, and after standing, almost motionless, for fifteen minutes, fed her young. Immediately on her departure the male arrived and commenced the same duty. They continued thus, in rapid succession, for a considerable time. Being now tired of sitting so long in one posture, I shot at the male, and down he tumbled.

"About three days after this I went back to despatch the female. To my astonishment, however, instead of one crow, as I expected, two alighted at the same moment on the nest, and commenced with alacrity their mutual operations. I remained a little while, and perceived that the widow, in order to assist her in her offices of love, had picked up some disconsolate widower, or disappointed bachelor. She had made choice of one of the largest and finest crows, I think, I ever

saw, as her partner for life; but alas! it was of very short duration, for in the course of a few moments I numbered her with the dead. Being anxious to ascertain whether or not the stepfather would continue to provide for his adopted offspring, I went back in about three days, when, to my surprise, I found that the sympathizing old fellow had not deserted his charge, but continued to feed them with the same unabated care as formerly. After the death of his beloved, he was a great deal more shy, for he remained scarcely a moment when he came to give the young food. On that account I found it very difficult to get a shot at him, but at length I succeeded.

"The strong attachment which the feathered kind have to their offspring is truly astonishing. Although the Carrion Crow is one of the most cunning of birds, yet I have deceived him with the young of the Rook. I once shot a female with all her brood, just as she was putting a part of a bird into the mouth of one of them. Being anxious to get the male, I took a young one out of the nest, and sent it with a boy to the rookery at Balbardie, to pick out four exactly of the same size. In this he succeeded. Having put them into the nest, I went back again in the course of two days, and shot him in the very act of feeding the young rooks with grubs.

"Carrion Crows are among the most voracious of birds. There was scarcely a pheasant's, a partridge's, or even the smallest bird's nest, that escaped their penetrating search. Nay, so very intent was the male on plunder that he used to come very early every morning into a young plantation within forty yards of my house, and examine most minutely every nest in which the hens were accustomed to lay. Even this did not satisfy his rapacious appetite; for should a duckling or a chicken happen to wander a little distance from its mother, he was sure to carry it off. In addition to these, he killed a considerable number of young hares. I have even seen him chase them and pounce upon them like a hawk, when they were more than half grown.

"Some naturalists assert that when Crows carry off eggs, they break the shell, and thrust their bills into them. Whether this be their general practice or not I cannot affirm; but I can

vouch for one fact to the contrary which came under my observation. I recollect when I was one day sitting at the side of an old wall, reading a book, a Carrion Crow flew over my head, with an egg in its bill. I halloed, and down dropped the egg into the middle of the field. On going to take it up, I found, to my astonishment, that it was whole. It was the egg of the common Wild Duck.

"The Carrion Crow is very easily tamed, and is strongly attached to the person who brings him up. I kept one for two years and a half. It flew round about the neighbourhood, and roosted every night on the trees of my shrubbery. At whatever distance he was, as soon as he heard my voice he immediately came to me. He was very fond of being caressed, but should any one except myself stroke him on the head or back, he was sure to make the blood spring from their fingers. He seemed to take a very great delight in pecking the heels of barefooted youths. The more terrified they were, the more did his joy seem to increase. Even the heels of my pointers, when he was in his merry mood, did not escape his art of ingeniously tormenting. His memory was astonishing. One Monday morning, after being satiated with food, he picked up a mole which was lying in the orchard, and hopped with it into the garden. I kept out of his sight, as he seldom concealed any thing when he thought you observed him. He covered it so nicely with earth that after the most diligent search I could not discover where he had put it. As his wings had been cut to prevent him from flying over the wall into the garden, he made many a fruitless attempt during the week to get in at the door. On Saturday evening, however, it having been left open, I saw him hop to the very spot where the mole had been so long hid, and, to my surprise, he came out with it in the twinkling of an eye."

Young.—In their first plumage the Carrion Crows are of the same colour as when full grown, but their tints are less vivid. After leaving the nest they continue for several weeks under the care of their parents.

Remarks.—This species is easily distinguished from the Raven, by its inferior size, and the shortness of the anterior cervical feathers. From the Rook it is still more easily distinguished, the bristly feathers over the bill remaining entire in it, while in that bird they are abraded; the texture and tints of the plumage are also different, as will be seen on comparing the descriptions. The Carrion Crow is much more nearly allied to the American Crow, Corvus Americanus, with which it had been considered identical, until the differences were pointed out by Mr. Audubon; see Ornith. Biogr. Vol. II, p. 323. I have carefully compared skins of the two species, and am convinced that they are different.

It is easily tamed, and in a state of domestication shews the same thieving propensities as the raven and jackdaw, carrying off to some hiding-place whatever articles strike its fancy. In activity and liveliness he is intermediate between the birds just mentioned; like them he may be taught to imitate the human voice; and his actions afford amusement to those who are fond of feathered pets, as he becomes very familiar with his friends, repels his canine foes, and contrives to console himself for the loss of liberty in the best way he can, although if his wings are left uncut he generally endeavours to regain his freedom.

According to Temminck, the Carrion Crow is dispersed over the whole extent of Western Europe, but is rare in the eastern parts. It has not been found in America.

CORVUS CORNIX. THE HOODED CROW.

GREY-BACKED CROW. GREY CROW. DUN CROW. BUNTING CROW.
ROYSTON CROW. CROW. HEEDY CRAW. FEANAG. STARAG.

FIG. 85.

Corvus Cornix. Linn. Syst. Nat. I. 156.
Corvus Cornix. Lath. Ind. Orn. I. 153.
Hooded Crow. Mont. Orn. Dict.
Corneille Mantelée. Corvus Cornix. Temm. Man. d'Orn. I. 109.
Hooded Crow. Corvus Cornix. Selb. Illustr. I. 351.
Corvus Cornix. Hooded Crow. Jen. Brit. Vert. An. 146.

Of the adult male and female, the head, fore-neck, wings and tail black, glossed with blue and green, the rest ash-grey; the tail slightly rounded, straight; the feathers of the throat short, lanceolate, compact. Of the young, the plumage all black, excepting a broad band of dusky grey round the fore part of the body.

MALE.—This species is so closely allied to the Carrion Crow, that, were the colours the same in both, it would be almost impossible to distinguish them. Some persons indeed have considered the two as probably forming only a single species; but in this opinion I do not agree with them, for reasons to be presently stated. The general form and size are about the

same as those of the species just mentioned. The bill is almost precisely similar, or, if different at all, it is perhaps not quite so robust. It is rather long, deep, and nearly straight; the upper mandible with its dorsal outline arcuato-declinate, the ridge obtuse but narrow, the sides convex, the edges sharp, direct, slightly arched towards the end, with a very slight notch close to the declinate rather obtuse tip; the lower mandible has the angle medial, of moderate width, rather acute, the dorsal line slightly convex, the sides erect and slightly convex, towards the tip sloping outwards, the edges sharp and slightly inflected, the tip rather acute.

Internally the upper mandible is concave and longitudinally marked with seven prominent lines and intermediate broad shallow grooves; the lower deeply concave, with a prominent central line. The palate is flat, the posterior aperture of the nares narrow and edged with small papillæ. The tongue oblong, emarginate and papillate at the base, flat above, thin-edged, horny, its point slit.

The eyes are of moderate size, the eyelids feathered, with narrow crenate margins. The nostrils roundish, concealed by the feathers. The aperture of the ears round, of moderate size.

The tarsi are covered anteriorly with nine scutella, posteriorly with two plates meeting at an acute angle. The toes are of moderate size; the first, which is about the same length as the second and fourth, but much stronger, has nine scutella, the second eight, the third ten, the fourth twelve; each of the anterior toes having moreover three basal scales. The claws are arched, compressed, rather acute, flat beneath, that of the middle toe with an inner sharp edge, those of the first and second obscurely grooved on the sides.

The plumage is moderately full, soft, the dark-coloured parts compact and highly glossed, the grey softer and less glossy. On each side of the base of the upper mandible, extending beyond the nostrils, are stiff bristly adpressed reversed feathers with short discrete filaments; and there are similar but shorter feathers at the base of the lower mandible. Bristles at the commencement of the gape strong and deflected. The feathers

of the head are rounded, of the hind-neck lanceolate and rather blended; of the rest of the upper parts ovate, rounded, rather indistinct; of the chin short, roundish, with separated barbs, and a long bristle point; of the throat ovato-lanceolate and compact; of the rest of the lower parts rounded and rather compact, except on the abdomen, where they are loose; on the legs short, abrupt, and rather blended. The wings are long, straight, much rounded; the primary quills ten, straight, tapering, the first half the length of the fourth and equal to the ninth, the fourth longest, the third two twelfths of an inch shorter, the fifth about equal to the third, the second one inch shorter than the fourth and equal to the sixth; the second, third, fourth, fifth, and sixth slightly cut out on the outer web; the first, second, third, and fourth on the inner. The secondary quills twelve, large, slightly incurved, abruptly rounded and acuminate.

The bill, feet, and claws are glossy black; the iris deep brown. The general colour of the plumage is ash-grey tinged with purplish, the shafts darker; the head, the fore part of the neck, the wings, and the tail black, glossed with purplish-blue and green; the secondary coverts and outer secondaries with purple; the alula, primary coverts, primaries, and tail with green.

Length to end of tail $20\frac{1}{4}$; extent of wings 39; wing from flexure 13; tail $7\frac{3}{4}$; wings $1\frac{1}{4}$ shorter than tail; bill along the back $2\frac{2}{12}$, along the edge of lower mandible $2\frac{1}{4}$; tarsus $2\frac{1}{4}$; first toe $\frac{10}{12}$, its claw $\frac{10}{12}$; second toe 1, its claw $\frac{7}{12}$; third toe $1\frac{4}{12}$, its claw $\frac{9}{12}$; fourth toe $\frac{11}{12}$, its claw $\frac{6}{12}$.

Female.—The female is similar to the male, somewhat smaller, the black less extended on the fore-neck, the grey of the back less pure.

Length 19 inches; extent of wings 38.

Habits.—The Hooded Crow is very abundant in the Hebrides, the Shetland and Orkney Islands, and most parts of the northern and middle divisions of Scotland; but is rare in the southern division, and gradually diminishes as we proceed

southward. It is not confined to the coast, but is met with in the very centre of the Grampians, and other inland districts; but in winter few individuals are found in the interior. Although somewhat more social than the Carrion Crow or the Raven, it is not gregarious, for although four or five individuals may often be seen together, more than that number seldom convene unless when attracted by an abundant supply of food. It derives its subsistence from carrion, dead fish, crabs, echini, mollusca, larvæ, grain, and other matters, it being fully as promiscuous a feeder as the Carrion Crow or the Raven, although it certainly prefers fish and mollusca to large carcases, and very rarely feeds upon a stranded whale, or even a domestic animal. Young lambs are favourite delicacies, and in severe seasons, when summer in vain struggles with winter, sometimes afford an abundant temporary supply. I am not, however, inclined to believe that the Hooded Crow often destroys these animals, nor that it ventures to attack sickly sheep. It never disputes a prize with the raven, much less the eagle, nor will it advance so near to a dog as the former of these birds, which it resembles in vigilance and cunning, but without shewing equal boldness.

Perhaps the most remarkable habit of the Hooded Crow is one which most persons who have observed it consider as indicative of the approach of rain, but which I have not found to have any connection with that phenomenon. In quiet, and more especially in dull close weather, one of them, perched on a stone or crag, continues to croak for a long time, being responded to at intervals by another that has taken a station at some distance. Its voice is not so loud or clear as that of the Carrion Crow, but resolves itself into a rather harsh sound resembling the syllable *Crăă*, pronounced by a genuine Aberdonian. On ordinary occasions, its flight is peculiarly sedate, being performed by regularly-timed slow beats; but when necessary, it can be greatly accelerated, although it never equals in rapidity that of the Raven. It also walks in the same staid manner as the Carrion Crow and the Rook, and in general wears a grave aspect, demeaning itself so as if it were not disposed to indulge in unbecoming levity. It rarely molests other birds, nor is it often attacked by any.

In districts frequented by it, you commonly find it along the shore, sometimes among the rocks, searching for crabs and shellfish, which it has sagacity enough, when it cannot otherwise open them, to raise in the air and drop to the ground; sometimes on the sandy beach, especially if fish or echini have been cast up. The latter are so frequently devoured by them in the Hebrides that they have obtained the name of Hooded Crow's Cups—cragan-feannaig. Gulls, even the strongest, rarely dispute with them on such occasions, but impatiently walk about until they choose to fly off.

Although familiar enough with this species, I have never observed it mount high into the air like the raven, for the purpose of sailing. Nor does it scour the hill tops and sides in the same free and bold manner, but rather has a skulking habit, and prefers remaining on the lower grounds, especially in the vicinity of water, whether fresh or salt. It searches the moors, however, for eggs and young birds, and commits considerable depredations upon those of the Golden Plover and Red Grouse. The eggs of Gulls and Terns it does not venture to seize upon, knowing that these birds would join in attacking any intruder.

It is said by some to assemble at times in very large flocks, apparently for the purpose of settling some important matter referring to their mutual benefit; but I have not observed any such conventions, and am disposed to consider them as merely imaginary. Nor is it necessary that they should have assemblies for the purpose of choosing partners, for, according to my observation, they remain paired all the year, and the young individuals can easily meet without having a general convocation. Several authors talk of their building in trees; but I have never seen a Hooded Crow's nest elsewhere than on a rock, and generally by the sea. It is large, composed of twigs, sea-weeds, heath, feathers, and straws, being similar to that of the Carrion Crow and Raven. The eggs, from four to six or seven in number, but generally five, are of a regular ovate form, from an inch and a half to an inch and eight twelfths long, and about one and a twelfth across; of a pale bluish-green tint, marked all over, but more thickly at the large end, with oblong and roundish spots of greenish-brown and pale

purplish-grey. They vary considerably in colour, as is the case with the other species, and in a cabinet cannot be distinguished from those of the Carrion Crow. The young are at first covered with blackish-grey down.

Young.—When fledged the young are black all over, excepting a broad band of dull grey, including the anterior half of the body and the hind-neck. After leaving the nest they continue several weeks together, and are led about and assisted by their parents. In their progress toward maturity, the grey colour becomes lighter and more extended, the black more glossy, and with brighter reflections.

Remarks.—On comparing specimens of the Hooded Crow and Carrion Crow, I cannot discover any differences in the form of the parts, or in the texture and outlines of the feathers by which they can be distinguished. Nor is there any decided difference in their size. Yet I am persuaded that the two species are perfectly distinct, for we have large tracts of country, the whole range of the Outer Hebrides for example, inhabited by the Hooded Crow, without an individual of the other species to be seen; and in districts inhabited by both they always keep separate, the Carrion Crow being moreover a much wilder bird than the other. It is alleged by some writers that these two species sometimes breed together, producing hybrids having characters intermediate between the two. How such hybrids could be recognised I am unable to conjecture; for the mere extent and tint of the grey-coloured space varies greatly in the Hooded Crow.

According to authors, this species occurs in all parts of Europe, remaining stationary in the eastern and mountainous districts, but, as M. Temminck alleges, appearing only in September and October in the western countries. In the whole of Scotland it is stationary all the year, although many individuals may probably migrate southward; but in most parts of England it appears in October, chiefly along the coast, and on the extensive maritime downs, and departs in March.

CORVUS FRUGILEGUS. THE ROOK.

CROW. CRAW. CREUMHACH. ROCUS.

FIG. 86.

Corvus frugilegus. Linn. Sp. Pl. 156.
Corvus frugilegus. Lath. Ind. Orn. I. 152.
Rook. Mont. Orn. Dict.
Freux. Corvus frugilegus. Temm. Man. d'Orn. I. 110.
Rook. Corvus frugilegus. Selb. Illustr. I. 353.
Corvus frugilegus. Rook. Jen. Brit. Vert. An. 146.

Of the adult male and female, the feathers of the anterior part of the head abraded; the plumage black, splendent, with purple, blue and green reflections; that of the neck blended, silky, steel-blue, purple and green; the bill attenuated towards the tip. The young with the head entirely feathered, the plumage black, less glossy.

MALE.—The familiar, well-known, and generally distributed Rook, one might naturally enough say, requires little description; and to many it might be sufficient to state that it is black, gregarious, and builds in tall trees; but, to be consistent, we ought to devote as much attention to the Rook as to the Raven; and, indeed, it is in many respects equally if not more deserving of regard. It is more slender and generally somewhat smaller than the Carrion Crow, which it greatly resembles when

viewed at a distance. The general form however is moderately full. The bill is of considerable length, robust, slightly arched, compressed, and tapering to a point; the upper mandible with the dorsal line arcuato-declinate, the ridge convex, the sides sloping and convex, the edges somewhat inclinate, acute, overlapping, the tip narrow and considerably prolonged; the lower mandible with the angle medial, rather narrow and acute, the outline of the crura straight, the dorsal line straight and inclined upwards, the sides flattened and inclined outwards, the edges sharp and inclinate, the tip narrow. The gape-line is slightly arched.

Internally the upper mandible is concave and longitudinally marked with seven prominent lines; the lower deeply concave, with a central prominent line. The palate is flat; the posterior aperture of the nares narrow, and edged with small papillæ, as is the aperture of the glottis. The tongue is oblong, emarginate and papillate at the base, flat above, horny, thin-edged, its point slit. At its base and under it a cavity can be produced by the dilatation of the skin in the angle of the jaw, forming a kind of pouch in which food is carried to the young. The œsophagus is wide, of nearly equal diameter, eight inches long; the proventriculus bulbiform, studded all round with cylindrical glandules. The stomach is a moderately strong gizzard of an oblong form, a little compressed, with rather large central tendons, and thin, longitudinally rugous, cuticular lining. The intestine is three feet six inches long, wider in its upper part; the cœca adnate, cylindrical, about three twelfths long, and placed at the distance of two and a half inches from the anus.

The eyes are of moderate size; the eyelids feathered, with a papillate margin; the nostrils broadly elliptical or roundish; the external aperture of the ear round, of moderate size.

The feet are of ordinary length, rather robust; the tarsus rounded before, with eight scutella, compressed, posteriorly edged, the lateral plates meeting behind. The second and fourth toes are nearly equal, the third considerably longer, all scutellate above, marginate, granulate and padded beneath; the first with eight, the second with nine, the third with thir-

teen, the fourth with eleven scutella. The claws are strong, large, arched, compressed, their sides grooved, their curve less than that of the claws of the preceding species.

The plumage is of ordinary length, highly glossed, silky, on the head and neck blended, on the back and wings rather compact, on the lower parts rather loose. The feathers are abraded from the base of the bill as far as the eyes, and from the skin of the throat to the extent of two inches from the angle of the lower mandible. The wings are long, much rounded; the primary quills straight, tapering; the first, second, third, fourth, fifth, and sixth, having the inner web cut out, the second, third, fourth, and fifth the outer. The fourth quill is longest, the third two twelfths shorter, the fifth about as much shorter than the third, the second an inch shorter than the third and half an inch longer than the sixth, the first about half the length of the fourth, and a little longer than the ninth. The secondary quills, twelve in number, are broad, slightly incurved, the outer abrupt and acuminate, the inner rounded. The wings reach to near the end of the tail, which is nearly straight, rounded, of twelve broad, broadly rounded feathers.

The bill, feet, and claws are black; the iris brown. The abraded space about the bill is dusky, with numerous whitish scurfy papillæ, each containing the base of a feather; sometimes this part, especially at the base of the upper mandible, is diseased, and I have seen the nostrils almost closed. The general colour of the plumage is deep black; the head and neck very highly glossed with vivid blue and purple reflections; the upper parts with purplish-blue; the lower with purple and a little green, the primary quills, their coverts, and the alula with green.

There is considerable variation as to size, the largest which I have examined measuring 21 inches in length, the smallest 18.

Length to end of tail $19\frac{1}{2}$ inches; extent of wings $38\frac{1}{4}$; wing from flexure $12\frac{3}{4}$; tail $7\frac{1}{4}$; bill along the back $2\frac{4}{12}$, along the edge of lower mandible $2\frac{4}{12}$; tarsus $2\frac{1}{8}$; first toe 1, its claw $\frac{10}{12}$; second toe $1\frac{1}{16}$, its claw $\frac{7}{12}$; third toe $1\frac{5}{12}$, its claw $8\frac{1}{2}$ twelfths; fourth toe 1, its claw $6\frac{1}{4}$ twelfths.

Female.—The female is precisely similar to the male, being merely a little smaller.

Length to end of tail $18\frac{1}{2}$ inches; extent of wings 36; wing from flexure 12; tail $7\frac{1}{4}$; bill along the back 2, along the edge of lower mandible $2\frac{2}{12}$; tarsus 2; first toe $\frac{10}{12}$, its claw $\frac{10}{12}$; second toe $10\frac{1}{2}$ twelfths, its claw $\frac{7}{12}$; third toe $1\frac{5}{12}$, its claw $\frac{8}{12}$; fourth toe $\frac{11}{12}$, its claw $6\frac{1}{2}$ twelfths.

Variations.—Individuals of either sex vary considerably in size. There is also a remarkable diversity in the form of the bill, which has a ruder aspect and rougher surface than in the other species, and not unusually has the point of the upper mandible a little deflected to one side. The base of the lower mandible is generally dilated, in some cases in a very remarkable degree, which is doubtless owing to the habit which the bird has of cramming its sublingual pouch with food for its young. Albino individuals sometimes occur, either pure white, or more frequently yellowish-white or cream-coloured, with the bill and feet also white, and the eyes reddish. Patches of white are also sometimes seen on individuals.

The plumage towards the period of the moult becomes ragged and as it were tarnished with brown. The feathers of an individual in a state of change shew a great difference, the old ones being dull brown, the new beautifully glossed with green and blue. The same circumstance is observable in the other species.

Habits.—The habits of the Rook form an interesting subject of observation, and have been minutely described by various writers, some of whom, not content with the phenomena presented by nature, have embellished their histories with many marvels supplied by their own active imagination. If we walk abroad in the summer mornings, in a place not remote from the haunts of this bird, we find it to be among the earliest astir of those that betake themselves to the open fields. While the dew is yet on the grass, even sometimes in the early dawn, before the sun has emerged from beneath the horizon, it urges its silent flight to some grassy field or hill,

where it feasts upon the earth-worms that usually come to the surface under night. Often too you may find it in the streets of the populous city, carefully searching for whatever is applicable to its wants among the garbage that waits the scavenger's cart.

It is pleasant and profitable to vary one's habits at times; for a naturalist in particular it were absurd to be fettered by resolutions as to the precise moment of sleeping or eating. Had I not once made an excursion at an unusual time of day, I should not have known that Rooks are early risers. The occasion was this: one night in June I had been reading of volcanoes and earthquakes, and had protracted my studies to an early hour. Just as I had fallen asleep, I was awakened by a loud noise, similar at its commencement to the report of a gun, but lengthened out into a series of undulatory sounds resembling thunder. I rose, and looking out of the window, could perceive no indications of electric explosions in the clear sky. A light mist lay over the town, and the air was so calm that not a leaf of the poplars stirred. Again another explosion, and I marvelled, listened and looked, but in vain. He who listens eagerly in the silence of a calm night hears many mysterious sounds swelling and dying away at intervals. To divine the cause of these I put on my clothes, went out by the garden door, forded the Water of Leith, and betook me to the Calton Hill.

The Hedge-sparrow and the White-throat were singing in the bushes before two; and, as I proceeded, some Thrushes and Blackbirds commenced their morning hymn, at first drowsily, and with few and unmusical notes. A watchman near Bridewell informed me that a shot or two had been fired, probably by boys. From the hill I could perceive no symptoms of thunder on the horizon, but the barking of a dog in the direction of Prince's Street came rattling back from the Abbey at such a rate, that I easily understood how the report of a pistol in so quiet a morning might be magnified into the semblance of an electric explosion. The voice of the watchman was more than stentorian. The sea, which was smooth as glass, and could not have formed a ripple on the beach of the height of a

foot, yet sent forth sounds louder than the crash of waves during a tempest.

The eastern horizon was obscured by thin vapours, which gradually changed from dull red to orange, as I seated me on a stone, impatiently to wait the appearance of the sun. Suddenly there issued from a grove to the eastward, and from the valley in which stands the ancient palace of Holyrood, two full volleys of song from a multitude of blackbirds. The music continued until half-past two, when it entirely ceased. In the meantime a drowsy Rook came flying over the hill on silent wings, steering its course with a ragged tail which the moult had deprived of several of its feathers, and without uttering a single croak. Presently came another, a third, and a fourth, all equally dull and silent. The chirping of sparrows was heard on the streets, and the little hedge-bird sent forth its lively ditty from a clump of bushes and weeds, in passing which I had been surprised by the nauseating odour which the hemlock, Conium maculatum, sent forth to the distance of several yards. By and by the Rooks returned, each having its throat distended with food. Reflecting that by this time the young were all fledged and had left their nests, and wondering why the old birds should thus toil at so early an hour, I imagined that these birds continue to provide for their offspring long after the latter have begun to seek food for themselves. The mist grew thicker, and as I had no chance of seeing the sun rise, I left the hill and walked home at three, among crowds of sparrows, as lively as if under the influence of mid-day excitement, quarrelling and bickering about the crumbs that were scattered about.

All day long you may find the Rook in the fields or pastures, diligently searching for worms and grubs, breaking up and turning over the dry cow-dung with its bill, thrusting it deep into the loose soil, or digging among tufts of grass and clover to extract the larvæ that find harbour amidst their roots. At this season, you often observe these birds scattered over the moorland haunts of the curlew and plover, and not unfrequently on the sandy or muddy beaches exposed by the tide. Towards evening, collecting into large straggling flocks, and uttering their loud and not unpleasant cries, they return to their roosts on the tall trees

of some antique mansion, where for ages, perhaps, their race has fixed its abode. During long droughts they experience great difficulty in procuring subsistence, at least in districts where there is not a diversity of soil and a variety of scenery, although in most parts of Scotland they have a choice of ground which renders them less liable to be seriously incommoded by extremes of weather. "In a hot day," says the author of the Journal of a Naturalist, "we see the poor birds perambulating the fields, and wandering by the sides of the highways, seeking for and feeding upon grasshoppers, or any casual nourishment that may be found. At those times, was it not for its breakfast of dew-worms, which it catches in the grey of the morning, as it is appointed the earliest of risers, it would commonly be famished. In the hot summer of 1825, many of the young brood of the season perished for want; the mornings were without dew, and consequently few or no worms were to be obtained; and we found them dead under the trees, having expired on their roostings. It was particularly distressing, for no relief could be given, to hear the constant clamour and importunity of the young for food. The old birds seemed to suffer without complaint; but the wants of their offspring were expressed by the unceasing cry of hunger, and pursuit of their parents for supply, and our fields were scenes of daily restlessness and lament. Yet, amid all this distress, it was pleasing to observe the perseverance of the old birds in the endeavour to relieve their famishing families, as many of them remained out searching for food quite in the dusk, and returned to their roosts long after the usual period for retiring. In this extremity it becomes a plunderer, to which by inclination it is not much addicted, and resorts to our newly-set potatoe fields, digging out the cuttings. Ranks are seen sadly defective, the result of its labours, I fear." The failures in the potatoe crops have of late years excited much attention, one consequence of which has been that the Rooks have been completely exonerated of the charge of digging up the sets, which have always been found in the ground, shrivelled, putrid, or devoured by worms. Most of the circumstances connected with this failure have been pointed out; but the farmers are deter-

mined to believe nothing, and thus we still have essays and observations on the subject, one recommending this and another that mode of treatment, and many deploring the lamentable failure of the constitution of the potatoe. Let them dung and prepare their fields in the ordinary way, plant the sets *entire* and at a proper depth, in the beginning of May; and let the soil and the weather be what they may, we shall hear no complaints as to the failure of the sets. I have tried the experiment of planting beside each other whole tubers and dry shrivelled cuts, and while some of the latter never sent out stems, all the former sprouted luxuriantly. No instance of the failure of entire sets has been recorded, and yet the farmers will not try them, because each has a theory of his own, and the rooks or the worms, or something else, are accused of an injury which is to be attributed solely to the knife of the potatoe-cutter.

"Early to bed, early to rise," is a good maxim, if received with latitude; but he who would imitate the Rooks in their bedding and rising would be a fool for his pains; for in summer he would retire to rest at ten and be up by two, and in winter would sleep from four in the evening to eight next day. Rooks and other birds labour incessantly all day long in winter, and rest two thirds of their time, and in summer, when the day is twenty hours long, they devote part of it to repose; while in the intermediate seasons, they proportion their labour and rest to the occasion, always, however, going early to bed, and bestirring themselves at dawn. It would appear that in all climates, taking the average of the whole year, birds spend at least one half of their time in repose.

In autumn, the labours of incubation and rearing their young over, and their old plumage exchanged for a new suit, the Rooks appear to live a happy life, shifting about from field to pasture, searching the potatoe and turnip grounds, spreading over the recently inundated meadows, examining the stubble-fields, and if extensive mud-flats or sandy beaches are not too distant, making daily or at least occasional visits to them. The food of the Rook consists essentially of larvæ and worms, to obtain which it digs up the roots of plants in which they are

lodged, or perforates the earth. If you watch a flock of these birds spread over a meadow, you will observe that if the wind be high they always proceed against it, but if it be calm, move about in all directions, very seldom interfering with each other. Selecting an individual for observation, you see that he walks along in a quiet manner, not ungracefully, with his body elevated considerably in front, his wings tucked up over his tail, his neck rather stretched, and his bill directed towards the ground, indicating that the objects of his search lie there. In a short time he picks up a worm and swallows it, or deposits it in his gular bag; then moves a few steps forward, suddenly stops, eyes the ground attentively for a few moments, rushes onward, and digs with his bill so furiously that the worm which he thus endeavours to seize must be nimble indeed if it can escape him. Now he attacks a large tuft of the hair-grass, Aira cæspitosa, and after much labour succeeds in digging it up by the roots, among which you perceive he has found several small grubs. In this manner he goes on for an hour or more, his companions all the time similarly occupied, and generally in silence. But now one of them on the outskirts rises on wing, and with loud cries gives intimation of danger to the rest, who instantly spring up, and amid much clamour and some confusion ascend, and fly off to some distant field. Open pastures and large fields are always preferred when a choice may be had, but sometimes they venture close to hedges, copses, or woods, or even visit gardens and orchards. In this case however they are particularly vigilant, and very frequently one or more individuals are seen perched on a wall or tree, apparently for the purpose of watching over the rest. It is generally early in the morning that they pay their visits to the gardens, dunghils, and streets.

In their distant flights they commonly proceed at a considerable height, moving with moderate speed, in a straggling disorderly band, often, especially at the outset, with much noise. Their flight is of that kind which I call sedate, being performed by regularly-timed rather slow beats of the expanded wings, direct, without undulations, and capable of being greatly protracted. Sometimes on one of their excursions, when passing

over a field or meadow at a great height, something in it appears suddenly to attract their attention, and they descend headlong, performing singular evolutions as they turn from side to side and wind among each other. In general, however, they settle with more caution, sometimes flying repeatedly over the ground, often dropping down one by one, and occasionally perching for a while in the neighbouring trees before venturing to alight.

The cry of the Rook resembles the syllable *Khraa*, more or less harsh or soft according to occasion. There is great diversity in the voice of individuals, some having much louder and clearer notes than others. Although separately their cries are monotonous and disagreeable, yet from a large flock, and at some distance, they are by no means unpleasant; and those who have become habituated to the noise of a rookery, do not generally find it annoying.

Although the staple food of the Rook is larvæ and worms, it also eats shell-fish, crustacea, coleopterous insects, lizards, seeds, especially of cereal plants, acorns, beech-nuts, portions of roots of grasses, and in winter even turnips. I have seen rooks picking at a fish on the beach, but I believe they never devour carrion, although they may be seen about a dead horse or cow searching for larvæ. While feeding, they freely associate with Jackdaws, and even Gulls; and I have seen Starlings, Redwings, Fieldfares and Missel Thrushes mingling with them without much apprehension of danger.

Rooks are not easily shot in the fields unless one come accidentally upon some that have straggled to the edge, for they are commonly shy and vigilant. At the same time they seem to calculate upon the protection which they usually receive in the neighbourhood of their breeding places, and are less shy on the lawn and in the park than on the distant pastures and in the ploughed fields. In the neighbourhood of towns they are always more wary than in the country, so that holding out a gun or a stick, or even the arm, or standing stock still, is sure to make them fly off, unless they be several hundred yards distant.

In winter they are sometimes reduced to as great straits as during a parched summer; for when snow lies for weeks on

the ground, their only sure resource is the sea-shore. On such occasions they sometimes alight on the corn-stacks and in the farm-yards, becoming bold from necessity. In a very severe winter, when the snow lay six weeks, and the Rock Pigeons and Woodcocks were found dead in the pastures, I have seen Rooks in great flocks visiting the Outer Hebrides, where none ever breed. During the heavy snow in the end of 1836, I observed that in the inland parts of Mid-Lothian, and in the county of Peebles, they resorted chiefly to the stack-yards, where they committed serious depredation by pulling out the straws to get at the grain.

Before proceeding with my own observations, I may here introduce some notes for which I am indebted to Mr. Weir:—

"Whether Rooks are more beneficial or prejudicial to mankind, is a matter of dispute. If they are destructive to the corn during harvest, they are undoubtedly of great use to the farmer during the months of spring, by destroying a vast quantity of grubs, which, in some seasons, are exceedingly hurtful to the tender shoots. By these little voracious insects I have seen many an acre of excellent oats, which to their owner held out the fairest prospect of an abundant crop, rendered wholly unfit for use. It is a fact, not generally known, that the Rooks destroy a great many of the young and eggs of different birds. Both this year and the last I have caught several of them in my rat traps, in the very act of carrying off the eggs which I had there placed as a bait for the carrion crows and magpies.

"The distance to which they fly almost every day to procure their food, is astonishingly great. The Rooks from Kirkliston have, during most part of this winter, flown every morning to the neighbourhood of Shotts, a distance of at least twenty miles, and returned late in the afternoon to their place of abode. They are excellent, I may say unerring, prognosticators of a change of the weather. If they fly back to their roost in the forenoon, or early in the afternoon, a storm of snow or rain takes place in the evening, or on the following day.

"In the rookery at Balbardie, several varieties of Rooks have occasionally been seen. Last season there was a young one of a pure white colour, but whether it was shot by some sports-

man, or died a natural death, I know not. It, however, disappeared in the course of a few weeks. I got one which had several white feathers in its wings; it was also white on the breast and the top of its head.

"They are sometimes taught to mimic different kinds of animals. There was an old woman in Bathgate who kept one for some years, which I have again and again heard imitating so remarkably well the barking of several dogs in the village, that had it been placed out of view, it would have been impossible to have discovered the deception.

"This morning (16th February 1837), I saw in a small rookery behind my house a pair of Rooks refitting an old nest which had resisted the winter's blast, and another pair carrying sticks to commence a new one. This is the earliest instance of nidification which I recollect of having seen. It was, no doubt, owing to the uncommon mildness of the day. In general, however, this does not take place before the first days of March. They are excessively shy birds. A few years ago, as they broke off a great many branches from my young apple and pear trees for building their nests, I was determined to banish them from the residence which they had so long possessed. This I found very difficult to accomplish, for after having shot once or twice at them, they recognised my dress as soon as I came within their sight, and immediately flew away. As there were several labourers draining my garden, which was a few yards from the rookery, I commonly put on one of their coats, and wrought along with them. It was only in this way that I succeeded in killing a few of them, and eventually in banishing them for the season."

About the middle of February, the Rooks having returned to their breeding places, which they commonly, or for the most part, desert in winter, begin to inspect their old tenements, and early in the following month commence the repairs rendered necessary by the dilapidation produced by the fury of the winds. From dawn to sunset all is bustle in the grove, where the younger pairs may be seen rearing their first edifice, either in a tree not previously occupied, or at a safe distance from those of the older members of the community, who incessantly, but

without confusion, ply their less laborious task. Some are seen flying abroad, others returning and bearing from the neighbourhood twigs of various trees, some of which they have broken from the branches, while others have been picked up from the ground. If you visit the rookery by day at this period, you find probably half the birds at home busily occupied, and so long as you remain at a distance not much alarmed, although now and then one calls out with a strong voice to his fellows to beware. If you advance nearer, those on the neighbouring trees fly off, making a loud and discordant noise, but alight at some distance. This commotion alarms the whole body, and should you go up to the centre of the place, they all fly away, and either keep sailing and circling about, uttering fierce vociferations, or betake themselves to the surrounding trees, whence they spring whenever they judge your proximity too close. If you shoot one of them, which you may easily do, the noise is greatly increased, and the greater part make off to a secure distance. When you have retired, you see them hastening back in groups to continue their labours, and presently all the disturbance which you have caused is forgotten. Thus even amid the anxiety and bustle of this busy season, the Rooks retain their usual vigilance, and are as little disposed as ever to favour the advances of man, although the desire of forwarding their work induces them to allow a much nearer approach than at other times.

At length, by the end of a week or ten days, the bulky edifices are completed; and when the eggs are deposited, the stir abates, although still a considerable bustle is kept up by the males, who carefully feed their mates while sitting. The nest has generally a diameter of two feet, or somewhat more, and is composed of sticks and twigs, some dry, others fresh, of ash, plane-tree, elm, fir, pear, apple, and other trees, frequently hawthorn cuttings; and is lined with fibrous roots and long straws rather neatly arranged, together with wool and other soft substances, varying according to circumstances. The eggs are four or five in number, of a rather elongated subelliptical form, having the larger end narrower than that of the eggs of the preceding species, the length varying from an inch and

eleven twelfths to an inch and nine twelfths, the greatest breadth about an inch and a quarter. They are of a light greenish-blue, blotched, clouded, spotted, dotted, or freckled with greyish-brown and light purplish-grey, sometimes so closely as nearly to conceal the ground colour. The young are hatched about the middle of April or sooner, when the season is very favourable, although in general Rooks are not much influenced by cold or heat with reference to the period at which they deposit their eggs.

These birds generally select for their breeding places the clusters of tall trees usually found in the neighbourhood of old family mansions; and being in this manner indicative of the antiquity of the house to which they have attached themselves, they become objects of interest to its members, and find protection from them. When the trees in such a situation are not numerous, the nests are sometimes crowded upon them in masses, three or four being occasionally contiguous. This season, 1837, there are on three large plane trees on the lawn at Prestonfield, the seat of Sir Robert Dick, twenty-six, twenty-five, and twenty-three nests, and on the neighbouring trees a variable number down to a single nest. But when a large wood is selected, they seldom build so closely, although even there it is not uncommon to find eight or ten on a tree. Rookeries are more numerous in highly cultivated districts, which are at the same time liberally supplied with wood. Although usually placed in tall trees, yet they are sometimes seen on such as are by no means remarkable for height, but in the latter case never elsewhere than in parks or pleasure grounds, for it is the experience or sense of security that determines their choice of a breeding place. There are several small rookeries in the heart of Edinburgh, and various authors speak of similar establishments in other cities. Instances of their building on cliffs, towers, and steeples, are also recorded, but they are very unusual. I have seen Jackdaws and Sparrows making use of the deserted nests of rooks, after the young of the latter were flown; but such occurrences are rare.

Not having visited a rookery at night, I was desirous of knowing how the birds would conduct themselves when dis-

turbed by an intruder after they had retired to rest, and accordingly went this evening, the 14th April, to that at Prestonfield in my neighbourhood. When about four hundred yards from it, I stopped to listen, and was surprised to hear several Rooks uttering a variety of soft clear modulated notes very unlike their usual cry. In the intervals I could distinguish the faint shrill voice of the newly hatched young, which their mothers, I felt persuaded, were fondling and coaxing in this manner. Indeed the sounds were plainly expressive of affection and a desire to please. Presently all became still, and I advanced until I could perceive the male birds perched on the twigs in great numbers. They had no doubt observed me, and a few seemed ready to fly off, but it was not until a loud croak from a distance, several times repeated, gave warning to the whole community, that they did so. As I proceeded, all the males removed, and ultimately, I believe, the females also; but with much less clamour than they would have used had it been day, most of them remaining mute, several uttering a kind of low grunt, expressive of dissatisfaction, others a sort of panting noise indicative of fear, and only a few croaking aloud in anger. I believe the whole colony was on wing, and wheeling over the trees, the young remaining perfectly mute. As I moved along, I heard those whose nests were behind settling in succession on the twigs, and before I had retired to the distance of four hundred yards, they all seemed to have returned. Their flight on this occasion was singularly wavering, undulatory, and undecided, and the strong flappings of their wings were distinctly heard, it being a calm evening. After they had all regained their tranquillity, a few croaks only being heard now and then, I broke a stick to see what effect the noise might have, when a few that were on some trees nearer than the rookery flew off in silence. A repetition of the noise produced the same effect, but the sound did not disturb the main body. I then clapped my hands, when presently all was mute, and so long as this sound was repeated, no cry was emitted. They seemed to watch in silence my further proceedings; and, on my ceasing, the rookery resumed its natural state: a young bird now and then uttered its faint cry, on which an old one emitted its cu-

rious modulated notes, and a gruff old fellow or two croaked aloud at intervals. The great variety of notes emitted by the Rooks under these different circumstances greatly surprised me; for although I had been aware that their cry is not always merely a *Craa*, I did not imagine that their voice was capable of presenting so many modifications.

The young are generally fledged about the 20th of May, and when they make their appearance on the edge of the nests, and perch on the branches, afford what some people are pleased to call good sport; in other words, are shot in great numbers. But, in many cases, they are taken from the nest by boys in various stages of growth. This devastation is permitted by their patrons, who, although proud of having a rookery near their mansion, are unwilling to be incommoded by an unnecessary increase of its inmates. Young Rooks are variously reported to be delicate, tolerable, or disgusting eating; but as I have not tasted their flesh I am unable to decide in this matter.

The food with which they are supplied consists chiefly of grubs, worms, and seeds, and is conveyed in the mouths of their parents, who continue gathering until the mass accumulated causes the skin of the throat and between the crura of the lower mandible to protrude. This circumstance however is not peculiar to the Rook, for I have seen the Robin, the Thrush, and other small birds, going to their young with their mouths quite filled with insects. It is pleasant to observe with what activity the Rooks cater for their brood, and how much self-denial they evince in endeavouring to procure an abundant supply for them. Their whole life is one of ceaseless activity, and therefore must be one of pleasure. All day long they labour in the fields and pastures, digging among tufts of decayed grass, thrusting their bills into the soft earth, or picking up the worms, mollusca, and seeds that are found on the surface. The acuteness of their sight must be very great, as we may be convinced from such circumstances as the following. In March of the present year, when the ground was covered with snow to a considerable depth, I observed on the road about fifty rooks crowded together, and busily engaged in picking up something. On going to the

place, I could perceive nothing but some mud and small stones partially covered with half-melted snow; but on poking about with the point of my umbrella, at length discovered a number of grains of wheat which had been spilt in the course of a wheel track. From early dawn until after sunrise they are generally abroad, but in summer they usually repose for a time in the middle of the day. Towards evening, collecting into large straggling flocks, and uttering their loud and not unpleasant cries, they betake themselves to their roosts, first wheeling round in irregular gyrations, with clamorous joy, then settling in succession, and after a while sinking into repose. As they neither attack other birds, nor are liable to be molested by rapacious species, their life is comparatively quiet. From the middle of June to the end of September, their plumage undergoes its annual renovation; and so gradual in general is the change, that the simultaneous loss of a few feathers in the wings or tail has little effect upon their flight, although individuals are sometimes seen that experience considerable difficulty in maintaining their ordinary speed. Their quills are often collected by the herds, and although small, are superior to goose quills for writing, provided the fingers of the person using them be sufficiently flexible and delicate to adapt themselves to so slender an instrument.

Young.—The young are at first nearly bare, and of a blackish colour. When fledged, they are similar to the old birds, but with much less gloss on their plumage, and having this remarkable difference, that the fore part of the head is feathered, and the nostrils and base of the bill concealed by straight and stiff narrow feathers, as in other crows. It is only after they have been abroad for some weeks that these parts begin to be abraded.

In some rookeries, especially those of small extent, in open places, both young and old fly off in June, while in others they remain all the year. In the former case, they generally return for some days in autumn, and again absent themselves until spring. I have not, however, been able to discover the causes of these apparent anomalies.

CORVUS MONEDULA. THE JACKDAW.

DAW. KAE. CATHAG.

FIG. 87.

Corvus Monedula. Linn. Syst. Nat. I. 156.
Corvus Monedula. Lath. Ind. Orn. I. 154.
Jackdaw. Mont. Orn. Dict.
Choucas. Corvus Monedula. Temm. Man. d'Orn. I. 111.
Jackdaw. Corvus Monedula. Selb. Illustr. I. 356.
Corvus Monedula. Jackdaw. Jen. Brit. Vert. An. 147.

Of the adult male and female, the plumage greyish-black, the hind-neck light grey, the head anteriorly glossed with blue, the primary quills, alula, and tail with green, the secondary quills with purple; the bill rather shorter than the head, subconical.

MALE.—In form the Jackdaw is more compact, and in action more lively, than any other British bird of the genus. It is about the size of the domestic pigeon, with the body ovate, the neck rather short, the head large, the feet, wings, and tail of moderate length. The bill is rather shorter than the head, strong, more conical than in the other species; the upper mandible with the dorsal outline declinate and slightly arched,

the sides convex, the edges rather sharp, and having a slight sinus close to the narrow but rounded tip; the lower mandible with the angle rather short, of moderate width, the sides erect, slightly convex, the edges sharp and involute, the dorsal outline very slightly convex, the tip compressed and rather acute. The gape-line is almost straight.

Internally the upper mandible is concave, with a prominent central and on each side two lateral lines; the lower deeply concave, with a central ridge. The palate is flat; the posterior aperture of the nares narrow and edged with papillæ. The tongue is oblong, emarginate, and papillate at the base, sharp-edged, horny, slit at the point, ten twelfths of an inch long. The œsophagus is four inches and a half long; the stomach elliptical, moderately muscular, with a tough rugous cuticular lining; the intestine twenty-seven inches long; duodenum five, with a diameter of four twelfths, the rest diminishing to three and a half twelfths; the cœca four twelfths long, half a twelfth in diameter; the rectum an inch and a half long.

The eyes and apertures of the ears are of moderate size; the nostrils oval, in the fore part of the broad nasal membrane, and concealed by the reversed bristly feathers.

The feet are of ordinary length, strong; the tarsi covered anteriorly with eight scutella, behind with two plates, the lower part transversely rugous; the first toe with nine, the second with eight, the third with eleven, the fourth with nine scutella. The claws are strong, compressed, arched, tapering; that of the hind toe has the sides flat, of the middle toe considerably curved outwards.

The plumage of the head and neck is soft, elongated, and blended, excepting on the forehead, where it is of ordinary length and glossy. The rest of the plumage is rather full and soft, the feathers indistinctly defined, their margins loose. The wings are rather long, rounded, very broad at the commencement, but suddenly tapering towards the end. The first primary quill is short, the third longest, the fourth about one twelfth of an inch shorter, the second half an inch shorter than the third, and about equal to the fifth, the first equal to the ninth; the outer primaries narrowed as in the other species.

The secondary quills ten, broad, obliquely rounded with a minute acumen. The tail is straight, rounded, of twelve broad rounded feathers.

The bill and feet are black. The irides greyish-white. The upper and forepart of the head is black, with purplish-blue reflections; the parts about the eye and the throat are blackish, tinged with grey; the ear-coverts, hind part and sides of the neck bluish-grey. The rest of the plumage is greyish-black, on the lower parts approaching to leaden grey; the wings and tail black, the primary quills, alula, and the tail glossed with gréen, the secondary quills with purple.

Length to end of tail $14\frac{1}{2}$ inches; extent of wings 30; wing from flexure 10; tail $5\frac{1}{2}$; bill along the back $1\frac{1}{4}$, along the edge of lower mandible $1\frac{1}{2}$; tarsus $1\frac{9}{12}$; first toe $\frac{9}{12}$, its claw $8\frac{1}{2}$ twelfths; second toe $10\frac{1}{2}$ twelfths, its claw $5\frac{1}{2}$ twelfths; third toe $1\frac{2}{12}$, its claw $7\frac{1}{2}$ twelfths; fourth toe $\frac{9}{12}$, its claw $5\frac{1}{2}$ twelfths.

Female.—The female differs so little from the male that one can scarcely determine the sex without internal inspection; the light grey on the neck is not so pure or extended, but the plumage in every other respect is similar.

Length to end of tail 14 inches; extent of wings 28; wing from flexure $9\frac{3}{4}$; tail $5\frac{8}{12}$; bill along the back $1\frac{5}{12}$, along the edge of lower mandible $1\frac{6}{12}$; tarsus $1\frac{8}{12}$; first toe $\frac{10}{12}$, its claw $9\frac{1}{2}$ twelfths; second toe $\frac{10}{12}$, its claw $\frac{6}{12}$; third toe 1 inch two and a half twelfths, its claw $6\frac{3}{4}$ twelfths; fourth toe 1, its claw $\frac{5}{12}$.

Variations.—Individuals vary a little in size, the largest being fifteen inches long, or a little more, the smallest fourteen, or a little less; but I have not seen any so short as $12\frac{3}{4}$, the measurement given by Mr. Jenyns and Montagu. White individuals have been seen; sometimes the plumage is variegated or patched with white; but these variations are so rare that one may look after white Jackdaws for twenty years without finding one. The recent plumage is more highly glossed, but the moult effects no other change.

Habits.—The Jackdaw is a remarkably active, pert, and loquacious little fellow, ever cheerful, always on the alert, and ready either for business or frolic. If not so respectable as the grave and sagacious raven, he is at least the most pleasant of the family, and withal extremely fond of society, for not content with having a flock of his own folk about him, he often thrusts himself into the midst of a gang of rooks, and in winter sometimes takes up his abode entirely with them.

The flight of this species is similar to that of the rook, somewhat more rapid, generally extremely wavering, the bird frequently shifting its direction, now dashing downwards, then curving up again, shooting obliquely to either side, and performing as many evolutions as if it could not follow a direct line, which, however, it sometimes does when in great haste. It is also extremely clamorous, and its note being loud and clear, resembling the syllable *Kae* or *Caw*, variously modulated, the noise emitted by a large flock, although in no degree musical, is far from being unpleasant.

Jackdaws inhabit deserted buildings, steeples, towers, and high rocks, especially those along the coast. Sallying from thence at early dawn, they betake themselves to the pastures, meadows, or ploughed fields, to search for larvæ, worms, insects, and in general the same sort of food as the rooks, with which they often associate on their excursions. They walk gracefully, and much more smartly than the rooks, often running under excitement, and frequently quarrelling together, although without any serious results. They do not despise carrion, and on the shore will occasionally feed on shell-fish, crustacea and fishes, being nearly as omnivorous as the Hooded Crows, although giving a decided preference to larvæ. They are scarcely less vigilant than the rooks, at least while in the fields, so that it is not always easy to get within shot of them; but in the breeding season one may readily procure specimens by concealing himself in the midst of their haunts.

This is one of the few birds that habitually or occasionally reside in the heart of cities, where it selects a steeple, a church tower, or any other high building in which it can find a sufficient number of secure retreats. In Edinburgh, for example,

it frequents Heriot's and Watson's Hospitals, the University, the Infirmary, the Chapel of Holyroodhouse, and the Castle, although in the latter it is chiefly in the rock that it takes up its abode. In the country, ruinous castles are its favourite places of resort, and it is found, for example, at Dunottar, Rosslyn, and Tantallon Castles, and the buildings on the Bass. It also not unfrequently finds refuge in high rocks, as at the Cove near Aberdeen, and in other places along the coast; and in defect of more agreeable lodgings, will sometimes settle in a wood.

In these places also it nestles, as well as not unfrequently in the interior of chimneys in which fire is not kept. The nest is fixed in any convenient recess, on a cornice or other projecting part of a building, in the hole of a spout, or, in short, in any place that seems suitable. It has a base-work of sticks, on which is laid a quantity of straw, wool, feathers, and other soft materials. The eggs are from four to seven, generally five, of a regular oval form, broader in proportion to their length than those of the other species, much lighter also, being of a very pale greenish-blue, or rather bluish-white, covered, more profusely at the larger end, with small, round, separated spots of dark brown and pale purplish. They vary in length from an inch and four twelfths to an inch and six twelfths, in diameter from eleven and a half twelfths to a twelfth more. The eggs are generally deposited in May, and the young are abroad by the end of June.

Like the Wheatear, it has sometimes been found to nestle in a rabbit's hole. Thus, White relates that a gentleman residing near Chichester informed him that " many daws build every year in the rabbit burrows under ground. The way he and his brothers used to take their nests, while they were boys, was by listening at the mouths of the holes, and if they heard the young ones cry, they twisted the nest out with a forked stick." " Another very unlikely spot," he adds, " is made use of by daws as a place to breed in, and that is Stonehenge. These birds deposit their nests in the interstices between the upright and the impost stones of that amazing work of antiquity; which circumstance alone speaks the prodigious height

of the upright stones, that they should be tall enough to secure those nests from the annoyance of shepherd boys, who are always idling round that place."

Like the Sparrow, the Chaffinch, and some other birds that breed in the vicinity of man, it sometimes lines its nest with a strange assortment of articles. Thus, it is related that a soldier having climbed to the nest of one in the ruins of Holyrood Chapel, for the purpose of recovering a piece of lace, found in addition part of a worsted stocking, a silk handkerchief, a frill, a child's cap, and several other things, which it had picked up from the streets.

Jackdaws often obtain a large proportion of their food in the streets, which they frequent more especially in the mornings, along with Pigeons, and sometimes Rooks. On these occasions they pick up the refuse of whatever serves as food to man. Like the Starling and the Magpie, they sometimes alight on sheep and cattle, apparently for the purpose of searching for the ticks and other animals among their hair. They are not so shy as Rooks when in privileged places, enter a garden with little fear, and are easily enticed to a particular spot by placing food for them. Thus in towns persons, for amusement, draw them to their windows, along with Pigeons and Sparrows; but they are always more suspicious than these birds, and on obtaining a morsel, rather than eat it at once, usually fly off with it to some more secure place.

The Jackdaw, in fine, is possessed of considerable penetration, being shy where there may be danger, familiar where there is little to fear. He has evidently observed the effects of fire-arms, or at least has noticed that an alarming noise proceeds from them, so that the holding up of a stick is generally sufficient to frighten him, and he allows an unarmed person to approach nearer than another. Being truly omnivorous, he searches all sorts of places for food, from the streets of the populous city to the hill pastures and the shores of the sea, suiting the times of visiting these places to circumstances, taking the early morning for his urban rambles, and the time of ebb for his marine excursions. Many stories are told of him, and of the perils encountered by boys in plundering his nest, as well as of

his habits in a state of domestication, to which he is easily reduced, but in which, although pleasing on account of his liveliness, as well as his capability of being taught to pronounce words, he is troublesome and occasionally mischievous, through his propensity to carry off and conceal articles of value although useless to him ;—a propensity common to most if not all the crows, and of which the original object has not been discovered. If the brains of birds are capable of being mapped, certainly the parish of acquisitiveness ought to be remarkably large in these species, as well as those of cautiousness and prudence, for the dread of man in birds unable to cope with him is evidently not cowardice, but a reasonable and estimable feeling.

Young.—The young, which at first are covered with a dusky down, are when fledged of the same colours as the adult, the grey of the neck a little less pure, and the feathers in general not so glossy.

Remarks.—The Jackdaw is generally distributed in England and Scotland, although there are large tracts, the Outer Hebrides for example, in which it does not occur. It is represented as inhabiting most parts of the Continent, but has not been found in America.

Several species of the genus are very nearly allied to it, particularly Corvus bengalensis. Taking European birds only into consideration, it forms the transition to the Magpie.

PICA. MAGPIE.

Bill about the length of the head, straight, strong, tapering, of nearly equal height and breadth at the base, compressed towards the end. Upper mandible having the dorsal outline slightly arched, towards the end declinate, the ridge narrow, the sides sloping at the base, convex towards the end, the edges direct, sharp, with a slight notch or sinus close to the tip, which is declinate, rather sharp, and projects a little; lower mandible with the angle medial, of moderate width, rather acute, the dorsal outline slightly arched and ascending, the edges sharp and slightly inflected, the tip rather acute. The gape-line straight, towards the end declinato-decurvate.

Mouth of moderate width; upper mandible concave within, and grooved; lower mandible deeply concave, with a prominent central line; palate flat; aperture of the posterior nares edged with small papillæ directed backwards; aperture of the glottis similarly margined, and with numerous papillæ behind. Tongue oblong, narrow, emarginate and papillate at the base, flat above, horny on both surfaces, thin-edged, the point slit. The intestinal canal of the common species is in all essential respects precisely similar to that of the Crows.

Nostrils in the fore part of the short nasal groove, which is filled up by a membrane, roundish, open, but concealed by the narrow reversed feathers, which cover a large portion of the bill. Eyes of moderate size; eyelids feathered, having a narrow crenate bare margin. Aperture of the ear roundish, of moderate size.

Head large, oblong, rather convex above; neck rather short,

strong; body ovate, compact. Legs of moderate length, strong; tarsi of ordinary length, compressed behind, covered anteriorly with eight scutella, posteriorly with two longitudinal plates meeting behind with a sharp edge; toes of moderate size, the outer adherent as far as the second joint; hind toe comparatively large, lateral toes nearly equal, third considerably longer; all covered above with a few large scutella, beneath padded, granulate, and transversely sulcate; claws strong, arched, compressed, sharp, generally with an obscure groove on each side, the third with the inner edge considerably dilated.

Plumage generally full, soft, more or less blended, and glossed; the feathers of the body ovate, rounded, with longish plumules composed of a few downy filaments. Feathers on the head short; those at the base of the upper mandible linear, stiff, with short discrete barbs, directed forwards and adpressed; there is also a series of decurved bristles at the base of the rictus. Wings of moderate length, much rounded, the outer primaries separated when extended; primary quills ten, the first very short, extremely narrow, and falciform, the fourth and fifth longest, the sixth longer than the third; the first five having both webs narrowed towards the end; secondary quills twelve, long, broad, rounded with a minute tip. Tail very long, graduated, of twelve broad, rounded feathers.

The birds whose principal characters are included in the above generic description, form a group which some have considered as a genus, others as a section of Corvus, and others again as associated with the Jays under a common generic name, Garrulus. It is no doubt very true, as M. Temminck remarks, that the Magpies and the Jays are so allied that it is difficult to separate them by a decided line; but this is equally the case with many generally acknowledged genera; and if Pica is to be united with Garrulus, it has at least an equal claim to be united with Corvus, from which it differs, not in the bill, feet, and digestive organs, but in the greater length of the graduated tail, and the comparative shortness and concavity of the wings. Magpies then may be considered as Crows, with the wings shortened and the tail lengthened. These circum-

stances induce a great difference in the habits of the birds subjected to them. The Magpies reside in trees and copses, search for food in the vicinity of places to which they can retreat in case of danger, rarely betake themselves to open pastures and moors, fly in a steady manner but with little speed, move on the ground by walking and leaping, and make their way among the branches with great agility. Instead of the croak or caw of the Crows, they have generally a chattering kind of cry. They are as omnivorous as the birds of the preceding genus, equally vigilant and cunning, and not less mischievous, although, being smaller, they are not so injurious to man.

Only one species occurs in this country, Pica melanoleuca, which is common to Europe and North America, the specimens from the latter country which I have seen differing in no essential characters from ours.

PICA MELANOLEUCA. THE COMMON MAGPIE.

PYET. PIANET. MADGE. MAG. PIOGHAID.

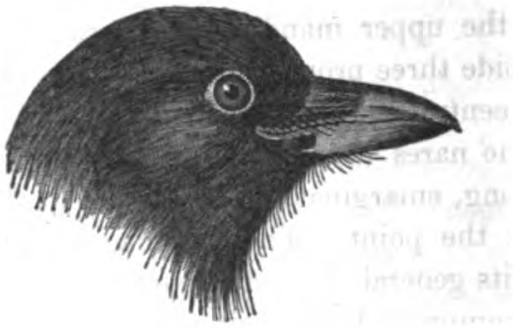


FIG. 88.

Corvus Pica. Linn. Syst. Nat. I. 157.
Corvus Pica. Lath. Ind. Orn. I. 162.
Magpie. Mont. Orn. Dict.
Pie. Corvus Pica. Temm. Man. d'Orn. I. 113.
Pie. Garrulus Picus. Temm. Man. d'Orn. III. 63.
Magpie. Pica melanoleuca. Selb. Illustr. I. 358.
Corvus Pica. Magpie. Jen. Brit. Vert. An. 147.

Plumage of the head, neck, back, anterior part of breast, and abdomen, black; of the rest of the breast, and the outer scapulars, white; tail very long, splendent with green and purple, as are the wings, the greater part of the inner web of the outer quills of which is white.

MALE.—The Magpie is among the most beautiful of our native birds, both with respect to the elegance of its form and the splendour of its plumage, although when seen at a distance one might imagine it to be merely black and white. The Crow to which it approaches nearest in form is the Jackdaw, which it greatly resembles in the form of the bill, the head, the neck, and the feet; but its wings are proportionally

shorter, and its tail extended so as to exceed the body greatly in length.

The bill is about the same length as the head, robust; the outline of both mandibles slightly arched, their ridge narrow, the sides convex, the edges sharp and inflected, the tips rather sharp, the upper with a slight notch on each side. The gape-line is nearly straight until near the end, when it is slightly arched.

Internally the upper mandible is concave, with a central, and on each side three prominent lines; the lower deeply concave, with a central ridge. The palate is flat; the posterior aperture of the nares narrow and edged with papillæ. The tongue is oblong, emarginate and papillate at the base, horny, edged, slit at the point. The œsophagus is four and a half inches long, its general diameter five twelfths. The stomach is elliptical, compressed, an inch and a half long, one and a twelfth broad; its muscular coat strong; the cuticular lining rather thick, with prominent circular rugæ. The intestine is twenty-eight inches long, three twelfths in diameter at the upper part. The rectum is two inches long, five twelfths in diameter. The cœca are adnate, cylindrical, four twelfths long.

The eyes and the apertures of the ears are of moderate size, the latter roundish, three twelfths in diameter. The nostrils roundish, rather large, covered by the reversed feathers.

The feet are of ordinary length, strong; the tarsi covered anteriorly with eight large scutella, posteriorly with two plates. The first, second, and fourth toes are about equal in length, the third considerably longer; the first has eight, the second nine, the third eleven, the fourth ten scutella. The claws are strong, compressed, arched, acute, with a broad groove on the sides.

The plumage is full, very soft, generally blended. Feathers of the head rather short, rounded; of the throat rounded, with separated barbs and a bristly tip; of the fore part of the back full, of the middle very soft and downy; of the lower parts full and blended. Wings of moderate length, rather convex; much rounded; coverts and quills all splendent on their ex-

posed parts. The first quill is little more than a third of the length of the longest, attenuated and falciform; the second is two inches longer; the third one inch longer than the second; the fourth, which is longest, is half an inch longer than the third; or frequently the fifth is longest: the first six are more or less attenuated on both webs. The secondary quills, ten in number, are long, broad, and rounded, with a minute tip. The tail is very long, being considerably longer than the body, straight, of twelve broad feathers, which are rounded with an acumen, and graduated from the middle.

The bill and feet are black. The irides brown. The plumage of the head, neck, fore part of the breast and back, the rump, the abdomen, and the tibiæ, black, with purplish-blue reflections. The middle and hind part of the breast, and the outer scapulars, pure white. The downy feathers of the back are white or greyish-white at the tips. The primary quills are blackish-brown, glossed with green, with a stripe of white on the inner web near the shaft; the secondary quills and the coverts are splendent with greenish-blue; the lower wing-coverts and axillars blackish-brown. The tail is splendent with bright green, a band of purple near the end of each feather, and its extremity blue and deep green. The feathers of the throat have the shaft downy, and of a greyish colour.

Length to end of tail 18 inches; extent of wings 24; wing from flexure $7\frac{3}{4}$; tail 10; bill along the back 1 inch $4\frac{1}{2}$ twelfths, along the edge of lower mandible $1\frac{8}{12}$; tarsus $1\frac{11}{12}$; first toe $\frac{9}{12}$, its claw $7\frac{1}{2}$ twelfths; second toe $\frac{9}{12}$, its claw $\frac{5}{12}$; third toe 1 inch $2\frac{1}{2}$ twelfths, its claw $\frac{6}{12}$; fourth toe $\frac{10}{12}$, its claw $4\frac{1}{2}$ twelfths.

Female.—The female is similar, and little inferior in size. Length to end of tail 17 inches, extent of wings 24.

Variations.—White individuals are very rarely met with. Little change takes place in the plumage as the period of moulting approaches, the only perceptible difference being a slight fading of the tints.

I have seen with Mr. Carfrae, Edinburgh, a discoloured in-

dividual, shot near Bowhill in Selkirkshire, one of the seats of the Duke of Buccleuch. The bill, feet, and claws were reddish-brown; the head, neck, fore part of the breast, the upper tail-coverts, the abdomen, and the legs, dull reddish-brown, the back yellowish-brown, with a white band across; the scapulars, and middle and posterior part of the thorax, white; the quills nearly white, the wing-coverts brown; the tail with the outer webs white, the inner webs and lower surface brown. Length $17\frac{1}{2}$ inches; wing from flexure $7\frac{2}{12}$; bill $1\frac{4}{12}$ tarsus $1\frac{3}{4}$.

Habits.—The Magpie is generally distributed in Britain, being more or less common in all the cultivated and wooded districts of England and Scotland, both in the interior and along the coast, although nowhere numerous, on account of the hostility of gamekeepers, gardeners, and sportsmen of all degrees. In the Outer Hebrides, the Shetland and Orkney Islands, it is never seen, and in large tracts of the central regions of Scotland is rarely if ever met with, because its habits are such as to induce it to remain at no great distance from human habitations.

There, on the old ash that overshadows the farm-yard, you may see a pair, one perched on the topmost twig, the other hopping among the branches, uttering an incessant clatter of short hard notes, scarcely resembling any thing else in nature, but withal not unpleasant, at least to the lover of birds. How gracefully she of the top twig swings in the breeze! Off she starts, and directing her flight towards the fir wood opposite, proceeds with a steady, moderately rapid, but rather heavy flight, performed by quick beats of her apparently short wings, intermitted for a moment at intervals. Birds with long graduated tails generally fly heavily, or at least have the appearance of doing so: the Pheasant, for example, and the Magpie. Even the Cuckoo, in its ordinary flight, seems to lack speed, although on occasion it shoots along with the rapidity of a Sparrow Hawk. Chattering by the way, she seems to call her mate after her; but he, intent on something which he has spied below, hops downwards from twig to branch, and descends to

the ground. Raising his body as high as possible, and carrying his tail inclined upwards, to avoid contact with the moist grass, he walks a few paces, and spying an earthworm half protruded from its hole, drags it out by a sudden jerk, breaks it in pieces, and swallows it. Now, under the hedge he has found a snail, which he will presently detach from its shell. But something among the bushes has startled him, and lightly he springs upwards, chattering the while, to regain his favourite tree. It is a cat, which, not less frightened than himself, runs off toward the house. The Magpie again descends, steps slowly over the green, looking from side to side, stops and listens, advances rapidly by a succession of leaps, and encounters a whole brood of chickens, with their mother at their heels. Were they unprotected, how deliciously would the Magpie feast, but alas, it is vain to think of it, for with fury in her eye, bristled plumage, and loud clamour, headlong rushes the hen, overturning two of her younglings, when the enemy suddenly wheels round, avoiding the encounter, and flies off after his mate.

There again, you perceive them in the meadow, as they walk about with elevated tails, looking for something eatable, although apparently with little success. By the hedge afar off are two boys with a gun, endeavouring to creep up to a flock of Plovers on the other side. But the Magpies have observed them, and presently rising fly directly over the field, chattering vehemently, on which the whole flock takes to wing, and the disappointed sportsmen sheer off in another direction.

The food of the Magpie consists of testaceous mollusca, slugs, larvæ, worms, young birds, eggs, small quadrupeds, carrion, sometimes grain and fruits of different kinds, in search of which it frequents the fields, hedges, thickets, and orchards, occasionally visits the farm-yard, prowls among the stacks, perches on the house top, whence it sallies at times, and examines the dunghil and places around. Although it searches for larvæ and worms in the ploughed fields, it never ventures, like the rook, and several species of gull, to follow the plough as it turns over each successive furrow. It has been accused of picking the eyes of lambs and sickly sheep, I think with injustice; but

it sometimes carries off a chicken or duckling, and sucks an egg that may have been dropped abroad.

It is extremely shy and vigilant in the vicinity of towns, where it is much molested, but less so in country places, although even there it is readily alarmed. When one pursues it openly, it flits along the walls and hedges, shifts from tree to tree, and at length flies off to a distance. Yet it requires all its vigilance to preserve its life; for, as it destroys the eggs and young of game birds, it is keenly pursued by keepers and sportsmen; so that one might marvel to find it maintaining its ground as a species, and yet it is not apparently diminishing in most parts of the country.

On the ground it generally walks in the same manner as the crows, but occasionally leaps in a sidelong direction. Its flight is as described above. The sounds which it emits are a sort of chuckling cry or chatter, which it utters when alarmed, as well as when it wishes to apprise other birds of danger. On the appearance of a fox, a cat, or other unfriendly animal, it never ceases hovering about it, and alarming the neighbourhood by its cries, until the enemy has slunk away out of sight.

It generally keeps in pairs all the year round, accompanies its young for some weeks after they first come abroad, and after the breeding season retires at night to the copses or woods, where sometimes a considerable number meet together. It does not appear that it has many enemies among its own kind, although doubtless many ill-wishers, seeing it is ever prone to destroy the eggs and young of the smaller birds.

It is always pleasant to meet with the Magpie, whatever be its number, even or odd,—some persons believing that there is virtue in numbers, whether applied to magpies or to systems of classification. Its loud clatter among the branches of the tall trees that overhang the road raises your drooping spirits, for it apprises you of the neighbourhood of a house, perhaps an inn, where you may recruit your energies. Doubly enlivening are the glimpses which you obtain of it as it flits from one branch to another, when descending from the central ridges of the Grampians, where you have been wandering all day in quest of their rarer vegetable productions, or mayhap laden

with thirty pounds weight of granite, you enter the birch and alder woods that skirt the torrent which you have followed from the hills, for there the Magpie indicates the existence of man. Indeed you rarely find it far from human habitations, for although not dependent upon man like the Sparrow, and always shy and vigilant in the highest degree, it seems to find it necessary to hang upon him. In places where it is privileged it becomes bolder, perches on the house top, alights on the dunghil, even approaches the door, and hops about among the poultry; for, like the Jackdaw, it accommodates itself to circumstances, and among good easy people, whose boys are not furnished with guns or pistols, it leads a happy life; whereas on the skirts of a town, or in a district full of gamekeepers, poachers, and sportsmen, it is ever anxious and vigilant, and good need it has to be so.

The Magpie begins to construct its nest early in March, selecting as its site the top of some tall tree, a poplar, an ash, an elm, sometimes a willow, or a beech; or, in defect of such in a favourite locality, placing it in a thick bush of hawthorn, holly, or other low tree, or even in a hedge. It is a large, and therefore generally very conspicuous fabric, of a spheroidal or elliptical form, composed first of a layer of twigs, on which is laid a quantity of mud; then of a dome of twigs, frequently hawthorn or sloe, but as often of any other kind, loosely but securely interlaced; while the bottom of the interior is lined with fibrous roots; and there is left in the side an aperture not much larger than is barely sufficient to admit the bird. It is very probable that the Magpie, when in the nest, must keep its tail erect or inclined forwards over the back, there being in reality no other way in which it could be conveniently disposed of. Why this bird should find it necessary, or rather should be impelled, to cover its nest with such a defence, it is not easy to guess. It cannot be for the purpose of protecting itself or its eggs from rain, for the texture is so loose as to afford no protection of that kind; and if as a defence against the attacks of other birds, it is strange that the rook and the wood pigeon, which build in similar places, should need none. The eggs are from three to six, and differ considerably in form and

colouring. In general, they are regularly ovate, or a little pointed, about an inch and five twelfths long, eleven and a half twelfths or an inch across; but sometimes more elongated by one twelfth of an inch, or abbreviated by nearly the same quantity. Frequently they are pale green, freckled all over with umber brown and light purple, and sometimes pale blue with smaller spots and dots of the same dark colours, so as very nearly to resemble the eggs of the Jay, which however are smaller.

Although the Magpie frequently breeds more than once in the same nest, yet in first choosing a spot for breeding in, it sometimes constructs two or more, partially or wholly in the same year, deserting them for some reason best known to itself. Mr. W. H. White, in Loudon's Magazine of Natural History, vol. IX, p. 350, gives an account of a nest which had been repaired and used six successive seasons, but having attained an extraordinary size, was blown down by a violent storm. The Rev. Mr. Stanley mentions another instance, accompanied by several interesting particulars, observed by "a gentleman when making an excursion in a remote and barren part of the north of Scotland." "Observing the Magpies hopping round a gooseberry bush, and flying in and out of it in an extraordinary manner, he noticed the circumstance to the owners of the house in which he was, who informed him that as there were no trees in the neighbourhood, they had for several years built their nest and brought up their young in that bush. And that foxes, cats, hawks, &c. might not interrupt them, they had barricadoed not only the nest, but the bush itself, all round, with briers and thorns, in a formidable manner. The materials in the inside of the nest were soft, warm, and comfortable to the touch, but all round, on the outside, so rough, strong, and firmly entwined with the bush, that, without a hedge-knife, or something of the kind, even a man could not, without much pain and trouble, get at their young; the barrier from the outer to the inner edge being above a foot in breadth. Frogs, mice, worms, or anything living were plentifully brought to their young. One day, one of the parent birds attacked a rat, but not being able to kill it, one of the young ones came out of the

nest and assisted in its destruction, which was not finally accomplished till the other old one, arriving with a dead mouse, also lent its aid. The female was observed to be the most active and thievish, and withal very ungrateful; for although the children about the house had often frightened cats and hawks from the spot, yet she one day seized a chicken, and carried it to the top of the house to eat it, where the hen immediately followed, and having rescued the chicken, brought it safely down in her beak; and it was remarked that the poor little bird, though it made a great noise while the Magpie was carrying it up, was quite quiet, and seemed to feel no pain, while its mother was carrying it down. These Magpies were supposed to have been the very same pair which had built there for several years, never suffering either the young, when grown up, or anything else, to take possession of their bush. The nest they carefully fortified afresh every spring, with rough, strong, prickly sticks, which they sometimes drew in with their united forces, if unable to effect the object alone."—*Familiar Hist. of Birds*, I, 251.

Mr. Weir of Boghead has favoured me with the following observations on this species:—" In our neighbourhood the Magpies most frequently select a tall old ash or beech tree adjoining a farm-house for their nest, which is built near the top of it, and generally upon such a slender branch as secures it from being destroyed. Sometimes, however, I have seen them build on the top of a high larch or Scotch fir tree, sometimes on a young larch in the middle of a thick stripe of plantation, about thirteen feet from the ground, and at other times, in an old hawthorn hedge more than a quarter of a mile from a house. When a pair of Magpies select a place for their nest, they make it their ordinary abode, and do not soon abandon it. For several years, two of them built within forty yards of my stable. So excessively shy and wary was the male, that I never could get a shot at him. In the course of a very short time, however, I deprived him of three successive females, which sat on the same eggs. I was struck by the rapidity with which he never failed to procure a helpmate in place of the one he had lost. Whether by his artful insinuations, the

cunning old fellow had seduced some young wife from her husband, or whether he had picked up a widow which some malicious sportsman had deprived of her partner, or whether he had fallen in with some fair damsel who during the pairing season had been disappointed of a lover, or finally, whether he had paid his devoirs to some discontented old maid who had formerly refused to enter into the state of matrimony, but repented of her conduct, I know not; but I can affirm that he never remained a widower longer than two or three days. In confirmation of this curious fact, Mr. John Mellish, gamekeeper to Sir William Baillie, Bart. of Polkemmet, told me that he saw six successive Magpies, which sat upon the same eggs, shot from a nest behind the old parish church of Midcalder.

"Their attachment to the same place is sometimes truly astonishing. A few years ago, about the beginning of May, I shot off the foot of a female Magpie, as she was coming out of her nest. She forsook it, but continued to hop up and down in the neighbourhood the best way she could in pursuit of her food. About the middle of the following summer, having killed a Magpie on the same nest, as she was feeding a brood of well-fledged young, I was astonished to find that I had shot my lame acquaintance.

"To all kinds of eggs they are destructive. Even the nest of the smallest bird does not escape their minute observation. To their rapacious appetite a great many partridges and pheasants, and several other birds, fall an easy prey. Day after day, I have observed them in pursuit of the same covey; and they never appeared to be satisfied until the poor birds were extirpated. So impudent were they, that early in the morning, and within a few yards of my house, I have seen them watching most eagerly the ducklings and chickens, and should any of them wander from their mother, they were sure to pounce upon them, and carry them off. Mr. Wark, farmer at Hardhill, told me that his brother, upon his property of Old Hall, in the parish of Dunlop, shot off the leg of a Magpie, as she was carrying off a chicken from his house. She was not seen during the winter and spring, but appeared again in sum-

mer. Lame though she was, she still carried on her murderous operations. One day he perceived her in pursuit of a duckling. It immediately ran to the water for protection. So intent, however, was she upon its destruction, that she ventured too far in after it, and got herself so wet, that before she was able to rise in the air, he knocked her down with a stick. A few years ago, a boy told me, that while he was tending his cattle, he heard several loud screams in a young plantation in my neighbourhood. Being anxious to ascertain the cause of the noise, he immediately ran to the place from whence it proceeded, and, to his astonishment, he beheld a Magpie standing upon the back of a hare almost half grown, picking out its eye, the other having been torn out before his arrival."

Young.—The young when fledged are similar to the old birds, but with the plumage less dense and glossy, and the tail much shorter. It has been asserted that the tails of young birds in general, and of hawks in particular, are longer than those of old individuals of the same species; but, so far as my observation goes, I believe the contrary to be the case.

Remarks.—The docility of the Magpie when obtained from the nest renders it an agreeable pet, although it is as apt to be troublesome as the Jackdaw and other tame crows, and precisely in the same way, namely by its superabundant activity, and its propensity to make off with whatever object strikes its fancy. Compared with the beautiful glossy bird of the thicket, the domesticated Magpie, draggled and mutilated, is a miserable-looking object. Indeed few birds residing at large in the house are otherwise.

This species resembles the true Crows in the form of its bill more than any of the exotic kinds, which have that organ generally more curved. It is reported by authors as being common in most parts of Europe, and in the north of Asia. I have seen specimens from North America, which differed in no essential respect from our birds.

GARRULUS. JAY.

Bill shorter than the head, straight, strong, about as deep as broad at the base, compressed towards the end. Upper mandible with the dorsal outline declinate and slightly arched, the ridge narrow, the sides sloping and convex, the edges direct and sharp, with a notch or sinus close to the tip, which is rather acute and declinate. Lower mandible with the angle medial, of moderate width, rounded, the dorsal outline ascending, convex, the edges sharp and slightly inflected, the tip rather acute. The gape-line nearly straight.

Mouth of moderate width; upper mandible concave within, generally with five or seven prominent lines; lower mandible deeply concave, with a prominent central line; palate concave; aperture of the posterior nares edged with small papillæ directed backwards; aperture of the glottis similarly margined, and having numerous papillæ behind. Tongue, Pl. IX, Fig. 4, *a*, sagittate, oblong, flat above, horny and thin at the edges, the tip cleft and lacerated. Œsophagus, *b*, *c*, *d*, wide, nearly uniform in diameter, slightly contracted on entering the thorax. Proventriculus, *d*, bulbiform, its glandules oblong, oblique. Stomach *f*, *g*, oblong, the muscular coat not very thick, the inner transversely rugous. Intestine, *h*, *i*, *j*, *k*, *l*, *m*, of moderate length, a little wider at the upper part; cœca, Fig. 5, *c*, *d*, very small, cylindrical; rectum, *a*, *b*, enlarged, very short, with an oblong dilatation at the end.

Nostrils round, in the fore part of the short nasal groove, and covered by the reversed shortish feathers. Eyes of moderate size; eyelids feathered, having a narrow crenate bare

margin, but without ciliary bristles. Aperture of the ear roundish, of moderate size.

Head rather large, oblong, convex above; neck short; body ovate, compact or rather slender. Legs of moderate length, stout or rather slender; tarsi of moderate length, compressed, covered anteriorly with about ten scutella, posteriorly with two longitudinal plates, meeting behind with a sharp edge. Toes of moderate size, the outer adherent as far as the second joint; hind toe large, lateral toes nearly equal, third considerably longer; all covered above with a few large scutella, beneath rather flattened, padded, granulate. Claws rather slender, arched, much compressed, acute, the first with an obscure groove on the sides, the third with the inner edge rather dilated.

Plumage generally full, blended, and very soft; the feathers of the body ovate, blended, with a long plumule composed of a few downy filaments. Feathers on the upper and anterior part of the head generally long and erectile; those at the base of the upper mandible linear, stiff, with short discrete barbs, directed forwards and adpressed, but much shorter than in the Crows. There is also a series of decurved bristles at the base of the rictus. Wings of moderate length, or rather short, much rounded, the outer primaries separated at the end when the wing is extended; primary quills ten, the first very short and narrow, about half the length of the fourth and fifth, which are almost equal and longest; the first five having both webs narrowed toward the end; secondary quills ten, broad, rounded. Tail long, generally a little decurved, rounded in various degrees, of twelve broad, rounded feathers.

The species of this genus are very numerous, and distributed over both continents. They differ from the Crows in having the body more slender, the wings shorter, the tail longer, the bill shorter and less robust, with the outline of the lower mandible more convex; the reversed bristly feathers much shorter, and scarcely extending beyond the nasal groove. They are more properly frugivorous than omnivorous, feeding principally on nuts and berries, but they also eat insects, larvæ, eggs, and young birds. They reside in woods, and seldom frequent open places like crows; are shy, suspicious, and not easily approach-

ed; nestle in trees and bushes, and have from four to nine of a brood. Some are gregarious, others unsocial. The sexes differ little in external appearance.

The affinities of this genus are various. Its most direct relation is to Corvus and Pica; but it is also allied to Turdus, of which several species are merely small Jays, and perhaps still more so to Parus, of which several species, although small, greatly resemble some Jays, not only in the form of the bill, but in colouring, and in some of their habits.

Only two species occur in Europe, of which one is a constant resident in Britain.

GARRULUS GLANDARIUS. THE BLUE-WINGED JAY.

JAY. JAY PIE. JAY PYET. SCREACHAG-CHOILLE.

FIG. 89.

Corvus Glandarius. Linn. Syst. Nat. I. 256.
Corvus Glandarius. Lath. Ind. Orn. I. 157.
Jay. Mont. Orn. Dict.
Geai. Corvus Glandarius. Temm. Man. d'Orn. I. 114.
Geai glandivore. Garrulus Glandarius. Temm. Man. d'Orn. III. 65.
Jay. Garrulus Glandarius. Selb. Illustr. I. 362.
Garrulus Glandarius. Jay. Jen. Brit. Vert. An. 148.

General colour of the plumage light brownish-red; fore part of the head whitish spotted with black, of which there are two broad bands from the base of the bill; primary coverts and alula bright blue banded with blackish-blue.

MALE.—The Jay, although inferior in beauty to many species of its genus, is yet one of the gaudiest of our native birds. It is about the size of the Jackdaw or Magpie, bating a portion of the tail of the latter, and of a moderately full, rather inelegant form, with a short neck and large head. The bill is rather short, strong, compressed; the upper mandible with the dorsal line a little convex, the sides sloping and convex, the sharp edges overlapping, with a notch near the tip, which is decli-

nate; the lower mandible with the angle short and rounded, the sides sloping and towards the end convex, as is the dorsal line.

Internally the upper mandible is concave, with three prominent lines in the middle and two towards the sides; the lower concave with a central prominent line. The palate is concave; the glottis with small papillæ behind. The tongue, Pl. IX, Fig. 4, *a*, is fleshy, oblong, flat above, horny and thin at the edges, the tip lacerated and cleft; the base emarginate with two long papillæ. The œsophagus, *b*, *c*, *d*, is five and a half inches long; the stomach, *f*, *g*, oblong, its muscular coat not very thick, the inner or cuticular transversely rugous; its greatest diameter an inch and a half. Intestine, *h*, *i*, *j*, *k*, *l*, *m*, two feet long, a little wider above; two cylindrical cœca, Fig. 5, *c*, *d*, half an inch long, about two inches from the extremity.

The eyes and the apertures of the ears are of moderate size; the nostrils round, of moderate size, concealed by the short reversed feathers.

The feet are of ordinary length; the tarsus with ten scutella anteriorly, and two longitudinal plates behind; the first toe with ten, the second with ten, the third with fifteen, the fourth with twelve scutella. The claws are arched, much compressed, obscurely grooved on the sides, and sharp.

The plumage generally is soft and blended; the feathers of the fore part of the head elongated, oblong and erectile. Wings of moderate length; the primary quills slightly decurved, the fifth longest, the sixth one twelfth of an inch shorter, the fourth about two twelfths shorter, the third nearly half an inch shorter than the fourth; the second ten twelfths shorter than the third, which exceeds the first by an inch and a half. The primary coverts and alula have their webs stiff and glossy. The secondary quills nine, long, broad, rounded. The tail rather long, nearly even, of twelve rather broad feathers, which are rounded with a minute tip.

The bill is blackish-brown; the irides bluish-white; the feet light reddish-brown; the claws dusky. The general colour of the plumage is a delicate light brownish-red tinged with grey or purplish on the back, and paler beneath. The feathers on the fore part of the head are whitish, each with an oblong

black spot; from the base of the lower mandible on each side is a broad band of black about an inch long. The most conspicuous trait of the plumage is the patch of ultramarine blue, transversely banded with blackish-blue, including the primary coverts and alula. The bases of the outer webs of the quills are faintly coloured in the same manner. The primary quills are dark brown, and, excepting the first have the outer edge dull white; the first six secondary quills have half of the outer web white, their remaining parts and the other three quills brownish-black. The upper and lower tail-coverts, and the lower feathers of the legs, are white. The tail is dark brown, with indications of bars at the base.

Length to end of tail $14\frac{1}{2}$ inches; extent of wings 23; wing from flexure $7\frac{1}{2}$; tail 7; bill along the ridge $1\frac{1}{12}$, along the edge of lower mandible $1\frac{7}{12}$; tarsus $1\frac{11}{12}$; first toe $7\frac{1}{2}$ twelfths, its claw $\frac{8}{12}$; second toe $\frac{8}{12}$, its claw $\frac{6}{12}$; third toe $1\frac{2}{12}$, its claw $7\frac{1}{2}$ twelfths; fourth toe $\frac{9}{12}$, its claw $\frac{7}{12}$.

Female.—The female differs very little from the male. The feathers of the head are shorter, the colours a little less intense, the white of the rump less extensive, and the blue of the wings a little less pure.

Length to end of tail $13\frac{3}{4}$ inches; extent of wings 22; wing from flexure $7\frac{2}{12}$; tail $6\frac{1}{2}$; bill along the ridge 1; along the edge of lower mandible $1\frac{6}{12}$.

The above descriptions are taken from two fine specimens, shot in Linlithgowshire, and sent to me by Mr. Falconar of Carlowrie.

Habits.—The Jay is pretty generally distributed in England and the southern and middle divisions of Scotland, occurring chiefly in parts that are well wooded. It is not less shy and suspicious than the other species of the Corvine family, although it frequents gardens for the purpose of feeding on the fruit, as well as beans and pease, of which it seems to be particularly fond. Its food, however, is not confined to these objects, for it also searches for worms, larvæ, and snails; plunders the nests of small birds, and pounces on mice and some-

times birds. The principal substances which I have found in its stomach in winter were acorns, mixed with fragments of quartz. It is scarcely gregarious, although for some weeks the members of a family keep together, in which case it is almost impossible to procure one of them, as they flit before you in the woods, taking care to keep beyond reach of a shot, and uttering at intervals their ordinary harsh scream. The flight of the Jay in an open place is somewhat similar to that of the Magpie or Missel Thrush, being direct, and performed by quick beats, with short cessations at intervals. It glides through the woods and thickets with great ease and dexterity, flits along the hedges, and rarely approaches the habitations of man, except in search of food for its young, its affectionate concern for which will induce it to brave dangers from which on ordinary occasions it would shrink.

"Its common notes," Montagu says, "are various but harsh;" my own observation goes no farther than to enable me to assent to the statement, and therefore I quote what he states in continuance:—"It will some time in the spring utter a sort of song in a soft and pleasing manner, but so low as not to be heard at any distance; and at intervals introduce the bleating of a lamb, mewing of a cat, the note of a kite or buzzard, hooting of an owl, and even the neighing of a horse. These imitations are so exact, even in a natural wild state, that we have frequently been deceived."

"Its nest," according to the same generally very accurate authority, "is commonly built in high coppice wood or hedges, and sometimes against the side of a scrubby tree. It is formed of sticks, lined with fibrous roots, and the bird lays five or six eggs of a light brown colour, not very unlike those of the Partridge, but smaller, and obscurely marked with a darker shade of brown." Professor Rennie has given a long straggling description of it, flimsy and ill put together like itself; whereupon Mr. Waterton remarks that the nests "are much more compact, and better put together, than those which naturalists have hitherto described. The nest of the Jay is never seen near the tops of trees, like those of the Magpie and Crow. He who feels inclined to study the nidification of this bird must search

the lower branches of the oak, or inspect the woodbine mantling round the hazel." The eggs are somewhat smaller than those of the Magpie, broadly ovate, generally an inch and a quarter long, with their largest transverse diameter ten and a half twelfths; pale bluish-green, faintly and thickly freckled with pale purplish and yellowish-brown. They vary considerably in colour, although not so much as those of the Magpie, and their number is from five to seven.

Although the Jay thus rears a large family, it is nowhere abundant, being in most districts less numerous than even the Magpie, which, however, is fonder of shewing itself, whereas the bird under consideration is of retired habits, and skulks among the trees and bushes as if ashamed of being seen. Another circumstance which may tend to diminish its number is, that, being a more showy bird than any other of the family, its skin prepared by the bird-stuffer is much in request as a domestic ornament. Add to this, the enmity which gamekeepers and gardeners, not without reason, have to it, and you will not be surprised to find it everywhere scarce.

Young.—The young when fledged are of the same colours as the adult, although somewhat less bright. They are abroad by the end of June, and keep together for several weeks.

NUCIFRAGA. NUTCRACKER.

Bill rather long, straight, moderately strong, tapering, of nearly equal height and breadth at the base, slightly compressed, but with the extreme tip depressed. Upper mandible having the dorsal outline almost straight, being very slightly convex towards the end, the ridge rather narrow but obtuse, the sides very convex, the edges sharp, direct, with a very obscure sinus close to the depressed blunt tip. Lower mandible with the angle very short, broad and rounded, the dorsal outline ascending and slightly convex, the edges sharp and inflected, the tip rather blunt and a little depressed. The gape-line is nearly straight, being very slightly arched.

Nostrils rather small, round, in the fore part of the very short, broad, nasal groove, and concealed by the narrow reversed feathers, which cover about a sixth of the bill. Eyelids feathered, having a narrow crenate bare margin. Aperture of the ear roundish, of moderate size.

Fig. 90.

Head rather large, oblong, nearly flat above; neck short; body ovate, compact. Legs of moderate length and strength; tarsi moderate, covered anteriorly with ten scutella, posteriorly with two plates, meeting behind with a sharp edge, and several small transverse scales below. Toes of moderate size; the first large, broad at the base, rather longer than the second and fourth, which are equal, the third considerably longer; the fore toes spread very little, the third and fourth united as far as the second joint; all covered

above with few scutella, beneath padded and granulate. Claws long, slightly arched, much compressed, acute; the first stronger and more arched, the third about the same length, but much more slender, the fourth smallest and about half the length of the third.

Plumage soft, rather blended, the feathers generally ovate and rounded. Feathers on the head short; those at the base of the upper mandible linear, stiffish, reflected, adpressed. Wings of moderate length, much rounded; the primary quills rather narrow and decurved towards the end; the first very short, the fourth longest, the fifth scarcely shorter; the secondary ten, long, rather broad, rounded with an acumen. Tail of moderate length, nearly even, of twelve broad, rounded feathers.

The Nutcracker, Nucifraga Caryocatactes, forms the transition from the Crows to the Starlings, and as M. Temminck thinks to the Woodpeckers, some of which it certainly resembles in the form of its bill, of which however the point is not compressed as in that family, but depressed as in the Starlings. Its feet are similar to those of the Crows, and still more of the Jays and Starlings, but are not more adapted for climbing than those of the last-mentioned families, although M. Temminck states that its habits greatly resemble those of the Woodpeckers. With the other species I am not acquainted. In the form of the bill, the genus Coracias approaches to this, as well as to Corvus; but the tarsi are not more than half the length of those of Nucifraga, the hind toe is much shorter than the second and fourth, and the wing has a different form.

NUCIFRAGA CARYOCATACTES. THE NUTCRACKER.

FIG. 91.

Corvus Caryocatactes. Linn. Syst. Nat. I. 157.
Corvus Caryocatactes. Lath. Ind. Orn. I. 164.
Nutcracker. Mont. Orn. Dict.
Le Casse-noix. Nucifraga Caryocatactes. Temm. Man. d'Orn. I. 117.
Nutcracker. Nucifraga Caryocatactes. Selb. Illustr. I. 368.
Nucifraga Caryocatactes. Nutcracker. Jen. Brit. Vert. An. 149.

Plumage brown, with numerous oblong white spots.

THE Nutcracker being merely a rare straggler with us, so that opportunities of studying its habits have not occurred, all that can with propriety be done here is to present a description of a specimen killed in Scotland, and now before me. The sex was not determined.

The form and size are nearly those of the Common Jay, but the details being given in the generic character, it is unnecessary to repeat them. The bill, feet, and claws are brownish-black. The general tint of the plumage is dull reddish-brown; the upper part of the head, the wing-coverts, quills, and tail, blackish-brown. The top of the head, and the upper tail-coverts are plain; all the other feathers have an oblong white spot margined with dark-brown at the end, the spots of the

lower parts larger. The lower tail-coverts and the tips of the tail-feathers are white, the lateral feathers having most, and the central least, of that colour.

Length to end of tail $12\frac{1}{2}$ inches; wing from flexure $7\frac{1}{4}$; tail 5; bill along the ridge $1\frac{3}{4}$.

Montagu states that "it is a rare species in England; two instances only on record: one shot in Flintshire, the other in Kent." Mr. Selby adds another, an individual having been seen by Captain Robert Mitford, in Netherwitton Wood, in Northumberland, in the autumn of 1819. There is a specimen in the Museum of the University of Edinburgh, said to have been shot in Scotland; another in that of Mr. Arbuthnot at Peterhead; and the individual from which I have taken the above description belongs to Mr. Th. Henderson, Coates' Crescent, Edinburgh.

It is said by authors to be common in many parts of the Continent, inhabiting the forests, and feeding on larvæ, insects, fruits, and occasionally eggs, and even young birds. Brisson states that it occurs in Austria, occasionally appears in various districts of Germany, and in 1753 was seen in very great numbers in France. M. Valmont-Bomare informs us that it prefers living in the pine-forests of mountainous regions, and feeds chiefly on fir-seeds and nuts. Nothing, he says, is more curious than to see it eating one of the latter. Having taken it from its store in the hole of a tree, it fixes it in a fissure, splits it open with a blow of its bill, and then extracts the kernel. Crows, Jays, and some Titmice, it may be observed, act in the same manner.

FREGILUS. CHOUGH.

Bill rather long, slightly decurved, rather slender, tapering, pentagonal and a little higher than broad at the base. Upper mandible having the dorsal outline slightly arched, toward the end declinate, the ridge obtuse, the sides flattened and sloping, the edges overlapping, sharp, almost or entirely without a notch, the tip declinate, slender, flattened, and projecting a little. Lower mandible with the angle short, of moderate width, obtuse, the dorsal outline concave, the edges sharp and slightly inflected, the tip slender, declinate, rather acute, the sides flattened and nearly erect. Gape-line slightly arched.

Mouth narrow; upper mandible slightly concave within, as is the lower, the latter with a slender prominent central line. Nostrils in the fore part of the very short nasal groove, elliptical, open, but concealed by the short, stiff, reversed feathers, which cover only a very small portion of the bill. Eyes of moderate size; eyelids feathered, having a narrow crenate bare margin, but without ciliary bristles, the lower much larger. Aperture of the ear roundish, of moderate size.

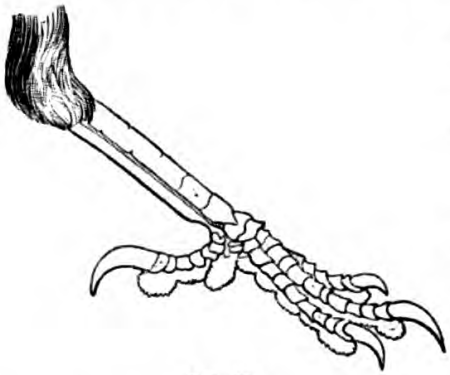


Fig. 92.

Head of moderate size, ovate, rather convex above; neck of moderate length, strong; body ovate, rather slender. Legs rather short, strong; tarsi rather short, compressed, covered anteriorly with eight scutella, of which the upper are generally blended, posteriorly with two longitudinal plates meeting be-

hind with a very sharp edge; toes of moderate size, the outer adherent as far as the second joint; hind toe comparatively large, lateral toes nearly equal, third considerably longer; all covered above with a few large scutella, beneath padded, rather flattened, granulate, and transversely sulcate; claws strong, arched, compressed, rather sharp, their sides flattened and erect, the inner edge of the third scarcely dilated.

Plumage dense, very soft, glossy, generally blended, and somewhat silky; the feathers of the body ovate, rounded, with discrete barbs, and a long plumule, composed of a few downy filaments. Feathers on the head short; those at the base of the upper mandible slender, short, stiff, reversed; there are also decurved bristles at the base of the upper mandible, and numerous straight ones in the angle of the lower. Wings long; the outer primaries separated when the wing is extended; primary quills ten, the first very short and narrow, the fourth longest, the third and fifth little shorter; the first five or six having both webs narrowed towards the end; secondary quills twelve, short, broad, the outer truncate, the inner rounded. Tail of moderate length, generally even, of twelve broad truncate feathers.

Two species of this genus occur in Europe, Fregilus Pyrrhocorax and Fregilus Graculus, of which the latter only inhabits Britain. Although in their general appearance, and in their particular characters, they agree so closely that one could hardly think of separating them, they have by Cuvier been referred to two different genera, merely because Pyrrhocorax has a shorter bill than Graculus, with a slight notch, which is obsolete in the other. These birds resemble the crows in their aspect and habits, while they have also a direct affinity to the genera Epimachus, Paradisea, Caryocatactes, Sturnus, Oriolus, and several others. They nestle in rocks and towers; are shy and vigilant; when searching for food betake themselves to open pastures, walk in the same manner as crows, and have a similar flight.

Considering it very inexpedient to alter the specific names of birds, I prefer the generic name Fregilus to Pyrrhocorax, thus leaving the latter to designate Corvus Pyrrhocorax of Linnæus.

FREGILUS GRACULUS. THE LONG-BILLED CHOUGH.

CHOUGH. CORNISH CHOUGH. CORNISH DAW. CORNWALL KAE. CHAUK-DAW KILLIGREW. RED-LEGGED CROW. MARKET-JEW CROW.

FIG. 93.

Corvus Graculus. Linn. Syst. Nat. I. 158.
Corvus Graculus. Lath. Ind. Orn. I. 165.
Red-legged Crow. Mont. Orn. Dict.
Pyrrhocorax Coracias. Pyrrhocorax Graculus. Temm. Man. d'Orn. I. 122. III. 69.
Cornish Chough. Fregilus Graculus. Selb. Illustr. I. 365.
Fregilus Graculus. Cornish Chough. Jen. Brit. Vert. An. 144.

Of the adult male and female, the plumage black, highly glossed, with purplish-blue and green tints; the feathers of the head and neck blended, the tail even; the wings about the same length; the bill longer than the head, attenuated, and, with the feet, vermilion.

MALE.—The Chough when seen at a distance bears a great resemblance to the Rook, which it excels, however, in elegance of form; but at hand is readily distinguished by the red colour of its bill and feet. As the generic character above given applies in every particular to this species, it is unnecessary to repeat the details of its external appearance, especially as we have no other with which to compare or contrast it. The bill is a little longer than the head, considerably arched, and taper-

ing to a nearly acute point. The wings are about the same length as the tail, which is moderate, even, the feathers abrupt, with a small tip. The fourth quill is longest, the fifth scarcely shorter, the third nearly as long, the second an inch shorter, the first rather more than half the length of the longest. The plumage of the head and neck is blended and glossy, as is that of the back and lower parts in a less degree. The feathers of the wings, and some of the upper and lower tail-coverts, compact.

The bill is vermilion, the feet of a darker tint approaching to coral-red, the claws black. The irides are brown. The general colour of the plumage is black, with blue and purple tints; the wing-coverts, secondary quills, and tail, glossed with green.

Length to end of tail 17 inches; extent of wings 34; wing from flexure $11\frac{3}{4}$; tail $6\frac{1}{2}$; bill along the back $2\frac{1}{4}$, along the edge of lower mandible $2\frac{1}{12}$; tarsus $2\frac{2}{12}$; hind toe $\frac{8}{12}$, its claw $\frac{10}{12}$; second toe $10\frac{1}{2}$ twelfths, its claw $8\frac{1}{2}$ twelfths; third toe $1\frac{1}{4}$, its claw $\frac{8}{12}$; fourth toe $\frac{11}{12}$, its claw $\frac{7}{12}$.

Female.—The female is similar to the male, but somewhat less.

Habits.—The Chough, according to Montagu, occurs in Devonshire, Cornwall, and Wales; I have met with it in Galloway and the Island of Barray, one of the Outer Hebrides; and it is said to be found in the Isle of Man, in various parts of the western coast of Britain, and at St. Abb's Head on the eastern coast of the southern division of Scotland. It is, however, a rare bird with us, and appears to be confined to the vicinity of the sea, although on the continent its habitual residence is said to be in the alpine regions of the interior. It is gregarious like the Rook and the Jackdaw, which it resembles in its mode of flying, as well as in its cries, which, however, are clearer and more shrill. Its food consists of insects, grubs, seeds, and the flesh of dead animals, for which it searches the open pastures and rocky grounds, walking in the manner of the birds mentioned above, and evincing much shyness, so that it is very

difficult to get within shot of it, unless in the places where it breeds. Its flight is generally elevated, irregular, and performed by moderately slow beats, occasionally varied by gambols and evolutions of various kinds.

According to Montagu, the nest, which is placed in a rock or cavern, sometimes in an old building, "is composed of sticks, and lined with a great quantity of wool and hair; the eggs are generally five in number, of a dull white, sprinkled with light brown and ash-coloured spots, most at the larger end."

Young.—The young are said to have their first plumage black, but without the gloss and purple tints of the adult birds. The bill and feet are stated by M. Temminck to be at first black, but Montagu affirms that they are red from the commencement. I have not seen a bird in its first feathers, and it does not appear that any recent British writer has had an opportunity of deciding the question.

THREMMAPHILINÆ.

COW-BIRDS AND ALLIED SPECIES.

The family of the Thremmaphilinæ, which is composed of the genera Gracula, Thremmaphilus, Buphaga, Sturnus, Sturnella, and a few others, has only two representative species among the birds of Britain: the Spotted Starling, Sturnus guttatus, and the Rose-coloured Cow-bird, Thremmaphilus roseus. They are inferior in size to the birds of the family of Corvinæ, which they however greatly resemble in many respects. Their body is ovate, compact, and moderately stout; their neck short; their head of ordinary size, ovato-oblong, flattened above, and narrowed anteriorly.

The bill is generally about the length of the head, or somewhat shorter, moderately stout or rather slender, nearly straight, compressed towards the end; the upper mandible with its outline slightly convex towards the tip, the ridge very narrow at the base, the nasal cavity being very large, the edges sharp and overlapping, with a slight or obsolete notch close to the slightly decurved tip; the lower mandible with a long, rather acute angle, its crura rather broad and sloping outwards, the dorsal outline straight or slightly convex, the edges sharp.

Internally both mandibles are concave, with a central prominent line. The characters presented by the intestinal canal are similar to those of the genus Corvus, in the Spotted Starling, which is the only bird of the genus dissected by me.

The eyes are rather small, or of moderate size; the eyelids with a narrow crenate bare margin, close to which is a fringe of very small feathers, the lower frequently bare. The nostrils are of moderate size, oval, with a horny arched operculum, and

placed in the fore part of the large nasal depression, which forms a deep sinus in the base of the mandible, and is filled by a membrane covered with short incurved feathers. The aperture of the ear is rather large and circular.

The feet are of moderate length or rather short. The tarsus compressed, with seven anterior scutella, and two longitudinal plates forming a thin edge behind. The toes are four, articulated on the same level; the first directed backwards, stronger than the second and fourth, which are about the same length; the third considerably longer; all covered above with large scutella, rather flat and granulate beneath; the fourth or outer united to the third as far as the second joint. The claws are rather long, arched, much compressed, acute, their sides flat with an obscure groove.

The plumage is moderately full. The feathers at the base of both mandibles are always very short, rather stiff, more or less directed forwards at first, but incurved. The wings are of moderate length, rather pointed, the first quill extremely small, being scarcely a fifth of the length of the second, which is about the same length as the third and fourth, but usually very slightly shorter than the former, which is the longest; the primary quills are ten, narrowed towards the end; the secondary generally nine, broad and abruptly rounded or emarginate. The tail is rather short, or of moderate length, slightly rounded, of twelve broad feathers.

The skeleton and digestive organs differ little from those of the last family. The manners of the different species being unknown to me by personal observation, I cannot give any general account of them farther than that these birds are generally gregarious, feed principally on worms, larvæ, insects, and fruits, and breed in high places, or in holes and crevices. They are easily domesticated, may be taught to pronounce words, some of them to whistle tunes, and exhibit the same indications of sagacity as the Crows.

SYNOPSIS OF THE BRITISH GENERA AND SPECIES.

GENUS I. STURNUS. STARLING.

Bill about the length of the head, straight, pentagonal, depressed toward the end, its ridge flattened in the middle; tarsi rather short; wings of moderate length, the third quill longest; tail rather short, emarginate.

1. *Sturnus guttatus. Spotted Starling.* Black, glossed with purple and green, and spotted with pale brown above and white beneath.

GENUS II. THREMMAPHILUS. COW-BIRD.

Bill rather short, nearly straight, compressed toward the end, the ridge convex; tarsi rather short; wings of moderate length; the second and third quills longest; tail of moderate length, slightly rounded.

1. *Thremmaphilus roseus. Rose-coloured Cow-bird.* Body rose-coloured, head crested, and with the fore-neck black glossed with purplish-blue.

STURNUS. STARLING.

Bill of about the length of the head, straight, rather slender, tapering, pentagonal; the upper mandible with its outline straight until towards the tip, where it is declinate and convex, the ridge very narrow at the base, broad and convex in the rest of its extent, the sides sloping and convex, the edges sharp and overlapping, with a very slight or obsolete notch close to the depressed tip; the lower mandible with a long rather acute angle, its crura rather broad at the base, and sloping outwards, the dorsal outline straight, the edges sharp. The gape-line ascends gently at the base, and is then direct.

Internally both mandibles are slightly concave, with a central prominent line; the palate straight, very narrow, sloping upwards at the sides. The other characters of the mouth and those of the intestinal canal are probably the same as those of Sturnus guttatus, described in the following pages.

The eyes are rather small, the eyelids fringed with very small feathers, and having a very narrow crenate bare margin; in some species, however, both, or at least the lower, bare. Aperture of the ear roundish, of moderate size. Nostrils ovate, oblique, open, with an arched horny operculum, and placed in the fore part of the long nasal groove, which is covered with slender feathers directed backwards.

The feet are moderately stout; the tarsus rather short, compressed, with seven anterior scutella, and two longitudinal plates forming a thin edge behind. The toes four; the first stouter, directed backwards, and of about the same length as the second and fourth, the third considerably longer, all covered above with large scutella, rather flat and granulate beneath; the fourth or outer united to the third as far as the second

joint. The claws are rather long, moderately arched, much compressed, acute, their sides flat, with an obscure groove.

The plumage is moderately full. The feathers along the nasal groove are short, pointed, curved backwards. The wings

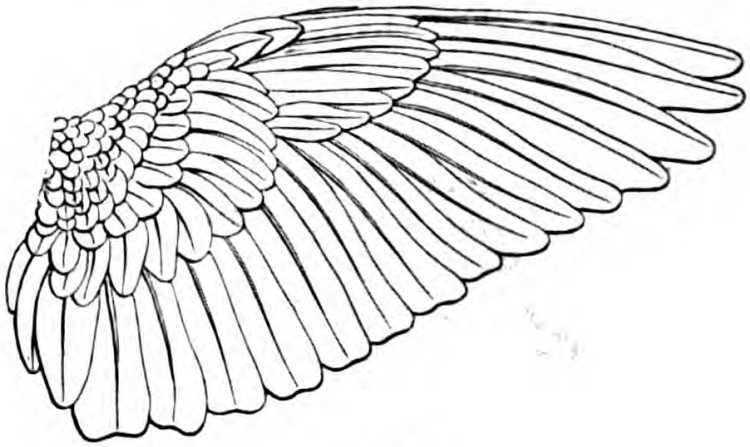


FIG. 94.

are of moderate length, rather pointed, the first quill extremely small, being about a sixth of the length of the second, which is a little shorter than the third; the fourth scarcely shorter, the rest graduated; primary quills ten, narrowed towards the end; secondary seven, broad, the outer slightly emarginate, the inner rounded. The tail is short, or of moderate length, slightly rounded, and generally emarginate.

The Starlings are generally birds of about the size of a common Thrush, gregarious, living on larvæ, worms, insects, and occasionally seeds. Their flight is rapid and direct, and they walk with great ease, seeking their food on the ground. They nestle in holes of trees, crevices of rocks and buildings, or in convenient situations in high places generally. The species belong to the old continent. Only two occur in Europe, of which one is generally distributed in Britain.

STURNUS GUTTATUS. THE SPOTTED STARLING.

STARLING. STARE. TRUID.

FIG. 95.

Sturnus vulgaris. Linn. Syst. Nat. I. 290.
Sturnus vulgaris. Lath. Ind. Orn. I. 321.
Stare or Starling. Mont. Orn. Dict.
Etourneau vulgaire. Sturnus vulgaris. Temm. Man. d'Orn. I. 132. III. 74.
Common Starling. Sturnus vulgaris. Selb. Illustr. I. 340.
Sturnus vulgaris. Common Starling. Jen. Brit. Vert. An. 143.

Adult male in full plumage, with the feathers of the head and neck lanceolate and acuminate, of the other parts broader but tapering; the general colour black with splendent blue and purple tints; all the feathers, excepting on the head and fore-neck, with a triangular white tip; the bill pale yellow; the feet light reddish-brown; in spring the feathers more attenuated, their white tips diminished. Female with the feathers as in the male, but broader, all tipped with broader spots, of which those on the upper parts are light brown, on the lower white; the bill dusky, the feet reddish-brown. Young in their first plumage of a uniform greyish-brown colour; the bill brownish-black; the feet dusky.

MALE.—The Starling, which is one of the most beautiful of our native birds, is about the size of the Common Thrush, and

of a compact form, rather stout, with the body ovate, rather deeper behind than before; the head of moderate size, ovato-oblong, flattened above, narrowed anteriorly; the feet rather short and strong; the wings of moderate length; and the tail rather short. In form it bears a greater resemblance to the Jackdaw than to a Thrush, and when mixed with a flock of Crows, might seem to a person unacquainted with it to be of the same family.

The bill is shorter than the head, straight, rather slender, tapering, pentagonal, towards the end depressed; the upper mandible with its dorsal outline nearly straight, convex and declinate towards the rather sharp tip, the ridge very narrow at the commencement, flattened over and beyond the nostrils, then convex, the sides sloping at the base, convex toward the end, the edges sharp and overlapping, the notch obsolete; lower mandible with the angle narrow and pointed, the sides sloping outward and concave on the crura, the dorsal line straight, the edges sharp. The gape-line ascends at the base, and is afterwards direct, the lower jaw being a little bent in the middle.

Internally both mandibles are slightly concave with a central prominent line; the palate straight, very narrow, sloping upwards at the sides. The aperture of the nares is linear, edged with large pointed papillæ directed backwards. The tongue, Pl. IX, Fig. 6, *a*, is sagittate, of moderate length (eight twelfths of an inch), slender, papillate at the base, concave above, horny and thin-edged towards the point, which is narrow and slightly lacerated. The aperture of the glottis is defended behind by numerous slender papillæ. The œsophagus, *b*, *c*, *d*, is of moderate width, uniform in diameter, three inches long; the proventriculus, *d*, encircled by numerous oblong glandules. The stomach *e*, *f*, *g*, is broadly elliptical, compressed, its muscular coat thick with round tendinous centres, the cuticular lining rugous; in short it is a gizzard of moderate power, as in the Crows. The intestine, *g*, *h*, *i*, *j*, *k*, is fifteen inches long, nearly uniform in diameter, the duodenal portion a little wider, being four twelfths of an inch; the cœca, Fig. 7, *c*, *d*, which are at the distance of an inch and a

quarter from the anus, are cylindrical, adnate, half an inch long.

The eyes are rather small, their aperture two twelfths of an inch in diameter; the eyelids fringed with very small feathers along the outer edge of the crenate bare margin; the greater part of the lower bare. The aperture of the ear is roundish, three twelfths across; the meatus small, linear, oblique. The nostrils are ovate, oblique, open, with an arched horny operculum, and placed in the fore part of the long nasal groove, which is feathered, leaving only a thin ridge of the horny mandible intervening.

The feet are rather short and stout; the tarsus compressed, with seven anterior scutella, and two longitudinal plates forming a thin edge behind. The toes four; the first stouter, directed backwards parallel to the tarsus internally, and of about the same length as the second and fourth, the latter much more slender than the rest, the middle toe considerably longer; all with large scutella above, the first seven, the second nine, the third thirteen, the fourth twelve; the outer adherent as far as the second joint. The claws are moderately stout, arched, acute, much compressed, the sides erect and grooved.

The plumage is compact and splendent. The feathers of the fore part of the head are short, those on the nasal groove recurved, on the head and neck generally lanceolate and tapering to a long point; on the back and breast ovato-acuminate; on the rump broader and less pointed. The wings are of moderate length; the first primary very small and slender, being only half an inch long, the second half a twelfth shorter than the third, which is two and a half twelfths longer than the fourth; the rest slowly graduated; the primaries ten, somewhat narrowed towards the end, but rounded; the secondaries nine, broad, the inner abrupt and emarginate, the outer rounded. The tail is short, straight, emarginate, of twelve broad, obliquely rounded feathers, the outer curved outwards toward the end.

The bill is pale yellow, the iris hazel (but I have also seen it yellowish); the feet light brownish-red, or brownish flesh-colour; the claws dusky. The general colour of the plumage is black, glossed with brilliant tints of blue, green,

and purple, the latter predominating on the neck and head. All the feathers of the head and fore-neck with a scarcely apparent very minute whitish tip, of the other parts with a triangular spot at the end. The spots on the upper parts are pale brown, on the lower white. The quills and tail-feathers are dusky, their outer webs more or less glossed with green, and margined with light brownish-red, as are the upper and lower tail-coverts.

Length to end of tail $9\frac{1}{4}$; extent of wings $15\frac{1}{2}$; wing from flexure $5\frac{2}{12}$; tail $2\frac{10}{12}$; bill along the back $1\frac{1}{4}$, along the edge of lower mandible $1\frac{4}{12}$; tarsus 1; first toe $\frac{1}{2}$, its claw $5\frac{1}{2}$ twelfths; second $7\frac{1}{2}$, its claw $4\frac{1}{4}$ twelfths; third $10\frac{1}{2}$ twelfths, its claw $\frac{5}{12}$; fourth $7\frac{1}{2}$ twelfths, its claw $\frac{4}{12}$.

Female.—The bill is blackish-brown; the irides hazel; the feet reddish-brown; the claws blackish. The feathers are less pointed; those of the head less elongated, all distinctly tipped, the upper with light reddish-brown, the lower with white spots, broader than in the males. On the hind part of the back, the light-coloured part of each feather extends so as to form a margin, as is the case more conspicuously on the lower tail-coverts. There is very little difference in size.

In an individual from which this description is taken, the tongue is ten twelfths of an inch long; the œsophagus three inches; the stomach nearly circular, compressed, eleven twelfths long, ten twelfths broad, seven twelfths thick; the intestine fifteen inches long, has a diameter of four twelfths in its duodenal portion; the cœca six twelfths long, one twelfth in diameter, vermiform and free, are placed at the distance of an inch from the extremity of the intestine; they admit none of the alimentary mass, but secrete a mucous fluid.

Length to end of tail $9\frac{1}{4}$; extent of wings $15\frac{1}{8}$.

Variations.—The above descriptions are of the plumage when perfect, that is, in autumn after the moult. In the males, in spring, the feathers by loosing their edges have become narrower and more pointed, and the white markings greatly diminished. The same effect takes place in a less degree in

the female. Old males generally have the head and fore-neck quite destitute of white spots. The variations in adult individuals are not otherwise remarkable. The species is occasionally subject to albinism; but I have not seen any British specimens either white or patched with that colour.

The dimensions given above are those of individuals shot in the south of Scotland. I subjoin those of five specimens shot by me in the Outer Hebrides in 1820, and described in my note-book.

1.	Bill	$\frac{7}{8}$,	$1\frac{2}{8}$	Length	$9\frac{1}{4}$	Extent of wings $15\frac{1}{2}$	Tail $2\frac{6}{10}$
2.	"	$\frac{7}{8}$,	$1\frac{2}{8}$	"	$9\frac{3}{8}$	" $15\frac{1}{2}$	
3.	"	$\frac{7}{8}$,	$1\frac{2}{8}$	"	$9\frac{1}{4}$	" $15\frac{1}{2}$	
4.	"	$1\frac{1}{16}$,	$1\frac{2}{8}$	"	9	" $15\frac{1}{2}$	
5.	"	1,	$1\frac{1}{4}$	"	$9\frac{1}{2}$	" $15\frac{7}{8}$	

Habits.—Having with much labour and some danger descended from the summit of a maritime cliff on the west coast of one of the bare Hebrides, we are now standing in a low and ragged cavern, of which the upper part is formed of great blocks of gneiss jammed into a rent of the solid rock, while the heavy waves of the Atlantic come rushing up its mouth, and alternately recede, leaving exposed at intervals a beautiful bed of polished pebbles. The melancholy tones of the Rock Dove's cooing issue from one of the recesses; and as we look for the bird, we observe a Starling perched on a projecting angle above, and screaming forth its low harsh note of alarm or anger. Presently several individuals of the same species issue from various holes and fissures, and fly out of the cavern, followed by a few pigeons, the sound of whose wings echoes from the walls. A shot is fired, and in the midst of the deafening noise that follows, a whole crowd of Starlings hurry over head to regain the open air, and escape the threatened danger. We have in fact strolled into one of their breeding places, and it being the month of June, we may here at leisure observe their domestic habits; but the tide is advancing, and therefore it may be best to regain the summit of the rock, purposing to return some other time.

Many such places exist along the rocky shores of these islands, in which Starlings are very abundant, as, according to Low and others, they are in the Shetland and Orkney Islands. To them they retreat after sunset all the year round. Early in the morning, accompanied perhaps at first by Pigeons and Cormorants, you may see them issue from their secure retreats, and hurry along the coast, or over the rocky ground, to the pastures and fields. The places to which above all they most frequently resort in summer and autumn are the cowfolds, where the farm stock is enclosed at night, and there before the cattle are let out, or at milking time, you may find large flocks busily employed in searching among the old and dried dung for larvæ and worms, keeping up an incessant low chatter, frequently perching for a while on the cattle, and when satisfied reposing on the low walls of the fold, where you may often shoot them by half dozens—I do not say whole dozens, for although that might happen, I never obtained more than six or seven at a single discharge. They also follow the cattle in the pastures and meadows, often perching on the backs of cows, horses, and sheep; but although very frequently seen in this society, they do not always accompany these animals. In winter they frequent the corn-yards, along with linnets, buntings, larks, and wild pigeons, to obtain a few grains of oats, search the stubble grounds for seeds, pick up small testaceous mollusca from the pastures, and occasionally visit the shores to feed on marine worms. In spring they find a supply of food in the newly turned fields or patches of ground; in summer and autumn they are furnished with abundance of larvæ and worms, found chiefly under the dung of domestic animals; and they attack the corn in the same manner as the sparrow, although this kind of food is apparently less agreeable to them than their more usual kind.

Starlings always keep in flocks, and generally fly in a compact body, which frequently appears to undergo a kind of rotatory motion, as the individuals shift their position. When in haste however, they fly in a direct manner, without undulations, and with great speed, employing regularly-timed beats of their wings. They alight in the open pastures abruptly, without

preparatory reconnoitering, immediately disperse, run along very nimbly, and diligently search for mollusca, worms, and other objects. On discovering traces of a subterranean larva or worm, they dig it up with great dexterity in the same manner as the thrushes and crows. During their search they are seldom altogether silent, some individuals commonly keeping up a chattering noise, and occasionally uttering a low scream, when interfered with by others. This scream prolonged and heightened is the intimation of alarm, and when heard from one or more of the flock, they immediately cease their search, look up, and, if they should judge it necessary, fly off with speed to another generally distant part.

In winter the flocks are often very large, but even in the breeding season the individuals that come abroad to search for food for their young, keep in parties. In the Outer Hebrides they associate with no other birds, excepting occasionally Pigeons; but in other parts they are frequently seen intermingled with Jackdaws, Rooks, and Thrushes of different species. In sunny weather, even in winter, Starlings congregated on a rock, the top of a wall, or other eminence, enact a very pleasant concert or medley, each singing in a low rather sweet voice, and the united effect being very similar to that of the winter song of a flock of Redwings. Individually the Starling's ditty is certainly not equal to that of the Throstle, but yet it is by no means despicable.

These birds are occasionally a little quarrelsome when two or more individuals happen to come into contact having a worm or other object in view; but their feuds are not deadly, and in general they live very peaceably together; nor do they molest any other species of bird. They are sometimes preyed upon by the smaller hawks, especially the Sparrow Hawk and Merlin.

The flesh of the Starling is not much inferior to that of a thrush, although tougher, and as a considerable number may be occasionally obtained at a single shot, this bird is not unworthy of the attention of the animal designated by the name of sportsman. The Hebridian shooters always twist off its head the moment they get hold of it, alleging that in the blood of that part there is something of a poisonous nature. Others main-

tain that the bitter taste which they attribute to the Starling's flesh resides in the blood, and that this affords the true reason for the decapitation practised. For my own part I never could perceive any difference between the flesh of a Starling merely shot, and that of another both shot and beheaded; and all that I can state on the subject is that both are very good, and not at all inferior to the flesh of the wild pigeon.

In the Hebrides the Starlings begin to form their nests in the end of April or the beginning of May, selecting suitable spots in the crevices of rocks, in caverns, or under large blocks, in situations as inaccessible as possible. I have found them also in large winding holes in grassy banks on an unfrequented islet, which I conjectured to have been originally formed by rats, and afterwards enlarged by the Starlings. It appears however that they also dig holes of themselves on the grassy shelves of the rocks. The nest is bulky, composed of grass and portions of plants of various species, with a rude lining of feathers and hair. The eggs, which are from four to six, are of a somewhat elongated or regular oval form, glossy, and of a delicate very pale greenish-blue. They vary in length from an inch and a quarter to an inch and two twelfths or a little less, and in their greatest breadth from three fourths to ten twelfths of an inch.

These birds occur in many other parts of Scotland, but are generally rare in the middle and southern divisions, where their colonies breed in maritime rocks, in old buildings, and sometimes in holes in decayed trees. In winter, they usually scatter over the country, appearing in flocks of greater or less extent in parts where they do not habitually reside. Thus far I have confined my statements to my own observation; but to complete my account of the manners of this interesting bird, I take the liberty of extracting from Mr. Stanley's Familiar History of Birds a portion of a passage on this subject equal in my opinion to the best biographical sketches of Wilson or Audubon.

"Not far from the church we have mentioned, there is a considerable sheet of water, occupying nearly thirty acres; flanked and feathered, on the eastern side, by the old beech-

wood, already spoken of as the abiding place of the Jackdaws. Its western margin is bounded by an artificial dam, which, as the water is upon a much higher level, commands an extensive view over a flat rich country, the horizon terminated by the faint outline of the first range of Welsh mountains. This dam, on the finer evenings of November, was once the favourite resort of many persons, who found an additional attraction in watching the gradual assemblage of the Starlings. About an hour before sun-set, little flocks, by twenties or fifties, kept gradually dropping in, their numbers increasing as day-light waned, till one vast flight was formed amounting to thousands, and at times we might almost say to millions. Nothing could be more interesting or beautiful, than to witness their graceful evolutions.

" At first they might be seen advancing high in the air, like a dark cloud, which, in an instant, as if by magic, became almost invisible, the whole body, by some mysterious watchword, or signal, changing their course, and presenting their wings to view edgeways, instead of exposing, as before, their full expanded spread. Again, in another moment, the cloud might be seen descending in a graceful sweep, so as almost to brush the earth as they glanced along. Then once more they were seen spiring in wide circles on high; till at length, with one simultaneous rush, down they glide, with a roaring noise of wing, till the vast mass buried itself unseen, but not unheard, amidst a bed of reeds, projecting from the bank adjacent to the wood. For no sooner were they perched, than every throat seemed to open itself, forming one incessant confusion of tongues.

" If nothing disturbed them, there they would most likely remain; but if a stone was thrown, a shout raised, or more especially, if a gun was fired, up again would rise the mass, with one unbroken rushing sound, as if the whole body were possessed but of one wing, to bear them on their upward flight. In the fens of Cambridgeshire and Lincolnshire, where reeds are of considerable value for various purposes, the mischief they occasion is often very considerable, by bearing down, and breaking them, as many as can find a grasping hold, clinging to the same slender stem, which, of course, bends, and plunges

them in the water, from whence they rise to join some other neighbours, whose reed is still able to bear their weight. This perpetual jostling and breaking down, is the probable cause of the incessant clatter, which continues for a considerable time; indeed, till all have procured dry beds, and a firm footing.

"It has been remarked that the flights of these birds have of late years much diminished, a fact to which we can speak from our own experience, for the assemblages which we have just described, as forming so interesting a feature in autumnal evening walks, have long ago ceased; and it is now a rare thing to see a passing flock of even fifty, where, in years gone by, they mustered in myriads."

It is interesting to trace the changes which the habits of birds undergo, to accommodate them to the different circumstances in which they may be placed. The Starlings of the Outer Hebrides and the north-eastern islands, equally treeless, remain all the year round, retiring nightly to rest in the places where they have bred, namely the caves and crevices of the maritime cliffs; while those of many other parts of Scotland, even of the island of Skye, and of England, leave their breeding places, like the rooks, collect into flocks, and roost in different localities during the winter. The reason of this difference is not apparent, unless it be that in the former case they cannot find a more secure retreat than that in which they have bred, and therefore are obliged to restrain their wandering propensities, which they can freely indulge in districts where they have a choice of station.

Mr. Weir, to whom I am indebted for so many interesting observations, has favoured me with the following notes having reference to this species. "About the end of May 1835, being very anxious to get a pair of Starlings for stuffing, I went to Carmichael House, Lanarkshire. While there, I was determined to ascertain if the fact be true, which I have somewhere heard or seen mentioned, that the male Starling does not feed its young ones. Of the absurdity of this statement I had an excellent opportunity of being convinced. The gamekeeper having pointed out to me a nest with young, in the hole of a very old ash tree, about thirty feet from the ground, the female

of which had been shot for eight days, I observed the male, notwithstanding the want of his partner, persisting in his labours of affection with unwearied assiduity. I set fetters around the hole, and caught the poor fellow. He was a remarkably beautiful bird. From the nest proceeded a most offensive odour, occasioned by the droppings of the birds not having been removed, which was not the case with any of the other nests that I looked into. There was, at least in this instance, a strong proof that the male does not condescend to take a share in this servile employment, but leaves it wholly to the charge of the female. But lest some sceptic should affirm that the father, although ordinarily austere, might have been moved with compassion towards his offspring when deprived of their mother, I made another attempt to be more fully convinced of its truth. I accordingly set my fetters around the hole of another nest, and in the course of a few hours caught the male and the female in the act of feeding their young ones. This proved beyond doubt the fallacy of the statement."

The Starling is easily tamed, and may be taught to whistle tunes, as well as to pronounce words. Almost all authors are agreed in reducing its natural notes to "a harsh scream and a chatter or twitter;" but I have certainly heard them enunciate what to me, who am more sentimental than musical, appeared to be a very pleasant little song. As a specimen of an accomplished Starling I may here introduce one visited by Mr. Syme. "We went, one morning, with a friend, to see a collection of birds belonging to a gentleman in Antigua Street, Edinburgh; and among these were some very fine Starlings—one, in particular, which cost five guineas. Breakfast was ready before we entered the room. When the bird was produced, it flew to its master's hand, and distinctly pronounced, 'Good morning, Sir,—breakfast—breakfast.' It afterwards hopped to the table, examined every cup; and, while thus employed, it occasionally repeated, 'Breakfast—breakfast—bread and butter for Jack—pretty Jack—pretty Jack.'"

Mr. Weir gives a similar account of another individual. "Mr. Paton, carver and gilder, Horse Wynd, Edinburgh,

had one a few years ago, which I have heard pronounce most distinctly the following sentences. When I entered the shop, he said to me, 'Come in, Sir, and take a seat—I see by your face that you are fond of the lasses—George, send for a coach and six for pretty Charlie—Be clever, George, I want it immediately;' and many other sentences to the same purport. He was taught by a shoemaker in Stewarton, Aryshire."

Young.—The young in their first plumage differ in colour so much from the old birds that several authors have described them as forming a distinct species. On this subject I have some remarks to offer, which are the more necessary that the question is not yet settled with some individuals, who have not compared specimens of the objects which they confound. In the first place, however, it is necessary to describe the young Starling. Its form is of course in all respects similar to that of the old bird, only the bill and claws are somewhat shorter. The former is blackish-brown with paler edges, the upper mandible having a slight notch close to the tip, which becomes obsolete in the adult. The irides are brown; the feet reddish-brown; the claws dusky. The plumage is not at all loose, although not of so compact a texture as in the old bird, and quite lustreless; the feathers less narrow and more rounded; the wings and tail as described above. The general colour is a dull rather light greyish-brown, the throat much paler, approaching to greyish-white. The quills and tail-feathers are of the same tint, and edged with pale reddish-brown. This is the Starling in its first plumage. I have before me a specimen obtained in August, in which the beautiful glossy dark narrower white-tipped feathers appear in patches among the dull brown ones, producing a curious contrast, and proving beyond a doubt that the "Brown Starling or Solitary Thrush" of authors is actually a young "Spotted Starling."

M. Temminck had long ago informed us that the young starlings "previous to the autumnal moult, are of a brownish-grey without spots, on all parts of the body; the wings and tail have the feathers bordered with reddish-grey; the throat is white, and there is a little of a whitish tint on the belly."

This, from so accurate an ornithologist might have induced people to look to nature for their descriptions, when they would have found that the Solitary Thrush of Montagu and Bewick is merely a young Starling.

Mr. Syme, in his Treatise on British Song Birds, clearly describes, under the article "Solitary Thrush, Moor Thrush, or Brown Starling," the habits and haunts of the Ring Ouzel, with which he associates the description of the Solitary Thrush of Bewick and Montagu. "From its nest being difficult to find," he says, "and from its being so rare a bird, it is seldom seen in a cage." Very seldom indeed, whether the Ring Ouzel or the Solitary Thrush, but which of them may have been "seen in a cage" does not appear. "The young are easily brought up, and repay the trouble by their sweet native song. They may also be taught to whistle, and articulate words, when confined. The species sings as well by candle-light as by day." Surely Mr. Syme must have "in his eye" some bird or other, when he talks thus; and when he states that "its notes, in all their qualities, excel those of the song-thrush," he must mean the Ring Ouzel, or nothing at all.

Mr. Knapp, in his Journal of a Naturalist, obviously describes the young of the Common Starling under the name of the Brown Starling, or Solitary Thrush; but those persons who cannot distinguish between a Starling and a Thrush must have very confused ideas of generic distinctions in ornithology, for the bill of the one genus is very different from that of the other.

"The Brown Starling, or Solitary Thrush *(Turdus solitarius)*, is not an uncommon bird with us (in Glocestershire). It breeds in the holes and hollows of old trees, and, hatching early, forms small flocks in our pastures, which are seen about before the arrival of the winter starling, for which bird, by its manners and habits, it is generally mistaken." It is to be regretted that the period of its first appearance is not mentioned, for the young of the Spotted Starling might be seen abroad in "small flocks," by the end of May. "It will occasionally, in very dry seasons, enter our gardens for food, which the common stares never do;"—but young inexperienced birds, like boys, often venture on exploits which old ones would not undertake

—" and this year (1826) I had one caught in a trap, unable to resist the tempting plunder of a cherry tree, in conjunction with half the thrushes in the neighbourhood. I have seen a few small, thrush-like birds associate and feed with the missel thrush in our summer pastures, which I suspect to be solitary starlings; but, wild and wary like them, they admit no approach to verify the species; and they appear likewise to follow and mix with this bird, when it visits us in autumn, to gather the berries of the yew and the mountain ash. I am not certain where it passes its winter season, but apprehend it mingles in the large flights of the common species. It returns to our pastures, however, for a short period in the spring, in small parties of six or ten individuals." Now, if this statement be correct, if a plain-coloured, unspotted Starling, appears in spring in the pastures, it is undoubtedly of a different species from the common, for the young of that acquires the plumage of the adult in August and September of its first year. Surely all doubts could easily be solved, by shooting a few spring specimens; but I fear the solitary starling will no more be forthcoming than the small thrush so much talked of in Loudon's Magazine, of which, although very abundant, not a fragment could ever be produced—for this reason, I apprehend, that it was merely the Redwing. " The common stare, when disturbed, rises and alights again at some distance, most generally on the ground; but the brown starling settles frequently on some low bush, or small tree, before it returns to its food. I know of no description that accords so well with our bird as that in Bewick's Supplement, excepting that the legs of those which I have seen are of a red brown colour, the bill black, and the lower mandible margined with white; but age and sex occasion many changes in tints and shades. This species possesses none of those beauties of plumage so observable in the common starling; and all those fine prismatic tintings that play and wander over the feathers of the latter, are wanting in the former. Its whole appearance is like that of a thrush, but it presents even a plainer garb; its browns are more dusky and weather-beaten; and for the beautiful mottled breast of the throstle, it has a dirty white and a dirtier brown. I

scarcely know any bird less conspicuous for beauty than the solitary thrush: it seems like a bleached, way-worn traveller, even in its youth." It is only in its youth that the "solitary starling," which by the above account associates with its neighbours in small flocks, and even joins the large flocks of the Spotted Starling, has this bleached appearance, for in less than four months after its birth it is splendent with blue and green. It is clear that Mr. Knapp, like many other observers, has not compared the supposed species with those allied to it, and that in short his Turdus solitarius, is neither a Turdus nor a solitary bird, nor even a species at all, but simply a young Starling, which, contrary to nature, and therefore to truth, he has made to retain its sober and dull youthful plumage all the winter and longer. Mr. Jenyns, in his British Vertebrate Animals, alleges that "the perfect plumage is probably not attained till the third year;" but this also is incorrect, for the bird assumes the dark brilliantly glossed and spotted plumage at its first moult, as I know from observation.

Progress toward Maturity.—The changes that take place in the plumage, as the bird advances in age, are not remarkable, the feathers becoming narrower, more pointed, and with their terminal spots smaller, so that in the males the latter entirely disappear from the head and fore-neck. Specimens obtained in spring or in summer shew in a remarkable manner the wearing of the edges and tips, and in them the white spots are more or less obliterated.

THREMMAPHILUS. COW-BIRD.

The birds of which this family is composed are intermediate between the Starlings and the Grakles. Some of them also approach very near to the Thrushes.

Bill of moderate length, or rather short, moderately stout, nearly straight, compressed towards the end; the upper mandible with its outline slightly declinate and convex, the ridge narrowed at the base, the nasal cavity being very large, the edges sharp and rather inflected, with a slight notch close to the slightly decurved tip; the lower mandible with a long rather acute angle, its crura rather broad and sloping outwards, the dorsal outline straight, the edges sharp. The gape-line ascends at the base, and is then direct.

Internally both mandibles are concave, with a central prominent line; the palate straight, rather narrow, sloping upwards at the sides. The characters of the digestive organs are unknown to me.

The eyes are rather small, the eyelids fringed with very small feathers, and having a very narrow crenate margin; in some species there is a bare space on the side of the head, including the lower eyelid. Aperture of the ear roundish, of moderate size. Nostrils elliptical, oblique, open, with an arched horny operculum, and placed in the fore part of the long nasal groove, which is covered with slender feathers, curved backwards.

The feet are moderately stout; the tarsus rather short, stout, compressed, with seven anterior scutella, and two longitudinal plates forming a thin edge behind. The toes four; the first

stouter, directed backwards, and of about the same length as the second and fourth, the third considerably longer; all covered above with large scutella, the first with nine, the second with ten, the third with thirteen, the fourth with eleven; rather flat and granulated beneath; the fourth united to the third as far as the second joint. The claws are rather long, moderately arched and stout, much compressed, acute, their sides flat and obscurely grooved.

The plumage is moderately full. The feathers along the nasal groove are very narrow, pointed, and curved backwards. The wings are of moderate length, rather pointed, the first quill extremely small, being about a sixth of the length of the second, which is generally a little shorter than the third, the fourth slightly shorter, the rest graduated; primary quills ten, narrowed towards the end; secondary generally nine, broad, all rounded, the inner slightly emarginate. The tail is of moderate length, or rather short, slightly rounded.

The birds of which this genus is composed are of small or moderate size, varying from that of a Common Thrush to that of a Jackdaw. They are peculiar to the Old Continent. The smaller species are closely allied to the Starlings on the one hand, and to the Thrushes on the other, insomuch that the only species which occurs in Britain has been referred by some to the genus Sturnus, by others to Turdus. Were the species not numerous, there would in fact be little reason for separating some of the Thremmaphili from Gracula, and the rest from Sturnus; nor would it be easy to point out the distinctive characters of these groups, although when a series of specimens is inspected, and the separation made, one is pleased with the result.

The species of this genus were first separated by M. Temminck from the genera Gracula, Sturnus, and Turdus, and received from him the common designation of *Pastor* (which being translated is simply *Shepherd.*) In the third part of his Manual, at p. 76, he states that objections have been made to the name, " not without some reason," but excuses himself for retaining it, because were the same strict criticism applied to very many other generic names, the number to be suppressed

would not be small. This, it is obvious, is mere trifling. He then suggests *Pecuarius*, and informs us that M. Brehm uses *Boscis*:—both ill-constructed names. I have therefore chosen Thremmaphilus, a name compounded of θρέμμα, cattle, and φίλος, friend.

The Thremmaphili are represented as resembling the Starlings in their mode of life, and, according to M. Temminck, "follow cattle even more assiduously, perch on their backs to pick the acari and ticks attached to their skin, flock upon dung; and also feed on large insects, such as grasshoppers." According to authors, they resemble the Starlings in their habits, nestle in the holes of trees, in crevices of rocks, and on old buildings, and inhabit various parts of Asia and Africa. Some of them, as Thremmaphilus Pagodarum, are remarkable for their vocal powers.

THREMMAPHILUS ROSEUS. ROSE-COLOURED COW-BIRD.

ROSE-COLOURED THRUSH, OR STARLING.

Turdus roseus. Linn. Syst. Nat. I. 294.
Turdus roseus. Lath. Ind. Orn. I. 344.
Rose-coloured Ouzel or Thrush. Mont. Orn. Dict.
Martin roselin. Pastor roseus. Temm. Man. d'Orn. I. 136. III. 76.
Rose-coloured Pastor. Pastor roseus. Selb. Illustr. I. 343.
Pastor roseus. Rose-coloured Pastor. Jen. Brit. Vert. An. 144.

Male with the feathers of the head elongated; the plumage of the body pale rose-coloured; of the head and fore-neck black, glossed with purple; the wings and tail brownish-black, glossed with green. Female with the colours similar but duller, the crest inconspicuous. Young with the upper parts light brown, the feathers edged with white.

Male.—The Rose-coloured Cow-bird is about the size of the Spotted Starling, which it resembles in its proportions. As it is not a native of this country, nor even a regular visitant, individuals can very rarely be obtained for examination; and I am therefore obliged to take my descriptions from foreign skins.

The bill is rather short, pentagonal, moderately stout, the gape-line bent near the base; the wings rather long; the tail rather short; the feet stout; the tarsi with seven anterior scales; the first toe with nine, the second with ten, the third with thirteen, the fourth with twelve; the claws slightly arched, rather slender, much compressed, acute.

The plumage is soft, and generally blended. The feathers of the fore part of the head are short and pointed; those of the hind and upper parts linear, elongated into a decurved crest about an inch long; of the neck narrow; of the body oblong.

The first quill is only three-fourths of an inch long; the second longest, being about the twelfth of an inch longer than the third; the rest graduated. In all the other species of the genus which I have examined, the third quill is longest. The secondary quills are seven, the outer abrupt and slightly emarginate, the inner rounded. The tail is rather short and slightly rounded.

According to M. Temminck, "the upper mandible of the bill and the point of the lower are yellowish rose-colour, the rest black; the feet yellowish; the iris deep brown." Mr. Selby makes the "upper mandible of the bill and the point of the lower one reddish-orange, the rest black; irides brown; legs flesh-red." Mr. Jenyns' account is to the same effect, with the necessary variations. Judging from skins, I am inclined to doubt all this. In them the feet are reddish-brown, as in the Starling; the lower mandible is flesh-coloured, its tip, and the greater part of the upper, light brown. Montagu says the bill is "of a flesh colour, blackish at the base." I apprehend that base has been accidentally substituted for tip.

The upper part of the head, including the crest, and the fore-neck, are black, glossed with purplish-blue; the hind part of the neck greyish-black. The feathers of the body, and the scapulars, are of a delicate pale rose-colour, or peach-blossom red. The smaller wing-coverts are black, margined with grey; the larger coverts glossy black with green reflections, as are the outer webs of the outer secondary quills, and both webs of the three inner. The quills are brownish-black tinged with green. The tail greenish-black and glossy, as are the upper and lower tail-coverts, and the feathers of the legs.

Length to end of tail about 9 inches; wing from flexure $5\frac{1}{4}$; tail 3; bill along the ridge $9\frac{1}{2}$ twelfths, along the edge of lower mandible $1\frac{1}{12}$; tarsus $1\frac{2}{12}$; hind toe $\frac{7}{12}$, its claw $\frac{5}{12}$; second toe $\frac{7}{12}$, its claw $\frac{4}{12}$; third toe 1, its claw $4\frac{1}{4}$ twelfths; fourth toe $4\frac{1}{4}$ twelfths, its claw $3\frac{1}{2}$ twelfths.

Female.—The female resembles the male, but has the colours much duller; the head and fore-neck greyish-black; the back

having the rose-colour obscured by brown; that on the breast less pure; the occipital crest scarcely apparent.

Length to end of tail about 9 inches; wing from flexure $5\frac{2}{12}$; tail $2\frac{3}{4}$; bill along the ridge $\frac{10}{12}$; along the edge of lower mandible $1\frac{1}{12}$.

Remarks.—This very beautiful bird, of which stragglers have been seen at various times in many parts of England, is said by authors to inhabit Africa and the warmer regions of Asia, and to migrate irregularly into the south of Europe. According to Wagler, "it lives on insects, especially locusts and grasshoppers, as well as on seeds of various kinds; often mingles with flocks of Starlings, and perching on the backs of cattle, extracts the larvæ of œstri; nestles in holes of trees and of old buildings, laying six eggs."

PRACTICAL ORNITHOLOGY.

FOURTH LESSON.

RETURN OF SPRING. ARRIVAL OF SUMMER VISITANTS. BIRD-NESTING. DIRECTIONS FOR PRESERVING EGGS, NESTS, AND SKINS OF BIRDS. CONCLUSION.

THE howl of the wintry blast among the leafless twigs has ceased, and the gentle gales of the south fan the pendulous catkins of the alders that overhang the stream, and steal over the pale flowers of the primrose that cluster on the sunny bank. The Fieldfare and Redwing, reminded by the increasing warmth of the woods and vales of their native land, prepare to commence their adventurous flight to the wild shores of the northern ocean; while, to occupy their place, a multitude of small birds from the southern regions are on wing. Already the Wheatear and Willow Wren have arrived, and in a few days the vicinity of the towns and villages will be enlivened by the Swallows, which will seek their former haunts, and in due time repair their mud-built tenements in the corners of the windows.

It is a lovely April day. All over the pale blue sky are scattered fleecy tufts of white vapour, buds of beauty are bursting from the earth, and the distant waterfall fills the valley with its soothing murmur. How delightful the scenery of these wild hills, where from the rift of the lichen-crusted crag juts out the rowan, whose elegantly pinnated foliage is fast unfolding; where, scattered along the broken steep, are seen the white-stemmed birches, with their drooping twigs and glistening leaflets; while the hillocks are crowned with blossomed furze; and the smooth waters of the deep lake send back the wooded banks and the heath-clad heights!

High over head wheels in wanton mazes the joyous Snipe, piping its singular song, and anon drumming on tremulous wing, as it shoots aslant. The shrill scream of the Curlew is

responded to by the wail of the Lapwing, and the melancholy whistle of the Golden Plover. Already have these birds deposited their eggs on the moor, in which they have scraped a slight hollow for the purpose of receiving them. Should you come upon one of their nests, you will admire the arrangement of its four pear-shaped and spotted eggs, the narrow ends of which meet in the centre. Among the tufts of furze and sloe hops the lively Ring Ouzel, newly arrived from the warmer region in which it has passed the winter; and by the pebbly margin of the pool flits the delicate Sandpiper, whose body is continually vibrating as if on a pivot.

It is the busy season of nature. What myriads of flowers are silently expanding, what rills of vegetable juices are ascending the stems to the topmost twigs, what mighty preparations, without confusion or bustle, are making to secure an abundant produce of fruit and seed for the support of animal life! How beautiful the brooding mystery of that happy Raven, seated on her nest to impart vital warmth to her newly-fledged young, while her mate croaks in joy on the projecting crag, ready to sally forth and drive away the prowling hawk that may chance to come near his ancient seat, the castle of his sires. For weeks might one wander among those wooded glens, finding each hour some fresh object to excite admiration, and warm his bosom with the glow of gratitude toward the Supreme Power which out of nothing has called all these wonders into being. But at present we are mere strolling naturalists, bent on collecting nests and eggs. Hard-hearted mortals!—Nay, is it cruel to slaughter the unoffending sheep, hook the deceived cod from the depths of the salt sea, scrape up the "gentle oyster" from his stony bed, or hunt the innocent rabbit from his hole with the blood-thirsty ferret? No, it will be said, all this is necessary, and more; but to gather eggs merely for their shells is not only cruel but childish. You may with propriety pick up those of the Lapwing and send them to market, whence they will be transferred to the kitchen; but to collect them as objects of curiosity, as food for the mind, is little better than sacrilege. Be this as it may, the ornithologist must gather eggs; and therefore a few words as to their preservation may not be amiss.

A collector can scarcely pick up with his own hands specimens of the eggs of half the species that breed in this country, some being rarely met with, or only in a particular district, and others being to be found in rocks, on remote islands, or in places not easily accessible. For example, how many British ornithologists have robbed an Eagle's or an Osprey's nest; who of all those that have described the Magpie's eggs have seen them in situ; and who has laid his grasping hand on those of the Raven, the Hooded Crow, the Chough, the Rock Dove, the Ptarmigan, or the Stormy Petrel? To make a collection of eggs, one must purchase from dealers, hire herds and boys, and lay his friends under requisition. But let him also search for himself, otherwise he will miss much knowledge.

The best way to empty an egg is to drill a hole near each end with a triangular needle, which is to be gently twirled between the finger and thumb. The contents are then blown out with the mouth. A solution of gum injected with a small syringe gives when dry strength to the shell, and prevents the membrane from being destroyed by insects. I have seen egg-shells almost filled with moths, and nothing is more common than to find them rendered so brittle by the disappearance of the film that they can scarcely be handled with safety. The apertures may also be filled with wax, or a small bit of thin paper may be pasted over them. Eggs must not be varnished or gummed over, because their natural surface would thus be altered. Nor should they be much washed, as the spots of many are easily abraded. They are best kept in the drawers of a cabinet, in pasteboard boxes, of a blue or other agreeable colour, having cotton or chopped moss in the bottom. Those of each species are of course to be kept apart, and the whole may be arranged according to the ornithological system adopted by the collector. Some write the name on the shell, which is thus liable to be greatly disfigured; others on slips pasted upon the boxes; and others on small cards attached to them, or lying loose. Eggs kept in this manner form a beautiful collection, which ought not to be exposed unnecessarily to the light, otherwise the colours soon fade. Half a dozen drawers of moderate size are sufficient to contain specimens of all the British eggs that can be procured.

As to nests, all that can be done with them is to preserve them in cabinets or chests, loosely stitching with thread those that are apt to be injured by being handled. It is only those of the smaller birds that can be kept.

Then, for birds themselves, the spoils of which are necessary to the ornithologist, there are various methods. All the parts of a bird may be preserved, but few collectors care for more than the skin and feathers. To skin a bird, lay it on its back, with its head from you; make an incision from the fore part of the breast to near the tail; separate the skin on each side, using sometimes the blade and sometimes the handle of the scalpel; thrust forward the legs, which separate at the knee joint; then cut across the rump, and skin the back and sides, until you come to the wings, which divide at the shoulder joint. Pull the skin over the head and neck, cutting the membrane of the ears, and scooping out the eyes; then separate the body by cutting the occiput across; remove the brain and tongue, as well as the muscles of the head and limbs; and after clearing away whatever fat or flesh may remain adhering to the skin, anoint its whole inner surface with arsenical soap liberally applied. Wrap some tow round the bones of the legs and wings; thrust cotton into the cavity of the cranium and the orbits; lay the skin on the table; fill it to the natural size or nearly so; stitch it up; smooth down the feathers; keep the wings in place by a bandage; and suspend by the legs, but not by the nostrils, or lay it on a tray in an open place, until dry. Finally, sprinkle over the plumage some pure rectified oil of turpentine; write on a small neatly cut piece of pasteboard the name, sex, date, and place of the specimen; affix it to the right tarsus, so that it may lie across the body; and deposit the preparation in its place.

Skins may be kept in drawers of a cabinet, or in chests having moveable trays of various depths. Two cabinets of moderate size are sufficient to contain specimens of all the British birds, of which, however, an individual can never make a complete collection. For description, or for comparison with descriptions, skins thus preserved are preferable to stuffed or mounted specimens, and occupy comparatively little room. To prevent the ravages of moths, they ought to be frequently in-

spected. The application of a little rectified oil of turpentine I have always found a more effectual remedy than camphor, spices, old tallow, or solution of corrosive sublimate. As to the arsenical soap itself, it is not to be trusted to entirely, for being applied only to the inner surface of the skin, although it may preserve that part, it does not prevent moths from breeding among the down.

The preparation of the skeleton, vascular system, digestive organs, and other parts of birds, may be deferred until a more convenient season, when, having before me some quires of good foolscap unsullied by the pen, I may have the pleasure of resuming my labours. In the meantime, "Good Pupil," go on and prosper; pursue the path on which you have entered; and if, when we meet again, you should have observed for yourself to some purpose, we may examine those parts of the structure of birds that have not been described in this volume, and commence an anatomical collection. For the present, our labours are ended. Happy shall I be to find that they have been the means of exciting a taste for studies which are alike conducive to the health of the body, and the improvement of the mind; and, above all, of cherishing that admiration of the wisdom and goodness of God, which the contemplation of his works cannot fail in some degree to inspire in every human intellect. It is indeed a solemn thought, that this wondrous world in which we live is the work of that glorious Being whose eye is on all our actions, who knows all our thoughts, who is within and around us, whose we are, and in whose presence may we all finally rejoice, when the small vanities of sublunar existence have vanished for ever; when the proud philosopher, who knew the names of ten thousand animals, and looked down with contempt upon him who could never succeed in gaining the applause of his fellows, or who never tried to gain it, shall shrink into his own utter insignificance, and confess that the humble Christian, who held on "the even tenor of his way," careless alike of censure or praise, chose indeed the better part.

EXPLANATION OF THE PLATES ILLUSTRATIVE OF THE ORDERS, FAMILIES, AND GENERA.

The objects are represented half the natural size.

PLATE VI. Digestive Organs of the Brown Ptarmigan, Lagopus scoticus.

FIG. 1. *Alimentary Canal, Trachea, Heart and Liver.*

a, the tongue.
b, *b*, hyoid bones.
b, *e*, œsophagus.
c, *d*, crop.
f, gizzard.
g, *h*, *i*, duodenum.
g, *h*, *i*, *j*, *k*, intestine.
a, *m*, trachea.

FIG. 2. *Cœca and part of Intestine.*

a, *b*, part of the intestine, including its extremity, *b*, near which the ureters are seen to enter.
c, the point at which the cœca come off.
c, *d*, *e*, *f*, *g*, *h*, the two cœca, narrower at their commencement, then cylindrical, marked with about seven longitudinal white bands, and terminating in mammillar points, *g*, *h*.

FIG. 3. *Lower part of Œsophagus, and Gizzard.*

a, œsophagus.
b, proventriculus.
c, *d*, *e*, *f*, *g*, gizzard.
c, upper or anterior muscle.
d, *e*, lateral muscles.
f, tendinous space.
g, lower muscle.
h, intestine.

FIG. 4. *Gizzard and Proventriculus laid open.*

a, part of œsophagus laid open.
b, proventriculus laid open. The glandules are seen in the section, and their orifices on the inner surface.
c, gizzard laid open.
d, *e*, lateral muscles.
f, outer or muscular coat.
g, middle coat.
h, inner coat.
i, cylindrical mass of food.

PLATE VII. Digestive Organs of the Rock Dove, Columba Livia.

FIG. 1. *Alimentary Canal of a Wild Rock Dove.*

a, the bill.
b, *c*, *f*, *g*, œsophagus, extremely dilated at its upper part.
d, *e*, crop, transverse, and somewhat contracted in the middle.
f, continuation of œsophagus, very narrow.
g, proventriculus.

h, i, j, k, l, gizzard.
h, upper muscle.
i, j, lateral muscles.
k, lower muscle.
l, tendon.
m, n, o, duodenal fold of intestine.
p, q, r, continuation of intestine.

FIG. 2. *Section of Proventriculus.*

FIG. 3. *Stomach and Proventriculus of another individual, seen from behind.*

g, proventriculus.
h, upper muscle of gizzard.
i, j, lateral muscles.
k, lower muscle.
l, tendon.
m, commencement of intestine.

FIG. 4. *Terminal portion of Intestine, and Cœca.*

a, b, intestine.
c, d, cœca.

FIG. 5. *Alimentary Canal of Tame Pigeon.*

a, bill.
b, head.
b, c, d, e, crop, of extreme size, and commencing at the fauces.
f, continuation of œsophagus.
g, proventriculus.
h, i, j, k, l, gizzard.
h, upper muscle.
i, j, lateral muscles.
k, lower muscle.
l, tendon.
m, n, o, p, q, r, intestine.

FIG. 6. *Inner surface of Crop.*

FIG. 7. *Terminal portion of Intestine.*

a, b, intestine.
c, d, cœca.

PLATE VIII. Digestive Organs of Huskers, Deglubitores.

FIG. 1. *Alimentary Canal of the House Sparrow, Passer domesticus.*

a, the bill.
b, crop, unilateral.
a, c, d, œsophagus.
d, proventriculus.
e, f, g, gizzard.
e, f, lateral muscles.
g, lower muscle.
h, i, j, k, l, m, n, intestine.
l, cœca.

FIG. 2. *Alimentary Canal of the Corn Bunting, Emberiza Miliaria.*

a, b, c, d, œsophagus.
b, crop, or dilatation of œsophagus.
d, proventriculus.
e, f, g, gizzard.
e, f, lateral muscles.
g, lower muscle.
h, i, j, k, l, m, n, intestine.
l, cœca.

FIG. 3. *Alimentary Canal of the Green Linnet, Fringilla Chloris.*

a, the bill.
a, b, c, d, œsophagus.
b, crop.
e, f, g, gizzard.
e, f, lateral muscles.
g, lower muscle.
h, i, j, k, l, m, n, intestine.
l, cœca.

FIG. 4. *Alimentary Canal of the Common European Crossbill, Loxia europæa.*

a, bill.
a, *b*, *c*, *d*, œsophagus.
b, crop.
d, proventriculus.
e, *f*, *g*, gizzard.
e, *f*, lateral muscles.
g, lower muscle.
h, *i*, *j*, *k*, *l*, *m*, *n*, intestine.
l, cœca.

FIG. 5. *Alimentary Canal of the Field Lark, Alauda arvensis.*

a, the head.
b, *c*, *d*, œsophagus, differing from the above, in having no crop.
e, *f*, *g*, gizzard.
h, *i*, *j*, *k*, *l*, *m*, *n*, intestine.
l, cœca.

FIG. 6. *Head of the Corn Bunting, Emberiza Miliaria.*

FIG. 7. *Palate of Corn Bunting.*

FIG. 8. *Head of the Green Linnet, Linaria Chloris.*

FIG. 9. *Palate of Green Linnet.*

FIG. 10. *Proventriculus and Gizzard of the Chaffinch.*

FIG. 11. *Proventriculus and Gizzard of the Yellow Bunting.*

PLATE IX. Digestive Organs of Wanderers, Vagatores.

FIG. 1. *Alimentary Canal of the Carrion Crow, Corvus Corone.*

a, the tongue.
b, *b*, hyoid bones.
b, *c*, *d*, œsophagus, wide, but without crop.
e, *f*, trachea.
g, bifurcation of trachea.
h, heart.
i, *j*, liver.
k, lung.
l, stomach.
m, *n*, *o*, *p*, *q*, intestine.

FIG. 2. *Stomach of the Carrion Crow.*

a, *a*, proventriculus.
b, *c*, *d*, *e*, stomach.
b, *c*, lateral muscles.
d, lower muscle.
e, tendon.

FIG. 3. *Cœca and Rectum of the Carrion Crow.*

a, *b*, part of intestine.
c, *d*, cœca.

FIG. 4. *Alimentary Canal of the Jay, Garrulus Glandarius.*

a, the tongue.
b, *b*, hyoid bones.
b, *c*, *d*, œsophagus.
d, proventriculus.
e, *f*, *g*, stomach, round, compressed, its muscular coat not separated into distinct muscles.
g, large tendinous space.
h, *i*, *j*, duodenal fold of intestine.
k, *l*, *m*, continuation of intestine.

FIG. 5. *Cœca and Rectum of the Jay.*

a, *b*, part of intestine.
c, *d*, cœca.

FIG. 6. *Alimentary Canal of the Spotted Starling, Sturnus guttatus.*

a, the tongue.
b, *b*, hyoid bones.
b, *c*, *d*, œsophagus.
d, proventriculus.
e, *f*, stomach, like that of the Jay.
g, *h*, *i*, duodenal fold of intestine.
j, *k*, continuation of intestine.

FIG. 7. *Cœca and Rectum of the Starling.*

a, *b*, intestine.
c, *d*, cœca.

PLATE VI.

Digestive Organs of the
BROWN PTARMIGAN
LAGOPUS SCOTICUS

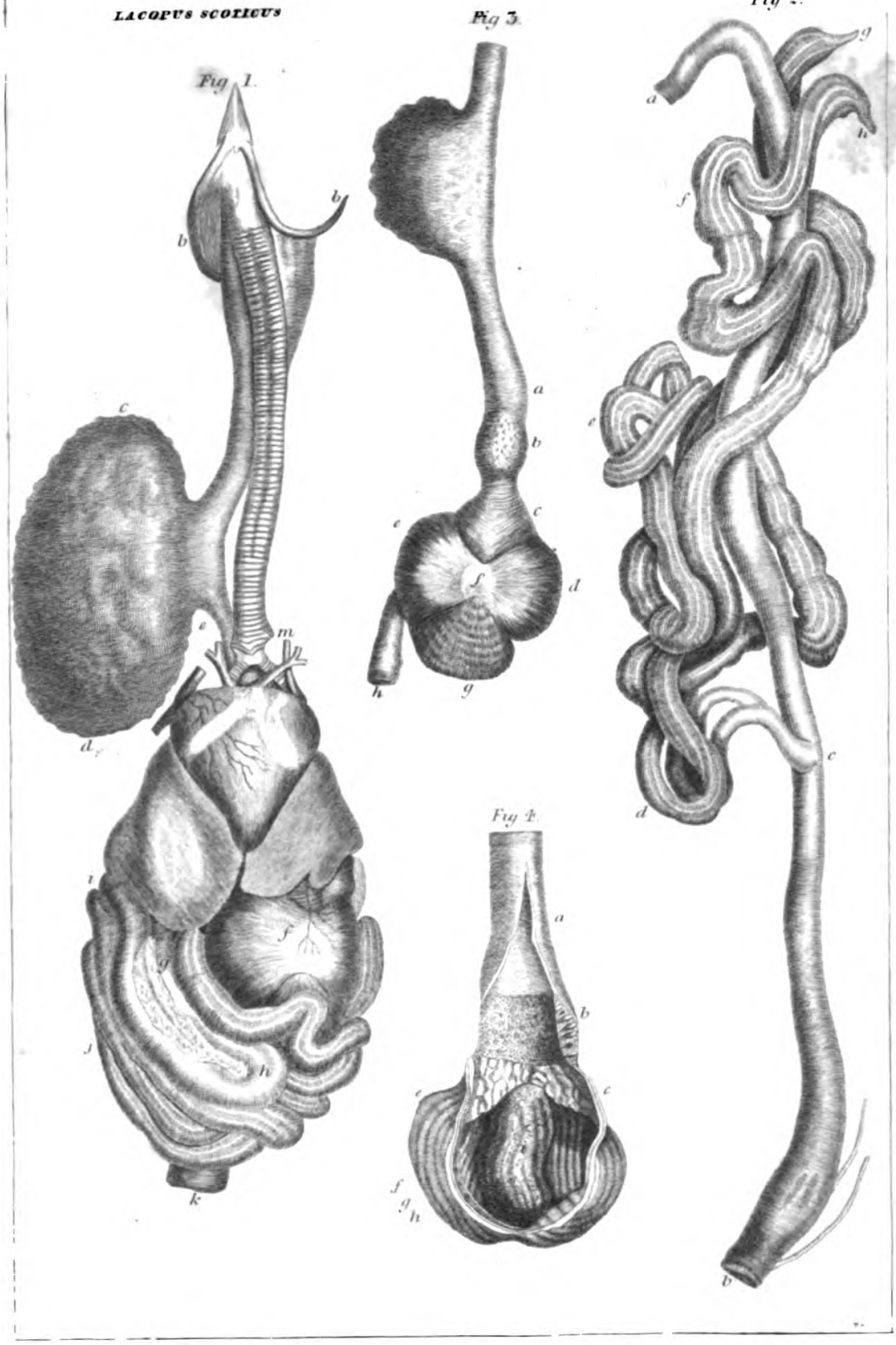


PLATE VII.

Digestive Organs of the ROCK DOVE. *COLUMBA LIVIA.*

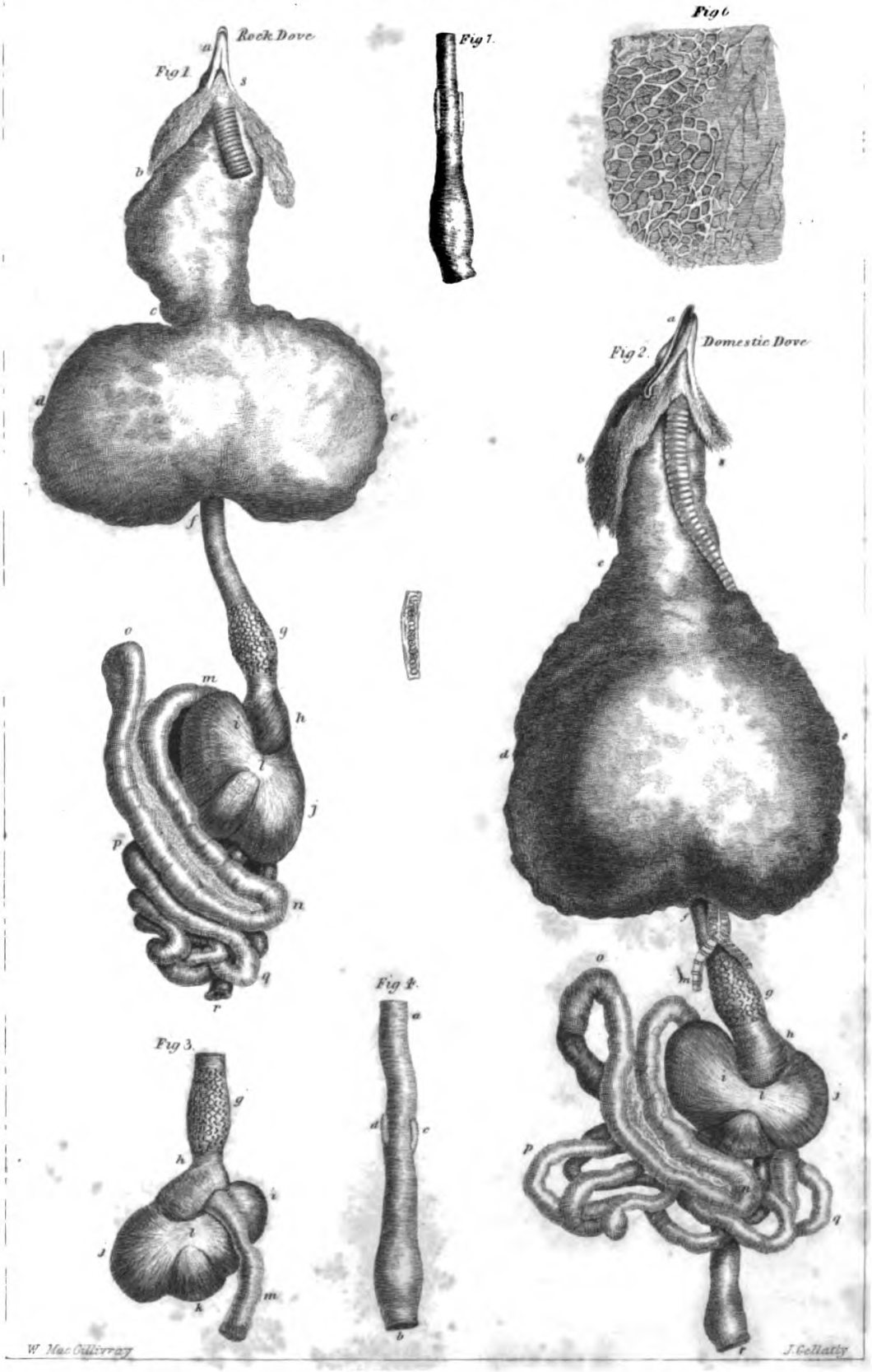


PLATE VIII.

Digestive Organs of

HUSKERS.

DEGLUBITORES.

Fig 1. Sparrow.

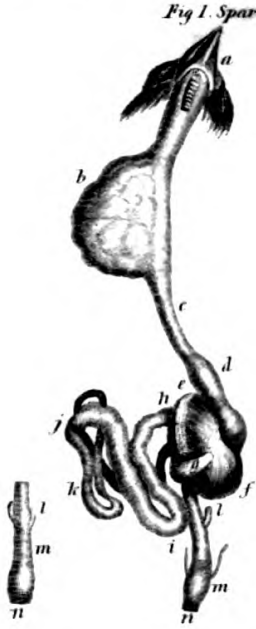


Fig 2. Bunting.

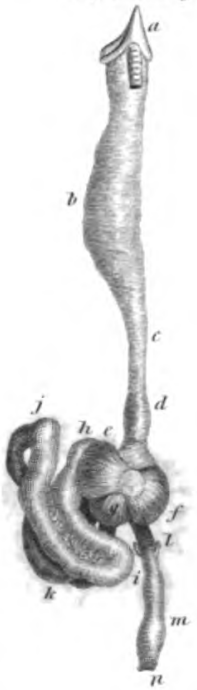


Fig 3. Green Linnet.

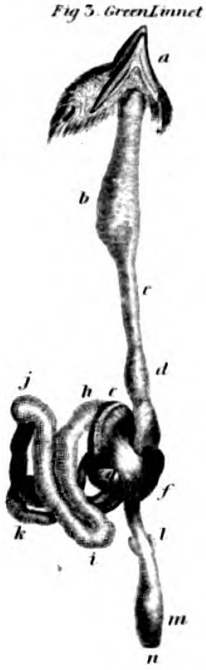


Fig 6. Bunting.

Fig 8 Green Linnet.

Fig 4. Crossbill

Fig 7.

Fig 9.

Fig 5. Lark.

Fig 10.

Fig 11.

INDEX TO THE SPECIES DESCRIBED.

The Approved Names only are employed, the Synonymes and Provincial Names being excluded.

GENERAL INDEX.

END OF VOLUME FIRST.

W. BURNESS, PRINTER, EDINBURGH.