The architecture of birds / [Anon].

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by James Rennie.

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OR, THE PLAIN

WHY AND BECAUSE:

FAMILIARIZING SUBJECTS OF USEFUL CURIOSITY AND AMUSING RESEARCH.

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PART III. — ORIGINS AND ANTIQUITIES.

PART IV. — ZOOLOGY: — BIRDS.

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PART VI. — SPORTS, PASTIMES, AND SUPERSTITIONS.

PART VII. — MECHANICS.

PART VIII. — ZOOLOGY: — AMPHIBIA, INSECTS, REPTILES, AND WORMS.

To be followed by

MAN, which will occupy a distinct part. Phenomena of the Weather. Botany. Surface and Interior of the Earth.

Discoveries and Inventions. Arts and Manufactures. Phenomena of Light, Heat, Sound, Electricity, and Magnetism.

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THE design of this Work is to present the enquiring Reader with just so many FACTS of 'useful research,' as may combine information with amusement; and gratify curiosity upon hundreds of laudable topics, without fatigue or uninviting study.

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At the same time, although *conversational*, the aim of 'THE PLAIN WHY AND BECAUSE' will be to condense as much as perspicuity will allow: condensation being the result of time and experience, which reject what is no longer essential.

The subjects of 'THE PLAIN WHY AND BECAUSE' will be almost as multitudinous, as the application of the terms themselves. Preference will nevertheless be given to such topics, as, from their general interest, are likely to possess charms for the great mass of the reading public. Plainness of illustration will always be preferred to technical terms; and world-knowledge, or common experience, may probably suggest much information which is not to be found in a connected form in books. All subjects that bear upon the arts of life, of society, and their common interests, are therefore recommended to the Editor's special attention, from their attractive character, as well as from their fascinating form of conveying useful information.

'THE PLAIN WHY AND BECAUSE' has already been eighteen months in preparation. The best and latest books have been consulted in this labour, and in many cases the authorities will be quoted. The present work will contain innumerable helps or aids to conversation and enquiry; while its comprehensiveness will, the publishers believe, entitle it to the recommendatory distinction of '*Knowledge for the People.*'

A SPECIMEN OF THE WORK FOLLOWS.

Why do birds change the form of their eyes?

Because, when flying in the air, and meeting with many obstacles, as branches and leaves of trees, birds require to have their eyes sometimes as flat as possible, for protection; but sometimes as round as possible, that they may see the small objects, (flies and other insects) which they are chasing through the air, and which they pursue with the most unerring certainty. This could only be accomplished by giving them a power of suddenly changing the form of their eyes. Accordingly, there is a set of hard scales placed on the outer coat of their eye, round the place where the light enters; and over these scales are drawn the muscles or fibres by which motion is communicated; so that, by acting with these muscles, the bird can press the scales, and squeeze the natural magnifier of the eye into a round shape, when it wishes to follow an insect through the air; and can relax the scales, in order to flatten the eye again, when it would see a distant object, or move safely through leaves and twigs. This power of altering the shape of the eye is possessed by birds of prey in a very remarkable degree. They can see the smallest objects close to them, and can yet discern larger bodies at vast distances, as a carcass stretched upon the plain, or a dying fish afloat on the water. A singular provision is made for keeping the surface of the bird's eye clean, for wiping the glass of the instrument, as it were, and also for protecting it, while rapidly flying through the air, and through thickets, without hindering the sight. Birds are, for these purposes, furnished with a third eye-lid, a fine membrane or skin, which is constantly moved very rapidly over the eyeball by two muscles placed in the back of the eye. One of the muscles ends in a loop, the other in a string which goes through the loop, and is fixed in the corner of the membrane, to pull it backward and forward.

Why have birds more varied motion in the neck than quadrupeds?

Because in birds the neck has a greater number of bones, and consequently of joints: the contrivance by which the spine of animals is rendered susceptible of varied motion, being by means of a strong chain of bones, (vertebræ) locked together by means of knobs and projections, to prevent dislocation, a chain which stretches from the head to the extremity of the tail. Except in the three-toed sloth, indeed, the bones in the neck of quadrupeds and of man are uniformly seven in number; the short-necked mole having the same as the long-necked giraffe; in birds, the number is never less than nine, and varies from that to twenty-four. — *Rennie.*

Why do birds sing?

Because of the receptacles of air already mentioned; but particularly by the disposition of the larynx, which in birds is not, as in mammifera and amphibia, placed wholly at the upper end of the windpipe; but, as it were, separated into two parts, one placed at each extremity. Parrots, ravens, starlings, bullfinches, &c, have been taught to imitate the human voice, and to speak some words: singing birds also, in captivity, readily adopt the song of others, learn tunes, and can even be made to sing in company, so that it has been possible actually to give a little concert by several bullfinches. In general, however, the song of birds in the wild state, appears to be formed by practice and imitation. — *Blumenbach.*

Why cannot birds be so correctly said to sing as to whistle?

Because natural singing is an exclusive privilege of man. — *Blumenbach.*

Why do the notes of different species of birds vary?

Because, probably, of the structure of the organs of each species enabling them more easily to produce

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The Pursuit of Knowledge under Difficulties, Part XIV, just published. Upon its announcement in London, the following notice appeared in the Ladies' Museum for January last.

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observations, as being advanced so completely in the spirit of true philosophy, and worthy of the attention of all engaged in the task of intellectual improvement.'

'The lives of Heyne, of Simpson, of W. Hutton, of Franklin, of Murray, not to mention more names, where the enumeration might be carried to hundreds, ought to prevent any one from desponding, be his present difficulties what they may. The struggle he has to wage may be a protracted, but it ought not to be a cheerless one; for, if he do not relax his exertions, every movement he makes is necessarily a step forward — if not towards that distinction which intellectual attainments sometimes confer, at least to that inward satisfaction and enjoyment which is always their reward. In other pursuits, the most unremitting endeavours often fail to secure the object sought; that object being generally some worldly advantage, is equally within the grasp of other competitors, some one of whom may snatch it away before it can be reached by him who best deserves it. But, in the pursuit of knowledge it matters not how many may be the competitors. No one stands in the way of another, or can deprive him of any part of his chance, we would rather say of his certainty of success; on the contrary, they are all fellow-workers, and may materially help each other forward. The wealth which each seeks to acquire, has, as it were, the property of multiplying itself to meet the wants of all.'

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THE ARCHITECTURE OF BIRDS.

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1831.

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THE

ARCHITECTURE OF BIRDS.

Chapter I.

INTRODUCTION.

In the 'Evenings at Home' of Mrs Barbauld and Dr Aikin, one of the few books for children which may be read with profit by persons of all ages, there is an instructive story, entitled 'Eyes and No-Eyes, or the Art of Seeing.' Two school-boys, at the close of a holiday, set out together to take a summer's walk: one saunters listlessly on without looking on the right hand or on the left; the other passes nothing, without finding some point of interest or amusement. 'I have been,' says the saunterer, 'to Broom-heath, and so round by the wind-mill upon Camp-mount and home through the meadows by the river's side; and I thought it very dull, for I scarcely met with a single person; I had rather by half have gone along the turnpike road.' 'I have had,' says the observer, 'O! the pleasantest walk! I went all over Broom-heath, and so up to the mill at the top of the hill, and then down among the green meadows

by the side of the river; and I am sure I hardly took a step that did not delight me; I have brought my handkerchief full of curiosities home.'

In the account which the observant boy subjoins of his interesting ramble (the other had nothing to tell) over the heath and the meadows, it is remarkable that Birds constitute more than two-thirds of his story. He saw a wheat-ear hopping about a pile of stones; a flock of lapwings throwing their fantastic somersets in the air, and one of them tumbling along as if her wing had been broken to lure him from her nest; he saw a king-fisher with its splendid plumage of green, orange, and blue, darting after fish in the brook, along the margin of which a family of sandpipers were hunting down aquatic insects, while some swallows which skimmed along on the wing were ready to dart upon the flies which escaped from these swift-footed pedestrians; he saw bank-swallows burrowing in the bank to shelter their nests from bad weather and worse enemies; he saw a heron take her patient stand at a bend of the river to watch for a passing fish, and, after a successful capture, fly off with her prey to her nest in the woods; and he saw a troop of starlings as numerous as a swarm of bees, — the same phenomenon which nearly three thousand years before had afforded Homer a fine poetical simile for a troop of fugitive warriors. 'So it is,' the narrative concludes — 'one man walks through the world with his eyes open, and another with them shut; and upon this difference depends all the superiority of knowledge the one acquires above the other.'

There are few persons, even of the well-informed, who, like the school-boy with 'his eyes open,' take an interest in such common occurrences as a wheat-ear hopping over stones, or a swallow hawking for flies over a brook. A taste for natural objects must be awakened and cultivated, before enjoyment

can be derived from the casual observation (if *study* be a term too strong and repulsive) of the works of creation, either in their picturesque and poetical aspects, or in their beautiful adaptation to their various purposes. But when an interest in natural productions has been once excited, we may confidently promise that the sources of pleasure will become exhaustless, and every walk, however short, will produce, like the ramble of the curious school-boy, something which has not been observed before.

From the want of a cultivated taste for natural objects, as they are presented to our own eyes, most persons are very partially acquainted with the peculiarities of their own immediate neighbourhood; and hence they are surprised when they chance to meet, in books, with descriptions of the various productions of nature which they have all their lives overlooked.

A gentleman, who was fond of reading Buffon, and similar works on Natural History, but who seldom looked into the great book of Nature itself, expressed to us his doubts of the account originally given by Heckwelder, of the butcher-bird sticking insects on the point of a thorn as a bait to allure small birds within its reach. He never thought, however, of disproving or ascertaining the circumstance, and was surprised beyond measure to be informed that at least one species of the butcher-bird (*Lanius Collurio*) was as common in his immediate neighbourhood as the song-thrush, and therefore opportunities of observing its manners could not be wanting. To satisfy ourselves, as well as to settle the doubts of our friend, we undertook to watch the proceedings both of the species just named, and also of the greater butcher-bird (*L. Excubitor*), both of which are so common that we found about half a dozen of the nests of each within five miles of Lee, in Kent.

Nest of the Butcher Bird (Lanius Excubitor).

We discovered that near those nests large insects, such as humble bees, and that the unfledged nestlings of small birds, were frequently seen stuck upon thorns.* We did not succeed in seeing the birds actually impaling these victims upon the thorns; but we obtained what we considered good proof of the fact: for the peasants, who had never heard of Heckwelder's story,

* The original observations in this volume, which are marked by the initials J. R., are by J. Rennie, A.M. A.L.S., Professor of Natural History, King's College, London.

all concurred in affirming, that the butcher-birds fix their prey upon thorns,—not, however, according to their belief, to allure larger game, but to kill or secure what has been already captured.

Selby, an eminent living naturalist, has confirmed the fact. 'I had the gratification,' he says, 'of witnessing this operation of the shrike (*L. Excubitor*) upon a hedge chanter (*Accentor Modularis*, Bechstein) which it had just killed, and the skin of which, still attached to the thorn, is now in my possession. In this instance, after killing the bird, it hovered with it in its bill for a short time over the hedge, apparently occupied in selecting a thorn for its purpose. Upon disturbing it, and advancing to the spot, I found the chanter firmly fixed by the tendons of the wing at the selected twig.'*

We have mentioned this habit of the butcher-bird (from which he derives his name) partly to show that in every situation there is an ample field for the inquiries of a naturalist, and partly to point out the extreme difficulty of collecting any great body of facts in Natural History without the most patient and diligent attention. When Alexander Wilson, the celebrated writer on the Birds of the United States, commenced his arduous task of examining every bird of that country with his own eyes, he complained that in the works of European naturalists he could only find 'a few vague and formal particulars of their size, specific marks, &c, accompanied sometimes with figured representations that would seem rather intended to caricature than to illustrate their originals.' With an enthusiasm never excelled, this extraordinary man, who went to the United States a poor and unfriended Scotch weaver, first taught himself, at the age of forty years, to draw and colour

* Illustrations of Brit. Ornith i, p. 141.

after nature, then applied himself to the study of various branches of knowledge, and having acquired the power of writing clearly and elegantly, as well as of depicting by his pencil what he saw in his rambles, set out to penetrate through the vast territory of the United States, undeterred by forests and swamps, for the sole purpose of painting and describing the native birds. During seven years in which he prosecuted this undertaking, he travelled more than ten thousand miles, 'a solitary, exploring pilgrim,' as he describes himself. His labours were rewarded with no worldly riches or honours, for he had the greatest difficulty in procuring subscribers for his splendid work, and when a bookseller at last undertook to print and publish it, the only remuneration which the author received was a payment for the mechanical labour of colouring his own plates. But his soul was set upon the one object of his life —that of giving a complete account of one of the most interesting portions of the works of the Creator, as far as the vast continent of North America afforded him opportunities for diligent examination. He passionately pursued his enquiry into the history of birds. In the preface to the fifth volume of his book he says, 'to me it appears, that of all inferior creatures, Heaven seems to have intended birds as the most cheerful associates of man;' and he declares that he has 'a thousand times turned, with a delight bordering on adoration, to the magnificent repository of the woods and fields—the grand aviary of nature.' Of the difficulties which an accurate student of birds in general has to encounter, and of the particular difficulties which exist in wild and unfrequented districts, Wilson has presented so striking and correct a view, that we cannot deny our readers the pleasure of reading one of the most characteristic passages of this ardent naturalist:—

'On many of his subjects it has not been in his power to say much. The recent discovery of some birds, and the solitary and secluded habits of others, have offered great obstacles to his endeavours in this respect. But a time is approaching when these obstacles will no longer exist. When the population of this immense western republic will have diffused itself over every acre of ground fit for the comfortable habitation of man—when farms, villages, towns, and glittering cities, thick as the stars of a winter's evening, overspread the face of our beloved country, and every hill, valley, and stream has its favourite name, its native flocks and rural inhabitants,—then, not a warbler shall flit through our thickets, but its name, its notes, and habits, will be familiar to all, repeated in their sayings, and celebrated in their village songs. At that happy period, should any vestige or memory of the present publication exist, be it known to our more enlightened posterity, as some apology for the deficiencies of its author, that in the period in which he wrote, three-fourths of our feathered tribes were altogether unknown even to the proprietors of the woods which they frequented—that, without patron, fortune, or recompense, he brought the greater part of these from the obscurity of ages, gave to each "a local habitation and a name," collected from personal observation whatever of their characters and manners seemed deserving of attention; and delineated their forms and features, in their native colours, as faithfully as he could, as records, at least, of their existence.'*

That the present volume may the better fulfil our design of awakening and extending a taste for observing the beauties of nature, we have judged it expedient to leave the beaten path of our predeces-

* American Ornithology, vol. v, p. viii.

sors, and to ramble through fields and forests, unfettered by system, but alive to whatever we meet with likely to interest for its curiosity or its novelty. The frame-work accordingly, in which we have disposed our materials, will be found to be at least attractive for its singularity, should it fail in possessing a more meritorious character. We devote this volume to an examination of Birds, in the exercise of their mechanical arts of constructing Nests. This work is the *business* of their lives—the duty which calls forth that wonderful ingenuity, which no experience can teach, and which no human skill can rival. The infinite variety of modes in which the nests of birds are constructed, and the exquisite adaptation of the nest to the peculiar habits of the individual, offer a subject of almost exhaustless interest. We shall not confine ourselves to the birds of our own country, although these will form the principal objects of our attention; but we shall select from the works of such accurate observers as Wilson, materials to give an additional value to our pages. We divide our subject according to the mechanical skill of particular birds, uniting those which are analogous in their general modes of building. We would request those who may think that we have sketched imaginary and distorted pictures in order to strain them to fit our various divisions, to examine the structures themselves which we have figured and described; and we are certain the conclusion will be, that birds are as well entitled as we are to be called masons, carpenters, and tailors — in some instances a great deal more so, inasmuch as, with all our boasted mechanical skill, we cannot rival, much less excel, the ingenuity of their workmanship. Aristophanes, the Greek dramatist, introduces birds as artificers, precisely in the light in which we have viewed them. He indeed represents them as parodists of the actions of men,

as in our own nursery tale, 'The death of Cock Robin;' —but the fancy is in many of the instances well sustained by an accurate knowledge of the natural habits of birds. This is the passage:—

Messenger. Birds, not a soul beside; Egyptian none,
Bricklayer, or stone-mason, or carpenter.
But the birds with their own hands, that 'twas marvellous.
From Lybia came about three myriad cranes,
Who had swallow'd stones for the foundation; these
The cornrails* with their beaks did chip and hew.
The storks, another myriad, bare the bricks;
While water to the air from underneath
Was brought by sea-larks and each river-bird.
Pisthetærus. And who with mortar serv'd them?
Messenger. Herons with hods.
Pisthetærus. And how did they the mortar throw therein?
Messenger. That too was managed, sir, most dexterously,
For by their feet the geese with understroke,
As 'twere with trowels cast it in the hods.
Pisthetærus. O what may not by help of feet be done!
Messenger. Ay, and the drakes, by Jove, with aprons tuck'd up,
Bare bricks; and after them, like serving lads,
Flew up with cement in their mouths, the swallows.
Pisthetærus. Who now would pay hired labourers for his work?
But let me see; the timber work o' th' wall,
Who wrought at that?
Messenger. Those carpenter-fowls, the hickwalls,†
Who with their beaks did hack the gates out workmanly,
And of their hacking the like sound arose
As in a dock-yard.‡

Before entering upon our immediate subject, it may be useful to many readers to give a brief sketch of the methods devised by some of the most distinguished naturalists for arranging birds into various groups according to their prevalent structures and habits. Such arrangements are not only convenient in assisting the memory, but often lead to the discovery of important facts connected with the mutual relations of the several groups. As we cannot spare room for an

* Landrails. † Woodpeckers.
‡ Cary's Translation of the Birds of Aristophanes, p. 109.

extended or critical account of the classifications in question, we must content ourselves with giving a few of these in outline.

Willughby's and Ray's System.

It would be doing injustice to our eminent countrymen Willughby and Ray, not to give precedence to their arrangement, which in fact is the basis of most of those that followed. They make two grand divisions:

I. LAND FOWL, are either such as have

Crooked beak and Talons, which are either
Carnivorous and Rapacious, and these are either
Diurnal, that prey in the day-time;
The Greater, and these are either
The more generous, called Eagles:
The more cowardly and sluggish, called Vultures.
The Lesser, called in Latin Accipitres:
The more generous, called Hawks:
Long-winged, as the *Falcon*;
Short-winged, as the *Goshawk*.
The more cowardly, and sluggish, and indocile:
The Greater, as the *Buzzard*.
The Lesser: European, as the *Shrikes*;
Exotic, as the *Birds of Paradise*;
Nocturnal, that fly and prey by night:
Horned or eared, as the *Horn Owl*;
Without horns, as the *Brown Owl*.
Frugivorous, called by the general name of Parrots:
Greatest kind, called *Macaws*;
Middle-sized Parrots and *Popinjays*;
Least kind, *Parrakeets*.

More Straight Bill and Claws, distinguishable into
Greatest kind: exotic birds of a singular nature, as the *Ostrich*, the *Cassowary*, the *Dodo*.
Middle-sized, divisible into

Such as have large, thick, strong bills, and feeding promiscuously upon flesh, insects, and fruits:
Some wholly black, as the *Crow* kind;
Others parti-coloured, as the *Pie* kind.
Upon fish only, as the *Kingfisher;*
Upon insects only, as the *Woodpecker* kind.
Such as have smaller and shorter bills, whose flesh is either
White, as the Poultry kind;
Black: Greater, as the *Pigeon* kind;
Lesser, as the *Thrush* kind.
Least kind, called small birds, which are either
Soft-beaked, with slender bills, and feeding chiefly on insects;
Hard-beaked, with thick and short bills, and feeding chiefly on seeds.

II. WATER FOWL, are such as

Frequent waters and watery places for their food, all cloven-footed:

The greatest are anomalous, as the *Crane*, the *Jabirou;*
The lesser, which are either
Piscivorous, feeding upon fish, as the *Heron*, the *Stork;*
Mudsuckers and Insectivorous:
Very long bills, whether
Crooked, as the *Curlew*, the *Whimbrel;*
Straight, as the *Godwit*, the *Woodcock.*
Middle-sized bills, as the *Sea-Pie*, the *Red Shauk.*
Short bills, as the *Lapwing*, the *Plover.*

Swim in the water; these are either
Cloven-footed, as *Morehens*, *Coot*, &c.
Whole-footed, either
Long-legged anomalous birds, as the *Flamingo*, the *Avoset.*
Short-legged, having
But three toes in each foot, as the *Penguin;*
Four toes in each foot, either
All connected together by membranes, as the *Pelican*, the *Poland Goose.*

The back toe loose ; and these are either
Narrow-billed, the bill either
Blunt and hooked at the tip, either
Serrate, toothed like a saw, as *Divers ;*
Not toothed, as the *Puffin.*
Sharp-pointed and straighter ; these are either
Short-winged and divers, called *Douckers;*
Long-winged, called *Gulls.*
Broad-billed, divisible into
Goose kind, which are the bigger ;
Duck kind, the lesser, which are either
Sea Ducks, that dive much ;
River and *Plash Ducks.*

Linnæan System.

Linnæus, who constructed so admirable an arrangement of plants, was less successful in his classification of animals; but as his system of birds has been very extensively adopted, sometimes with slight alterations, such as those of Pennant and Latham, we must not pass it over. He distributes birds into six orders.

I. Accipitres, or Hawks.
II. Picæ or Pies, divided into those with
1. Feet formed for perching.
2. Feet formed for climbing.
3. Feet formed for walking.
III. Anseres, or Geese, divided into those with
1. Bill toothed.
2. Bill without teeth.
IV. Grallæ, or Waders, divided into those with
1. Feet four-toed.
2. Feet three-toed.
V. Gallinæ, or Poultry.
VI. Passeres, or Sparrows, divided into those with
1. Bill thick.
2. Upper mandible somewhat hooked at the point.
3. Upper mandible notched near the end.
4. Bill straight, simple, tapering.

CUVIER'S SYSTEM.

1. With strong hooked beak and claws.

Birds of prey
- 1. Flying by Day, — Eagles, Hawks, Vultures, [&c.
- 2. Flying by Night, — Owls, &c.

2. With two toes or claws before and behind.

Climbers. . . . Woodpeckers, Cuckoo, Parrots, &c.

3. With a strong thick bill, nostrils large, and covered by a cartilaginous scale, and toes partly united at their base.

Gallinaceous. — Peacocks, Pheasants, common Fowls, Partridges, Pigeons, &c.

4. Without the characters of any of the preceding.

Passerine.
- 1. With the beak notched on either side, — Butcher-birds, Flycatchers, Chatterers, Thrushes, Nightingales, Warblers, &c.
- 2. With the mouth opening very far back, — Swallows, Goatsuckers.
- 3. With a strong, conical, unnotched beak, — Larks, Titmice, Buntings, Linnets, Starlings, Rooks.
- 4. With a slender curved beak, — Hoopoe, Creepers, Humming-birds, King-fishers.

5. With long naked legs.

Waders.
- 1. With wings unfitted for flying, — Ostrich, Emeu, Cassawary.
- 2. With very short, or no hind toe, — Bustards, Plovers, Lapwings.
- 3. With a long, broad, strong, and generally sharp beak, — Cranes, Herons, Storks, Spoonbills, &c.
- 4. With a long, slender, curved beak, — Curlews, Snipes, Woodcocks, &c.
- 5. With very long toes, bordered by membrane, — Rails, Water-hens, Coots, Flamingoes, &c.

6. With webbed feet.

Swimmers.
- 1. With the legs very near the tail, — Divers, Auks, Penguins, &c.
- 2. With very long, powerful wings, — Petrels, Albatrosses, Gulls, Pelicans, Cormorants, &c.
- 3. With a large fleshy tongue, and a thick beak, covered with a softish skin, and finely notched at the edges, — Swans, Geese, Ducks, &c.

Temminck's System.

The celebrated Dutch naturalist, Temminck, published a system in 1820, founded upon the manners and the organization of birds. He makes sixteen orders.

I. Rapaces, or Birds of Prey.
II. Omnivores, or general feeders.
III. Insectivores, or insect eaters.
IV. Granivores, or grain eaters.
V. Zygodactyli, or birds with two toes before and two behind.
  1. Beak more or less arched.
  2. Beak long, straight, conical, and tranchant.
VI. Anisodactyli, with toes unequal, or three before and one behind.
VII. Alcyones, or Halcyons.
VIII. Chelidones, or Swallows.
IX. Columbæ, or Pigeons.
X. Gallinæ, or Poultry.
XI. Alectorides, or Cock-like.
XII. Cursores, or Runners.
XIII. Grallatores, or Waders.
  1. With only three toes.
  2. With three toes before and one behind.
XIV. Pinnatipedes, with only the rudiments of webs between the toes.
XV. Palmipedes, or web-footed.
XVI. Inertes, or birds with wings unfit for flight.

Quinary System.

We were almost deterred from giving an outlin

of this system, in consequence of the author himself not being 'friendly to sketches of the present description, in which the characters and affinities of groups are not explained and illustrated;'* but as we have not here space for such illustrations, we must content ourselves with the outline, and refer critics and students to the author's original papers in the Linnæan Transactions and the Zoological Journal. Following up the views first developed by Mr W. S. MacLeay, according to which he arranged lamellicorn beetles into circular groups of fives, Mr Vigors classes birds in similar quinary groups, thus:

Order I, RAPTORES, Birds of Prey.

1. Family, ——— ?
2. Family, *Vulturidæ*, Vulture kind.
3. Family, *Falconidæ*, Falcon kind.
4. Family, *Strigidæ*, Owl kind.
5. Family, ——— ?

Order II, INSESSORES, Perchers.

Tribe I, Fissirostres, Cleft Bills.

1. Family, *Meropidæ*, Bee-eater kind.
2. Family, *Hirundinidæ*, Swallow kind.
3. Family, *Caprimulgidæ*, Night-jar kind.
4. Family, *Todidæ*, Tody kind.
5. Family, *Halcyonidæ*, Kingfisher kind.

Tribe II, Dentirostres, Toothed Bills.

1. Family, *Muscicapidæ*, Flycatcher kind.
2. Family, *Laniadæ*, Shrike kind.
3. Family, *Merulidæ*, Thrush kind.
4. Family, *Sylviadæ*, Warbler kind.
5. Family, *Pipridæ*, Chatterer kind.

Tribe III, Conirostres, Conic Bills.

1. Family, *Fringillidæ*, Finch kind.
2. Family, *Sturnidæ*, Starling kind.
3. Family, *Corvidæ*, Crow kind.
4. Family, *Buceridæ*, Hornbill kind.
5. Family, *Loxiadæ*, Grosbeak kind.

* Zool. Journ., ii, 391.

Tribe IV, SCANSORES, Climbers.

1. Family, *Ramphastidæ*, Toucan kind.
2. Family, *Psittacidæ*, Parrot kind.
3. Family, *Picidæ*, Woodpecker kind.
4. Family, *Certhiadæ*, Creeper kind.
5. Family, *Cuculidæ*, Cuckoo kind.

Tribe V, TENUIROSTRES, Slender Bills.

1. Family, *Nectariniadæ*? Honey-sucker kind.
2. Family, *Cinnyridæ*, Sun-bird kind.
3. Family, *Trochilidæ*, Humming-bird kind.
4. Family, *Promeropidæ*, Promerops kind.
5. Family, *Meliphagidæ*, Honey-eater kind.

Order III, RASORES, Scratchers.

1. Family, *Columbidæ*, Dove kind.
2. Family, *Phasianidæ*, Pheasant kind.
3. Family, *Tetraonidæ*, Grous kind.
4. Family, *Struthionidæ*, Ostrich kind.
5. Family, *Cracidæ*, Curassow kind.

Order IV, GRALLATORES, Waders.

1. Family, *Gruidæ*, Crane kind.
2. Family, *Ardeidæ*, Heron kind.
3. Family, *Scolopacidæ*, Snipe kind.
4. Family, *Rallidæ*, Rail kind.
5. Family, *Charadriadæ*, Plover kind.

Order V, NATATORES, Swimmers.

1. Family, *Anatidæ*, Duck kind.
2. Family, *Colymbidæ*, Diver kind.
3. Family, *Alcadæ*, Auk kind.
4. Family, *Pelecanidæ*, Pelican kind.
5. Family, *Laridæ*, Gull kind.

Mr Vigors further divides these families into five sub-families, the falcons (*Falconidæ*), for example, thus:

1. *Aquilina*, Eagles.
2. *Asturina*, Hawks.
3. *Falconina*, Falcons.
4. *Buteonina*, Buzzards.
5. *Milvina*, Kites.*

* Zool. Journal, ii, 391 — 405.

Chapter II.

Mining Birds — The Bank-Swallow. The Bee-Eater. The Petrel. The Puffin. The Penguin.

Although the notion that man derived the first hints of mechanical contrivance from the lower animals, may at first view appear plausible, it will be found, when traced circumstantially, no more to accord with the actual origin of inventions than the once popular fancy of tracing the origin of all human knowledge to the Iliad of Homer, or, as the Turks do, to the Koran of Mahomet. Pope, who was essentially the poet of good sense and reason, doubtless believed that some arts were thus acquired, when he said,

> 'Learn of the little Nautilus to sail,
> Spread the thin oar and catch the driving gale;'

but the fact itself appears very questionable, inasmuch as the various species of Nautilus (*Nautilidæ*) are not only of rather infrequent occurrence even where they are indigenous; but, being confined to the locality of warm latitudes, they could not have afforded any hint of boat-building to many tribes, such as the Esquimaux or the New Zealanders. We might, apparently with as good reason, attribute the invention of paper-making to wasps: but the recorded history of paper would disprove the theory; for the manner in which wasps make paper was not known previous to 1719, though Réaumur had endeavoured to discover it for twenty years.

Following up the principle of ascribing human inventions to the inferior animals, we might in a similar

manner trace the art of mining to a rabit-burrow, or a fox-earth, or, to come to our immediate subject, to the mined holes of the bank-swallow, or sand-martin, (*Hirundo riparia*). These constructions could not fail to strike the most indifferent observer the first time they were seen. Yet, simple as such holes appear, they have given rise, as we shall afterwards see, to several very singular misconceptions, not only among the vulgar, but among naturalists of distinguished reputation.*

We cannot well conceive how it happened that White of Selborne, usually so accurate in his facts, should have committed so many mistakes respecting the bank-swallow. These mistakes are the more unfortunate, as they have been implicitly copied by almost every succeeding writer. 'Perseverance,' says White, 'will accomplish anything; though at first one would be disinclined to believe that this weak bird, with her soft and tender bill and claws, should ever be able to bore the stubborn sand-bank, without entirely disabling herself; yet with these feeble instruments have I seen a pair of them make great despatch; and could remark how much they had scooped that day, by the fresh sand which ran down the bank, and was of a different colour from that which lay loose and bleached in the sun.'†

Whoever, on the contrary, looks at the bill and claws of the bird, cannot fail to be convinced, that so far from being 'soft and tender' they are more than commonly hard and sharp, and admirably adapted for digging. The bill, we admit, is small, but its very shortness adds to its strength, as it suddenly tapers to a point like a sailor's marlin-spike, or rather like the points of a pair of fine compasses

* See Pliny's account of the swallow embankment on the Nile, in our chapter upon 'Mason Birds.'

† Nat. Hist. Selborne, i, 299, ed. 1825.

Head of the Bank-Swallow.

when shut. If we compare this little sharp borer, as we may well call it, with the caliper-like mandibles of the sand-wasps (*Sphecidæ*, LEACH), and of the burrowing bees which, like this swallow, excavate galleries proportionable to their size in hard sand,* we are compelled to confess that the bird is furnished with the more efficient instrument. Its operation also is very different. The insects alluded to gnaw into the sand, or rather bite off a portion of it, and carry it out of the hole in their mouths; but the bank-swallow, as we have had an opportunity of observing, works with its bill shut. This fact our readers may verify by observing their operations early in the morning through an opera-glass, when they begin in the spring to form their excavations. In this way, we have seen one of these swallows cling with its sharp claws to the face of a sand-bank, and peg in its bill as a miner would do his pick-axe, till it had loosened a considerable portion of the hard sand and tumbled it down amongst the rubbish below. In these preliminary operations it never makes use of its claws for digging; indeed, it is impossible it could, for they are indispensable in maintaining its position, at least when it is beginning its hole.†

We have further remarked that some of this swallow's holes are nearly as circular as if they had been planned out with a pair of compasses, while others

* See Insect Architecture, chap. iii, &c. † J. R.

are more irregular in form ; but this seems to depend more on the sand crumbling away than upon any deficiency in the original workmanship. The bird, in fact, always uses its own body to determine the proportions of the gallery — the part from the thigh to the head forming the radius of the circle. It does not trace this out as we would do, by fixing a point for the centre around which to draw the circumference. On the contrary, it perches on the circumference with its claws, and works with its bill from the centre outwards; and hence it is that in the numerous excavations recently commenced, which we have examined, we have uniformly found the termination funnel-shaped — the centre being always much more scooped out than the circumference. The bird consequently assumes all positions while at work in the interior, hanging from the roof of the gallery with its back downwards as often as standing on the floor. We have more than once indeed seen a bank-swallow wheeling slowly round in this manner on the face of a sand-bank, when it was just breaking ground to begin its gallery.*

This manner of working, however, from the circumference to the centre, unavoidably leads to irregularities in the direction, which would not so readily occur by reversing the procedure ; for though the radius formed by a part of the bird's body is subject to little variation, yet the little that does occur from the extension or contraction of the neck, must tend to throw it out of the right line. Accordingly, all the galleries are found to be more or less tortuous to their termination, which is at the depth of from two to three feet, where a bed of loose hay and a few of the smaller breast feathers of geese, ducks, or fowls is spread with little art for the reception of the eggs.†

It may not be unimportant to remark also, that it

* J. R. † J. R.

always scrapes out with its feet the sand detached by the bill, but so carefully is this performed that it never scratches up the unmined sand or disturbs the plane of the floor, which rather slopes upwards, and of course the lodgment of rain is thereby prevented.*

White says, he has frequently observed holes of different depths left unfinished at the end of summer; and, rejecting the first notion which occurred to him, that these beginnings were intentionally made in order to be in the greater forwardness for next spring, supposes they may have been abandoned on account of the soil proving either too hard or too loose. It appears more probable, we think, that some accident may in such cases have befallen the birds; for they seem to be always careful in choosing the sort of bank best suited for their mode of mining. In most of the numerous localities which we have examined, they made choice of a very hard bed of alluvial sand, in an escarpment either facing a river, a quarry, or a sand-pit, and from ten to thirty feet from the base, being evidently most in fear of enemies from below; while above we have often seen their galleries within a foot of the surface. When the escarpment, again, is very high, they prefer a middle-height, an instance of which occurs at the chalk-pit behind the hanging wood at Charlton, in Kent.*

'One thing is remarkable,' says White, 'that after some years, the old holes are forsaken and new ones bored; perhaps because the old habitations grow foul and fetid from long use, or because they may so abound with fleas as to become untenantable. This species of swallow, moreover, is strangely annoyed with fleas; and I have seen fleas — bed fleas (*Pulex irritans*) swarming at the mouths of these holes, like bees on the stools of their hives.'†

* J. R.

† Nat. Hist. of Selborne, i, 301. White was wrong in sup-

With respect to the bank-swallows shifting their quarters, we have often remarked that it usually arises from their being disturbed. Daring boys find means of scaling the highest escarpment they can select; and still more frequently is their whole colony undermined by the encroachment of a river or the operations of digging and quarrying. Although, in such cases, they abandon their original site, they seldom go far to establish a new one. We have seen several instances, in which, from these causes, they had to remove almost every year. At Catrine in Ayrshire, there is a regular colony of bank-swallows, established in the alluvial sand lying over the sandstone of a small quarry; and it has often happened that on their arrival in spring every hole of the previous summer has been demolished by the quarrymen. In this case they never begin their operations in the same place, but select another about the distance of a stone's throw. When the face of the bank, thus selected, has proved too small for the population, though their galleries are so crowded as often to have scarcely three inches of partition, we have seen a small sub-colony of the supernumeraries established at fifty or a hundred yards off; but we have never observed an instance of a single pair of these birds living solitary and at a distance from their brethren, in the same manner that similar sub-colonies of rooks are often formed.*

Comparing this fact with White's remark, that 'they seem not to be of a sociable turn — never (with us) congregating with their congeners in the autumn' — we can hardly bring ourselves to believe that he meant the same species, or, at least, that he spoke in this instance from his own observation.

posing the swallow-flea (*Pulex Hirundinis*, STEPHENS) to be the common bed-flea. * J. R.

A more decidedly social bird we are not acquainted with; since it not only always nestles in numerous colonies, but also hunts for insects in troops of from three to fifty, and, as Buffon correctly remarks, associates freely with other swallows.*

The social disposition of the bank-swallow, indeed, has been noticed in every quarter of the world, from Siberia to the Cape of Good Hope. Professor Pallas says, that on the high banks of the Irtish, their nests are in some places so numerous, that when disturbed they come out in vast flocks and fill the air like flies;† Aristotle says, they were common in the narrow passes of the mountains in Greece;‡ Vaillant found them abundant in Southern Africa;§ Montagu makes a similar statement, and Wilson says, it 'appears to be the most social of its kind of all our swallows, living together in large communities of sometimes three or four hundred. Several of their holes,' he adds, 'are often within a few inches of each other, and extend in various strata along the front of a precipice, sometimes for eighty or a hundred yards. From the crowds of swallows that usually play round these breeding places, they remind one, at a distance, of a swarm of bees. They are particularly fond of the shores of rivers, and, in several places along the Ohio and the Kentucky river, they congregate in immense multitudes.'‖

The remark, also, that the bank-swallow shuns human neighbourhood, does not accord with our individual observations. 'It is,' says White, '*fera naturâ*, at least in this part of the kingdom, disclaiming all domestic attachments and haunting wild heaths and commons; while the other species are

* Buffon, Oiseaux, vii, 509, 12mo.
† Pallas, Travels in Russia. ‡ Hist. Anim. viii, 16.
§ Oiseaux, v, 121. ‖ American Ornithology, v, 46

remarkably gentle and domesticated, and never seem to think themselves safe but under the protection of man. Here are in this parish, in the sand-pits and banks of the lakes of Walmer-forest, several colonies of these birds, and yet they are never seen in the village, nor do they at all frequent the cottages that are scattered about in that wild district.'* Wilson also says, that it 'appears to be the least intimate with man of all our swallows.'

On the contrary, the colony above mentioned, at Charlton in Kent, is in the vicinity of a number of cottages, while two lime-kilns are in constant operation just below the bank. The colony, again, at Catrine, in Ayrshire, is not only within a few yards of a party of quarrymen constantly at work, but is not a gun-shot from a row of nearly a hundred houses, — close by the doors of which we have seen the birds hawking for flies every hour of the day. A more marked instance occurs in a colony of them established at the lime-kilns at Greenwich, near the foot of Blackheath-hill, which is surrounded by streets; and along these we have frequently seen parties of the bank-swallows in pursuit of their prey, though they certainly prefer a more distant excursion to the Thames or the Ravensbourne.

We have also observed a colony of bank-swallows, which still more strikingly confirms our position, at Dartford in Kent; where they have not only made choice of the bank through which the great public road from London to Dover has been cut, but have preferred the parts of it nearest the town, some of their holes being within a dozen yards of the end of the street, while we did not see a single hole at the farther end of the bank. The wildest locality in which we have observed colonies of the bank-swallow was on the high sea cliffs between Cape d'Antifer

* Selborne, ii, 297.

and La Héve on the coast of Normandy; but we also repeatedly saw parties of half a dozen or more from these very colonies skimming through the streets of the adjacent villages several miles from their nests.*

Our readers who have followed the preceding details will readily agree with us, that it is an unproved and improbable fancy, that the bank-swallow appropriates for her nest any hole she can find ready excavated. Belon, inferring, as White afterwards did, that she could not dig into a sand-bank on account of the inefficiency of her bill, imagines that the old hole of a kingfisher (whose bill is large and strong) is always appropriated for this purpose.† But he forgot that the kingfisher is a solitary bird, while the bank-swallow always nestles in numerous communities; and that the hole of the kingfisher is dug near the water's edge, sometimes, according to Temminck, one abandoned by the water-rat, whereas the bank-swallow generally, in this country, selects a higher elevation. Wilson, however, found them on the Ohio at the height of only two or three feet;‡ and on the bank cut through by the London road between Portsmouth and Petersfield, we have observed them at a similar height. A correspondent in the Magazine of Natural History § retorts upon the kingfisher the charge of robbing the bank-swallow of its hole, as we think, with equal improbability. Buffon says the bank-swallow often takes possession of the hole of the bee-eater (*Merops apiaster*). The fact of this being also a social bird might give some colour to the opinion; were it not that the bee-eater nestles, as he tells us, in sandy hillocks, and does not dig more than one-third the depth of the bank-swallow. In this country, however, these appropriations cannot

* J. R. † Belon, des Oyseaux, p. 380, ed. 1555.
‡ American Ornith., v, 47. § Vol. ii, p 206.

take place; for the bee-eater is recorded as having been very rarely seen in Britain,* and kingfishers are by no means numerous, there being probably as many bank-swallows in one colony, as of kingfishers in the empire.

The description which Buffon has given of the nestling of the bee-eater, from Aristotle and Kramer, would lead us to infer that its habits are very different from those of the bank-swallow; for though it is furnished with what the Sicilians call an iron bill, it chooses a place where the soil is loose, sometimes frequenting mountain ridges, as in Candia, where it can meet with plenty of bees and wasps feeding on the wild thyme; and sometimes resorting to the shelving sandy brinks of rivers, where it digs a hole about six inches deep and as many wide, depositing its eggs, from four to seven in number, on a bed of moss. Instead of six inches, however, Aristotle says six cubits, and Pliny six feet;† while Temminck uses the indefinite term 'profound.' 'In the neighbourhood of Gibraltar,' says Latham, 'the whole country is stocked with them by the end of May, when they make a nest in sandy banks in the manner of the bank-swallow, penetrating three feet horizontally, and then turning at right angles three feet farther, making a hole large enough to admit a man's arm, and widening at the end to the size of the crown of a hat.'‡ As the bird itself, indeed, is ten inches long, we cannot imagine how it could place its body in the shallow hole assigned by Buffon. According to Pallas, they nestle in the high sand-banks of the Wolga, Samara, and other great rivers of Russia, and in such multitudes, that the hills on

* Linn. Trans., iii, 333.

† 'She maketh her nest six foot deepe within the ground.' — Plinie's Nat. Hist., by Ph. Holland, p. 289.

‡ Gen. Hist. of Birds, iv, 120.

the eastern bank of the Wolga are completely studded with them, and the escarpment, as Montagu says, appears like a honey-comb The bill of the bee-eater, it must be confessed, is much larger than that of the bank-swallow; and it would require one of considerable size and strength, if it digs holes six feet deep, as we have mentioned above from Aristotle and Pliny.

The bird which approaches the nearest to the bank-swallow in its manner of breeding is the stormy petrel (*Thalassidroma pelagica*, VIGORS), the storm-swallow of the Dutch, whose great power of wing enables it to sweep over the ocean at every distance from land, and even to weather the most tempestuous winds, while, with its webbed feet and light form, it can actually walk upon the billows with as much ease as a sparrow can hop along a garden walk. 'It is indeed an interesting sight,' says Wilson, 'to observe these little birds, in a gale, coursing over the waves, down the declivities, and up the ascents of the foaming surf that threatens to burst over their heads, sweeping along the hollow troughs of the sea as in a sheltered valley, and again mounting with the rising billow, and just above its surface, occasionally dropping their feet, which, striking the water, throw them up again with additional force, sometimes leaping, with both legs parallel, on the surface of the roughest waves for several yards at a time. Meanwhile they continue coursing from side to side of the ship's wake, making excursions far and wide to the right and to the left, now a great way ahead, and now shooting astern for several hundred yards, returning again to the ship as it she were all the while stationary, though perhaps running at the rate of ten knots an hour. But the most singular peculiarity of this bird is its faculty of standing, and even running on the surface of the

water, which it performs with apparent facility. When any greasy matter is thrown overboard, these birds instantly collect around it, facing to windward, with their long wings expanded and their webbed feet patting the water. The lightness of their bodies, and the action of the wind on their wings, enable them with ease to assume this position. In calm weather they perform the same manœuvre by keeping their wings just so much in action as to prevent their feet from sinking below the surface.'*

The Stormy Petrel (Thalassidroma pelagica, Vigors). *Length, about six inches.*

'There are,' says the same writer in another place, 'few persons who have crossed the Atlantic that have not observed these solitary wanderers of the deep, skimming along the surface of the wild and wasteful ocean; flitting past the vessel like swallows, or following in her wake, gleaning their scanty pittance of food from the rough and whirling surges. Habited in mourning, and making their appearance generally in greater numbers previous to or during a storm, they have long been

* American Ornithology, vii, 97.

fearfully regarded by the ignorant and superstitious, not only as the foreboding messengers of tempests and dangers to the hapless mariner, but as wicked agents, connected some how or other in creating them. 'Nobody,' say they, 'can tell any thing of where they come from, or how they breed, though (as sailors sometimes say) it is supposed that they hatch their eggs under their wings as they sit on the water.' This mysterious uncertainty of their origin, and the circumstances above recited, have doubtless given rise to the opinion, so prevalent among this class of men, that they are in some way or other connected with the prince of the power of the air. In every country where they are known their names have borne some affinity to this belief. They have been called witches,* stormy petrels, the Devil's birds, and Mother Cary's chickens,† probably from some celebrated ideal hag of that name; and their unexpected and numerous appearance has frequently thrown a momentary damp over the mind of the hardiest seaman. It is the business of the naturalist, and the glory of philosophy, to examine into the reality of these things; to dissipate the clouds of error and superstition wherever they darken and bewilder the human understanding, and to illustrate nature with the radiance of truth.'‡

When we inquire, accordingly, into the unvarnished history of this ominous bird, we find that it is by no means peculiar in presaging storms, for many others of very different families are evidently endowed with an equally nice perception of a change in the atmosphere. Hence it is that, before rain, swallows

* Pennant, Arctic Zool., p. 464.

† 'This name seems to have been originally given them by Captain Carteret's sailors, who met with these birds on the coast of Chili. See Hawkesworth's Voyages, i, 203.'

‡ American Ornithology, vii, 95.

are seen more eagerly hawking for flies, and ducks carefully trimming their feathers, and tossing up water over their backs, to try whether it will run off again without wetting them. But it would be as absurd to accuse the swallows and ducks on that account of being the cause of rain, as to impute a tempest to the spiteful malice of the poor petrels. Seamen ought rather to be thankful to them for the warning which their delicate feelings of aërial change enable them to give of an approaching hurricane.

'As well,' says Wilson, 'might they curse the midnight light-house that, star-like, guides them on their watery way; or the buoy that warns them of the sunken rocks below, as this harmless wanderer, whose manner informs them of the approach of the storm, and thereby enables them to prepare for it.' The petrels are nocturnal birds. When, therefore, they are seen flying about and feeding by day, the fact appears to indicate that they have been driven from their usual quarters by a storm; and hence, perhaps, arose the association of the bird with the tempest. Though the petrels venture to wing their way over the wide ocean as fearlessly as our swallows do over a mill-pond, they are not, therefore, the less sensible to danger; and, as if feelingly aware of their own weakness, they make all haste to the nearest shelter. When they cannot then find an island or a rock to shield them from the blast, they fly towards the first ship they can descry, crowd into her wake, and even close under the stern, heedless, it would appear, of the rushing surge, so that they can keep the vessel between them and the unbroken sweep of the wind. It is not to be wondered at, in such cases, that their low wailing note of *weet, weet*, should add something supernatural to the roar of the waves and whistling of the wind, and infuse an ominous dread into minds prone to superstition.

If these views be correct, as to us they appear to be, Mr Knapp has not represented in its true light the appearance of this little bird in stormy weather, although his conjecture is ingenious. 'The petrels,' says he, 'seem to repose in a common breeze, but upon the approach, or during the continuation of a gale, they surround a ship, and catch up the small animals which the agitated ocean brings near the surface, or any food that may be dropped from the vessel. Whisking with the celerity of an arrow through the deep valleys of the abyss, and darting away over the foaming crest of some mountain wave, they attend the labouring bark in all her perilous course. When the storm subsides, they retire to rest, and are no more seen.'* Would our author, then, have us to infer that they sleep during a calm, and only feed when roused by the roar of a storm?

The popular opinion among sailors, that the petrels carry their eggs under their wings in order to hatch them, is no less unfounded than the fancy of their causing storms: it is, indeed, physically impossible. On the contrary, the petrels have been ascertained to breed on rocky shores, in numerous communities, like the bank-swallow, making their nests in the holes and cavities of the rocks above the sea, returning to feed their young only during the night, with the superabundant oily food from their stomachs. The quantity of this oily matter is so considerable, that, in the Faro Isles, they use petrels for candles, with no other preparation than drawing a wick through the body of the birds from the mouth to the rump.† While nestling, they make a cluttering or croaking noise, similar to frogs, which may be heard during the whole night on the shores of the Bahama and Bermuda Islands, and the coasts of Cuba and Flo-

* Journal of a Naturalist, p. 196, 1st edit.

† Pennant, Brit. Zool. ii, 434.

rida, where they abound. Foster says they bury themselves by thousands in holes under ground, where they rear their young and lodge at night; and at New Zealand, the shores resound with the noise, similar to the clucking of hens, or the croaking of frogs (Pontoppidan, speaking of those of Norway, says like the neighing of a horse), which they send forth from their concealment.

'As the stormy petrel,' says Mr Drosier, 'is scarcely ever to be seen near the land, except in very boisterous weather, one of the natives (of Foula), for a trifling remuneration, agreed to traverse the face of a rock, and take me some from out its fissures. Accordingly, accoutred with a rope of hemp and hog's-bristles coiled over his shoulders, he proceeded to the cliff. Having made one end fast by means of a stake, he threw the coil over the face of the rock, and gradually lowered himself down, but with the utmost caution and circumspection, carefully pressing his foot hard upon the narrow ridges before he at all loosened his firm grasp of the rope, which he never altogether abandoned. I had previously thrown myself upon my chest, to enable me to have a better view of him, by looking over the cliff; and, certainly, to see the dexterity and bravery with which he threw himself from one aperture to another, was truly grand. The tumbling roar of the Atlantic was foaming many hundreds of feet beneath, and dashing its curling cream-like surge against the dark base of the cliff, in sheets of the most beautiful white; while the herring and black-backed gulls, alternately sweeping past him so as to be almost in reach of his arm, threw a wildness into the scene, by the discordant scream of the former, and the laughing, oft-repeated bark of the latter. This, however, he appeared entirely to disregard; and, continuing his search, returned in about half an

hour, with seven or eight of the stormy petrel, tied up in an old stocking, and a pair of the Manks puffins, together with their eggs. The birds, he told me, he had no difficulty in capturing. The eggs of the stormy petrel are surprisingly large, considering the diminutive size of the bird, being as large as those of the thrush. The female lays two eggs, of a dirty or dingy white, encircled at the larger end by a ring of fine rust-coloured freckles. The birds merely collect a few pieces of dried grass, with a feather or two, barely sufficient to prevent the eggs from rolling or moving on the rock. That of the Manks puffin (*Puffinus Anglorum*, FLEMING), the bird laying but one, is of a very round shape, and uniformly white, very much resembling that of a hen. These birds very often excavate a small hole, if the stratum is soft enough to admit of it, like the common puffin (*Fratercula arctica*, BRISSON), by means of their small sharp claws, on the ground of which they deposit their single eggs.'*

The blue petrel (*Procellaria Forsteri*, LATHAM), which is twice the size of the preceding, makes its nest in subterranean cavities, as Forster discovered at Dusky Bay, in New Zealand ; but he also found the same species in the middle of the woods, under the roots of trees, as well as in the crevices of rocks.† These, along with all the species, have the singular faculty of spurting a quantity of oily stuff through their nostrils, upon those who attack their nests or otherwise annoy them ; and fowlers, who clamber up rocks for this purpose, if not on their guard, are often in this manner suddenly blinded by the birds, and losing their balance, are precipitated down the cliffs.‡

* Mag. of Nat. Hist. iii, 326.

† Forster's Voy., i, 153 ; and Cook's First Voy., i, 29.

‡ Smith, Hist. of Kerry.

Temminck and others accuse the petrels of appropriating, for their nests, the holes which have been abandoned by burrowing animals ;* but we are not a little doubtful of the correctness of this : at least it appears that in some instances they burrow out their own holes.† Our old navigator, Wafer, was more probably right when he tells us that in the island of Juan Fernandez, they 'make holes in the ground like rabbits ;' and Father Lobat says, 'the great sulphur mountain in Guadaloupe is all bored like a rabbit-warren with the holes which these imps (*Diablotins*) excavate ; but as they select the steepest parts it is very dangerous to catch them. All the night we spent on that mountain, we heard the great noise made by them going out and in, calling and answering each other. By our mutual assistance, dragging each other with cords, we reached places stocked with these birds ; and in three hours our four negroes took thirty-eight out of their burrows, and I myself seventeen.' We cannot, however, determine the particular species meant by these writers. We are less in doubt with respect to the manner in which the holes of several species of birds (the auks, razor-bills, puffins, and penguins,) of similar habits are burrowed out, as we have authentic details of their proceedings.

The Puffin (*Fratercula Arctica*, Brisson) is one of the best known of these. It is remarkable for the singular form of its bill, which exactly resembles two very short blades of a knife applied one against the other by the edge, so as to form a sort of triangle, but longer than it is broad, and channelled transversely with three or four little furrows near the point. From the position of the feet also, which

* Temminck, Manuel, p. 801.
† See Linn Trans. xiii, p. 617.

are thrown so far back that it stands almost upright, it has more the air of a small kangaroo, than of a bird. They have this character in common with *all* the true diving birds.

The Puffin (*Fratercula Arctica*, Brisson.) *Length about twelve inches.*

In the breeding season, numerous troops of them visit several places on our coasts, particularly the small island of Priestholm, near Anglesey, which might well be called puffin land, as the whole surface appears literally covered with them. Soon after their arrival in May, they prepare for breeding, and it is said, the male, contrary to the usual economy of birds, undertakes the hardest part of the labour. He be-

gins by scraping up a hole in the sand not far from the shore ; and after having got to some depth, he throws himself on his back, and with his powerful bill as a digger and his broad feet to remove the rubbish, he excavates a burrow with several windings and turnings, from eight to ten feet deep. He prefers, where he can find a stone, to dig under it, in order that his retreat may be more securely fortified. Whilst thus employed, the birds are so intent upon their work that they are easily caught by the hand.

This bird, like others which burrow in similar localities, is accused of dispossessing the rabbits, the legitimate proprietors of the soil, and even of killing and devouring their young. But it would require more authentic testimony than we have yet met with to convince us of this alleged robbery; the only apparent evidence being, that they are found burrowing *along with* rabbits in similar holes.

We very commonly find, in the same sand-bank, numerous perforations crowded into a small place, the work of various species of solitary bees (*Anthophora*, *Halictus*, *Andrena*, &c,) side by side and intermingled with those of sand-wasps (*Sphecidæ*) ; but no naturalist who has accurately observed the proceedings of these insects would conclude that they were mutual robbers, merely because he observed them going in and out of contiguous holes.

In some instances, we are certain that the puffin must form its own burrows. 'In one part of the island' (Akaroe), says Professor Hooker, 'where there is a considerable quantity of rich loose mould, the puffins (*Fratercula arctica*) breed in vast numbers, forming holes three or four feet below the surface, resembling rabbit-burrows, at the bottom of which they lay a single white egg, about the size of that of a lapwing, upon the bare earth. Our people dug out about twenty of these birds, which they

afterwards assured me made an excellent sea-pie.'* He elsewhere tells us that Iceland contains no indigenous quadrupeds, and he does not enumerate rabbits among the animals introduced. The climate indeed would probably be too cold for them.

If the puffin, however, is really a robber of rabbit-burrows, it is too formidably armed to allow of retaliation with impunity, and few birds or beasts venture to attack it in its retreat. Sometimes, however, as Jacobson tells us, the raven makes bold to offer battle; but as soon as he approaches, the puffin catches him under the throat with her beak and sticks her claws into his breast, till he screams out with pain and tries to get away; but the puffin keeps fast hold of him and tumbles him about till both frequently fall into the sea, where the raven is drowned, and the puffin returns in triumph to her nest. But should the raven at the first onset get hold of the puffin's neck, he generally comes off victorious, kills the mother, and feasts on her eggs or her young.†

The Penguin (*Aptenodytes Patachonica*, LATHAM) is still more like a kangaroo than the puffin, on account of its having no quill-feathers in its wings, or rather arms; while it is so large, that it has, as well as the albatros, obtained from our sailors the name of the Cape sheep. But though its bill, which is long and narrow, seems less strong for digging than that of the puffin, it contrives to form extensive burrows in the desolate islands which it frequents. Sir Francis Drake says, the French call them toads, from their creeping into holes under ground; and Van Noort tells us, that they make the holes themselves as our rabbits do. They select for nestling a sandy plain or down, where they usually congregate in such numbers as every where to undermine

* Hooker's Tour in Scotland, p. 36.

† Histoire Gén. des Voy. xix, 46.

the ground, so that in walking it is not unusual to sink up to the knees; but if the penguin chance to be at home, she revenges herself upon the passenger who has destroyed her roof, by fastening upon his legs and biting him severely. The species are so numerous on most of the uninhabited islands of the South Seas, on both sides of Cape Horn, and the Cape of Good Hope, that Pyrard says, one cannot stir a foot without crushing their eggs or their young.

Another species of these birds, called the Cape Penguin (*Aptenodytes demersa*, LATH.), smaller than the preceding, makes its nest among brambles, scraping in the sand and forming a hole, in which it lurks so closely that in passing along it is not readily perceived, though the traveller soon receives no very friendly notice to quit the premises, by the penguin biting his legs with her formidable bill. The Viscount de Inerhoënt informed Buffon that these birds nestle on the islets along the southern coasts of Africa; and what is remarkable, they were observed, in one instance, to prefer a raised knoll, though it was half a mile from the sea.

Chapter III.

Mining Birds, continued.—The Burrowing Owl. The Jackdaw. The Kingfisher. The Miner Lark. The Skylark.

The burrowing owl (*Strix cunicularia*, Molina), a singular bird, found in some of the warmer districts of America, may probably be accused of availing itself of the labours of another animal, with as much injustice as it appears to us that the puffin is subjected to. It is not yet well ascertained whether those found in Chili, La Plata, St Domingo, and on the west of the Mississippi, are of the same or of different species. Fouillée and Molina, the original describers, we believe, say, that the owl found in Chili digs a hole in the ground for its nest.* The 'evidence for this fact,' says Hill, 'is far from being satisfactory, for it does not follow that a bird which has been found in a hole under ground, either dug that subterraneous habitation, or constantly resided there.'† The evidence upon the subject is certainly contradictory; and can only be reconciled by considering that the observations of travellers apply to distinct species of these birds. Vieillot tells us, that the owl he observed in St Domingo digs itself a burrow two feet deep, at the bottom of which its eggs are deposited on a bed of moss, stalks of herbs, and dried roots; and that the young, when only covered with down, frequently ascend to the entrance to enjoy the warmth

* P. Fouillée, Journal des Observ. Physiques, p. 562. Molina, Hist. of Chili, i, 184.

† New Syst. of Nat. Hist. ii, 137; Edin. 1792.

of the sun, but being very fearful of danger, they quickly hide themselves in the burrow the instant they are approached.* Azara, on the other hand, says, that the diurnal owl which he calls *Suinda*, never enters woods or perches upon trees, but exclusively haunts the open country where game abounds, making its nest and concealing itself in the holes or kennels of the armadillos, which are not very deep, but well lined with hay or straw. It flies by day, seldom rising above five or six feet from the ground, and looks, at a distance, so like a buzzard, that it deceived both Noseda and himself. It is scarce in Paraguay, though it is said to abound to the south of the river La Plata; but it is so quick in diving into its burrow, that Azara could not procure a specimen.† The one described by Noseda, however, is four inches longer than the Mississippi one, and differently marked.

The owl described by Say, and Charles Bonaparte, is also a day-bird, and in this respect is as different from its European night prowling brethren as in its burrowing habits. 'In the trans-Mississippian territories of the United States,' says the latter, 'the burrowing-owl resides exclusively in the villages of the marmot or prairie dog, whose excavations are so commodious as to render it unnecessary that our bird should dig for himself, as he is said to do in other parts of the world, where no burrowing animals exist. These villages are very numerous, and variable in their extent, sometimes covering only a few acres, and at others spreading over the surface of the country for miles together. They are composed of slightly elevated mounds, having the form of a truncated cone, about two feet in width at base, and seldom rising as high as

* Vieillot, Ois. d'Amer. Septentrionale, i, 48.
† Sonnini's Azara, iii, 121.

eighteen inches above the surface of the soil. The entrance is placed either at the top or on the side, and the whole mound is beaten down externally, especially at the summit, resembling a much used footpath.

From the entrance, the passage into the mound descends vertically for one or two feet, and is thence continued obliquely downwards until it terminates in an apartment, within which the industrious marmot constructs, on the approach of the cold season, the comfortable cell for his winter's sleep. This cell, which is composed of fine dry grass, is globular in form, with an opening at top capable of admitting the finger ; and the whole is so firmly compacted, that it might, without injury, be rolled over the floor. It is delightful, during the fine weather, to see these lively little creatures sporting about the entrance of their burrows, which are always kept in the neatest repair, and are often inhabited by several individuals. When alarmed, they instantly take refuge in their subterranean chambers ; or if the dreaded danger be not immediately impending, they stand near the brink of the entrance, bravely barking and flourishing their tails, or else sit erect to reconnoitre the movements of the enemy. The mounds thrown up by the marmot, in the neighbourhood of the Rocky Mountains, have an appearance of greater antiquity than those observed on the far-distant plains. They sometimes extend to several yards in diameter, although their elevation is trifling, and, except immediately surrounding the entrance, are clothed with a scanty herbage, which always distinguishes the area of these villages. Sometimes several villages have been observed almost entirely destitute of vegetation ; and recollecting that the marmot feeds exclusively on grasses and herbaceous plants, it seems singular that this animal should always choose the most barren

spot for the place of his abode. However this may be accounted for, it at least affords an opportunity of beholding the approach of his enemies, and allows him to seek, within the bosom of the earth, that security which he has neither strength nor arms to command.

'In all these prairie dog villages, the burrowing-owl is seen moving briskly about, or else in small flocks, scattered among the mounds, and at a distance it may be mistaken for the marmot itself, when sitting erect. They manifest but little timidity, and allow themselves to be approached sufficiently close for shooting; but if alarmed, some or all of them soar away, and settle down at a short distance. If further disturbed, their flight is continued until they are no longer in view, or they descend into their dwellings, whence they are difficult to dislodge. The burrows into which these owls have been seen to descend, on the plains of the river Plortte, where they are most numerous, were evidently excavated by the marmot, whence it has been inferred by Say that they were either common, though unfriendly residents of the same habitation, or that our owl was the sole occupant of a burrow acquired by right of conquest. The evidence of this was clearly presented by the ruinous condition of the burrows tenanted by the owl, which were frequently caved in, and their sides channelled by the rains, while the neat and well-preserved mansion of the marmot showed the active care of a skilful and industrious owner.'

These facts do not quite bear out the inference derived from them; for the owl may be a slovenly miner, even though it dig its own burrow; resembling perhaps, in this respect, the propensities of its nocturnal brethren, who delight to haunt ruins, while the marmot, loving neatness and order, may abandon a ruined gallery and dig a new one.

'We have no evidence,' adds Bonaparte, 'that the owl and marmot habitually resort to one burrow; yet we are well assured by Pike and others, that a common danger often drives them into the same excavation where lizards and rattlesnakes also enter for concealment and safety. Throughout the region traversed by the expedition, the marmot was unquestionably the artificer of the burrow inhabited by the owl.'*

The Burrowing Owl (*Strix cunicularia*, Molina). *Length, about nine inches.*

A singular instance of burrowing, apparently similar to that of the American owl, has been recorded, by White, of the jackdaw (*Corvus monedula*, Linn.), from the information of a gentleman at Chichester 'In a warren joining to his outlet many daws build every year in the rabbit-burrows under ground. The

* C. L. Bonaparte, Amer. Ornith. i, 72.

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. I should never have suspected the daws of building in holes on the flat ground. Another very unlikely spot 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.' We are informed by a gentleman who has visited Stonehenge frequently, and at different seasons, that his experience does not confirm White's statement. He never saw a jackdaw near these extraordinary remains.

Sonnini thinks that jackdaws prefer a church to nestle in before any other building of similar height and construction. This is evidently a mere fancy, which the playful humour of our poet Cowper has turned to account:

> 'A great frequenter of the church,
> Where, bishop-like, he finds a perch,
> And dormitory too.'

A fact no less singular than the burrowing of jackdaws is related by M. Montbeillard of the rook. At Baume-la-Roche, a few leagues from Dijon, he himself saw a colony of these birds, which, he was told, had for half a century nestled in the holes of the rocks facing the south-west; and they were so familiar that they sometimes ventured to steal the reapers' luncheons. From some cause they disappeared, and their place was immediately occupied by the hooded crows (*Corvus Cornix*).*

* Oiseaux, Art. Le Freux.

We might add another instance of similar variation in habit, in the kingfisher, or halcyon (*Alcedo Ispida*, LINN.), if we could believe in the ancient fable, that it nestles along with gulls (*Laridæ*, LEACH) upon trees. The kingfisher, on the contrary, is uniformly a miner. But before we record its actual proceedings, it may not be uninteresting to glance at some of the other very curious accounts given by the ancients, — philosophers, as well as orators and poets, — which induced Aldrovand to say, that it was 'the most celebrated and besung of all other birds.'

Every schoolboy is acquainted with the story in Ovid's Metamorphoses, of Ceyx, king of Magnesia, being shipwrecked, and of his queen, Alcyone (fabled to be the daughter of the wind), who flung herself from a cliff overhanging the sea, that she might be drowned as well as her husband;* — but, instead of perishing, both were changed into kingfishers: as Dryden gives it,

'The gods their shape to winter birds translate,
But both obnoxious to their former fate.
Their conjugal affection first is tried,
And still the mournful race is multiplied.'

The description of this bird by Aristotle is both luminous and accurate. 'The halcyon,' says he, 'is not much larger than a sparrow; its plumage is painted with azure and green, slightly tinged with purple, — these colours not being distinct, but blending into one another, and shining in an iridescent manner over the whole body, the wings, and the neck; the bill is greenish yellow (υποχλωρος), long and slender.'† Pliny has in part followed Aristotle, but has introduced more details of the notions prevalent respecting the bird among the ancients. We shall give his account, from the old quaint translation by Holland:

'The halcyones are of great name and much

* Ovid Metam. ix, 9. † Hist. Animal ix, 14.

marked. The very seas, and they that saile thereupon know well when they sit and breed. This very bird so notable, is little bigger than a sparrow: for the more part of her pennage, blew, intermingled yet among with white and purple feathers, having a thin small neck and long withal. There is a second kind of them breeding about the sea side, differing both in quantitie and also in voice; for it singeth not as the former do which are lesser: for they haunt rivers and sing among the flaggers and reeds. It is a very great chance to see one of these halcyones, and never are they seene but about the setting of the starre Virgilliæ, [i. e. the brood-hen,] or else neere midsummer, or mid-winter; for otherwhiles they will flie about a ship, but soone are they gone againe and hidden. They lay and sit about mid-winter when daies be shortest; and the time whiles they are broodie, is called the halcyon daies; for during that season, the sea is calme and navigable, especially in the coast of Sicilie. In other parts also, the sea is not so boisterous, but more quiet than at other times, but surely the Sicilian sea is very gentle, both in the streights and also in the open ocean. Now about seven daies before mid-winter, that is to say, in the beginning of December, they build; and within as many after, they have hatched. Their nests are wonderously made, in fashion of a round bal: the mouth or entrie thereof standeth somewhat out, and is very narrow, much like unto great spunges. A man cannot cut and pierce their nest, with sword or hatchet; but break they wil with some strong knocke, like as the drie fome of the sea; and no man could ever find of what they be made. Some thinke they are framed of the sharpe pointed prickes of some fishes, for of fish these birds live. They come up all into fresh rivers within land, and there doe lay ordinarily five egges.'*

* Plinie's Nat. Hist. by Ph. Holland, p. 287.

With respect to the vocal powers of any species of halcyon, it is probable that Pliny, and those he copied from, confounded it with the sedge bird (*Sylvia salicaria*), with the dipper (*Cinclus aquaticus*, Bechstein), or some other water-songster, whose manner it is to sing concealed; while the halcyon, perched on some leafless twig overhanging the water, being easily perceived, acquired credit for what she was incapable of performing. It was supposed, by Belon, and perhaps correctly, that the musical halcyon was the river

The Kingfisher (*Alcedo Ispida*, Linn.) *Length, about seven inches.*

nightingale, or reed thrush, (*Turdus arundinaceus*, LINN.), which is reported to be a pertinacious songster, and creeps about amongst water plants in pursuit of insects; but Belon is wrong in supposing it the only river bird which sings. He says, it makes its nest with rushes among the flags,* while Klein tells us, it builds on the ground with moss.

Wilson's description of the belted kingfisher (*Alcedo Alcyon*), though differing in a few points from the common halcyon of Europe, comes much nearer the reality than the fables of the old poets and naturalists. 'Like the love-lorn swains,' says he, 'of whom poets tell us, he delights in murmuring streams and falling waters; not, however, merely that they may soothe his ear, but for a gratification somewhat more substantial. Amidst the roar of the cataract or over the foam of a torrent, he sits perched upon an overhanging bough, glancing his piercing eye in every direction below for his scaly prey, which with a sudden circular plunge he sweeps up from their native element and swallows in an instant. His voice, which is not unlike the twirling of a watchman's rattle, is naturally loud, harsh, and sudden; but is softened by the sound of the brawling streams and cascades among which he generally rambles. He courses along the windings of the brook or river, at a small height above the surface, sometimes suspending himself by the rapid action of his wings like certain species of hawks, ready to pounce on the fry below; now and then settling on an old dead over-hanging limb to reconnoitre. Mill-dams are particularly visited by this feathered fisher; and the sound of his pipe is as well known to the miller, as the rattling of his own hopper.'†

* Belon, Oyseaux, p. 221.

† Wilson, Amer. Ornith. iii, 59.

The Belted Kingfisher (Alcedo Alcyon.) Length, about twelve inches.

It is easy to be perceived how the kingfisher might be mistaken for a bird of song. But the fancy of the halcyon's ruling the weather after the manner assumed by the philosopher in the tale of Rasselas is so extravagant, that we cannot but smile at Montaigne, who seriously believes that 'nature has honoured no other animal so much during its sitting and disclosing, for that the whole ocean is stayed, made stable, and smoothed without waves, without winds or rain, whilst the halcyon broods upon her young,—which is just about the

winter solstice,—so that, by her privilege, we have seven days and seven nights, in the very heart of winter, wherein we may sail without danger.'* The poets, however, have successfully employed the ancient fiction. Theocritus, and Petrarch, and Tasso, equally avail themselves of it. The notion that the stormy waves are calmed for the sake of one pretty bird, belongs to the empire of poetry, however it may be rejected by the truth of natural history. We may laugh at the conceit, and yet admire the sweet lines of one of our old writers.

> 'Blow, but gently blow, fayre winde,
> From the forsaken shore,
> And be, as to the halcyon, kinde,
> 'Till we have ferried o'er.'†

Montaigne is equally undoubting in his faith as to the wonderful construction of the halcyon's nest. 'The most inquisitive into the secrets of nature could never yet arrive at the knowledge of the wonderful fabric and architecture wherewith the halcyon builds her nest for her little ones, nor guess at the matter. Plutarch, who has seen and handled many of them, thinks 'it is the bones of some fish, which with her beak and no other instrument she joins and binds together, interlacing them some lengthwise, and others across, and adding ribs and hoops in such manner, that she forms at last a round vessel fit to launch, which being done, and the building finished, she carries it to the edge of the sea beach, where the waves beating gently against it shows her where to mend what is not well joined and knit, and where better to fortifie the seams that are leaky and open at the beating of the waves, and on the contrary, what is well built and has had due finishing, the beating of the waves does so close and

* Montaigne, Apology for Raymond de Sebonde.
† W. Browne.

bind together, that it is not to be broken or cracked, by blows either of stone or iron, without a great deal of trouble.* What is still more to be admired is the proportion and figure of the cavity within, which is composed and proportioned after such a manner that it is not possible to receive or admit any other thing save the bird which built it, for to every thing else it is so impenetrable, close and shut, that nothing can enter, not even the water of the sea."† See here,' adds Montaigne, 'a very clear description of this building, and borrowed from a very good hand, and yet methinks it does not give a sufficient light into the difficulty of this architecture.'

To us it appears that what Plutarch took for the nest of the halcyon was simply the crustaceous covering of some of the sea urchins (*Echinidæ*), which agree in most particulars with his description. The most common of the shells, perhaps, is the edible one (*Echinus esculentus*) found on sea rocks near low-water mark, and varying in size from that of a small orange to nearly that of a cocoa-nut, and in colour from almost white to reddish orange. When alive, or recent and uninjured, it is covered with numerous blunt spines disposed in rows, but frequently crossing each other‡ at various angles, so as to give some colour to Plutarch's notion of interlacing, and the comparison of Ælian to basket-making,§ while the whole crust, readily separating into five triangular sections, doubtless gave rise to the notion of 'ribs and hoops,' particularly as these sections are themselves marked with ribs.‖ The peculiar closure of the mouth also appears to have suggested the wonders respecting

* Plutarch, de Solertiâ Animal.
† Idem, de Amore in Prolem.
‡ Donati, Storia Nat. Marina dell Adriatico, p. 38.
§ Ælian, de Animal, ix, 17.
‖ Monro, Physiol. of Fishes, fol. p. 66.

the exclusion of sea water, and the mouth (always on the under part) is furnished with five teeth, not placed in line nor in jaws, but disposed circularly, in a frame which has been denominated Diogenes' lantern, and meeting in a central point.*

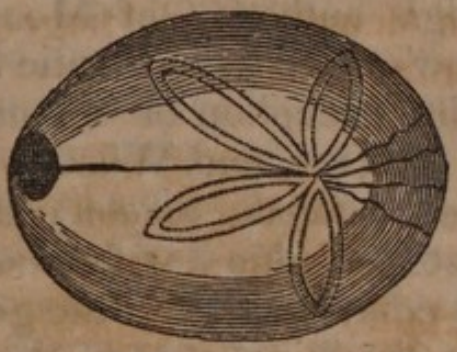
Echinus esculentus.

Aristotle himself has evidently fallen into the same mistake, when he describes the halcyon's nest to be of a reddish colour and of the figure of a cucurbit,† with the neck somewhat extended. This is the case in some echinidæ, such as the sea egg (*Spatangus ovum-marinum*, Briss.) He tells us farther, that it is very friable and easily crushed, like dried sea foam. This, again, is nothing more than a number of the small shells (*Spatangi*) of the family in question deprived of their animal inhabitant and their outward *chevaux-de-frise* of spines. We recollect that in our early researches we were not a little puzzled to make out what these substances, apparently resembling concreted sea foam, could possibly be, as, among some hundreds of them which we gathered on the beach at

* Parkinson, Oryctology, p. 105.

† A vessel of glass, used for chemical processes, in the shape of a gourd.

Largs, in Ayrshire, not one was in a perfect state, all being without the spines.*



The Sea-egg (Spatangus ovum-marinum, Briss.).

Belon, who found the kingfisher plentiful on the banks of the Hebrus, in Thrace, appears to have been the first author who correctly stated that it makes its nest by mining into the sand, and was somewhat fearful that he should not be credited because he contradicted the ancients.† Up to the present time, however, more or less misrepresentation has been introduced into the descriptions of its burrow. Gesner furnishes it with a soft bed of reed flowers ;‡ Goldsmith says it lines its hole with the down of the willow ;§ and Colonel Montagu, half reverting to the ball of fish-bones described by Aristotle, tells us that at the end of the hole there is a kind of bedding formed of the bones of small fish and some other substances, evidently the castings of the parent birds, generally about half an inch thick, and mixed in with the earth. He farther thinks there is every reason to suppose that both the male and the female come to this spot to eject the refuse of their food for some time before the latter begins to lay, and that they dry it by the heat of their bodies, as they are frequently known to continue

* J. R.
† Belon, Oyseaux, p. 224.
‡ Aldrovand, iii, 201.
§ Animated Nature, iii, 345.

in the hole for hours long before laying; and on this disgorged matter the female deposits and hatches her eggs.* Belon's account is very similar.

From the high authority of Montagu, the latter description is now copied as authentic by every modern author,† with the exception of Temminck, who says nothing on the subject, and Wilson, who says of his belted kingfisher (*Alcedo alcyon*), that 'its nest is neither constructed of glue nor fish-bones.'‡ We are certain that this contradiction of the general belief will apply equally to the kingfisher of England. In the bank of a stream at Lee, in Kent, we have been acquainted with one of these nests in the same hole for several successive summers, but so far from the pellets of fish-bones, ejected as is done by all birds of prey, being dried on purpose to form the nest, they are scattered about the floor of the hole in all directions, from its entrance to its termination, without the least order or working up with the earth, and are all moist and fetid. That the eggs may by accident be laid upon portions of these fish-bones, is highly probable, for the floor is so thickly strewed with them, that no vacant spot might be found; but they assuredly are not by design built up into a nest.§

The hole is from two to four feet long sloping, upwards, and narrow at the entrance, but widening in the interior, in order, perhaps, to give the birds room to turn; and for the same apparent reason the eggs are not placed at the extremity. We are somewhat doubtful whether it selects, as is said, the old hole of a water-rat to save itself trouble, the water-rat being the deadly enemy of its eggs and young; but it

* Montagu, Ornith. Dict., art. Kingfisher.

† See Fleming, Brit. Animals; Atkinson's Ornithol.; Bingley's Anim. Biog., &c.

‡ Wilson, Amer. Ornith., iii, 60. § J. R.

seems to indicate a dislike to the labour of digging, that it frequents the same hole for a series of years, and will not abandon it, though the nest be repeatedly plundered. The accumulation of cast bones in one of these old holes has perhaps given origin to the notion of the nest being formed of them.

Our own opportunities of carefully studying the habits of this bird, lead us to remark, that it is not so very shy and solitary as it has been represented, for it has more than once allowed us to approach within a few yards of the bough on which it was perched. Mr Jennings says that it is 'rarely if ever found near the habitations of man.'* On the contrary, we are in the habit of seeing kingfishers very often on the banks of a brook which runs past our garden, not a hundred yards from the house. A kingfisher's nest was found with young last summer on the bank of the same brook, and within gun-shot of a whole row of houses.† This fact was stated in the Magazine of Natural History. Another correspondent of Mr Loudon's says, 'that for the last nine years, and perhaps more, I have observed that a pair of kingfishers have uniformly constructed their nests in a hole of a bank which projects over a piece of water, on my premises, not one hundred yards from the house.'‡ In the summer of 1828, a single kingfisher took up his abode at Stamford Hill, in the immediate neighbourhood of London, in a narrow garden, much frequented, and close to several houses, on occasion of a small pond being stocked with gold-fish. The bird was frequently seen perched upon an ornament in the middle of the pond watching the fish, and was at last shot by the gardener from an apprehension that he would destroy the young fry. The necessity for obtaining its food from streams and shallow

* Ornithologia, p. 172. † J. R.
‡ Loudon's Mag. of Nat. Hist., iv, 82,

ponds causes this bird, however, to frequent secluded places. The belted kingfisher of America, as we have already seen, is partial to mill-dams, in defiance of the clack of the hopper, because there he finds facilities in watching for fish.

It may be interesting, as a sequel to the fancies of the ancients which we have noticed, to mention one or two modern superstitions respecting the kingfisher. 'I have once or twice,' says Mrs Charlotte Smith, 'seen a stuffed bird of this species hung up to the beam of a cottage ceiling, and imagined that the beauty of the feathers had recommended it to this sad pre-eminence, till, on inquiry, I was assured that it served the purpose of a weather vane; and though sheltered from the immediate influence of the wind, never failed to show every change by turning its beak to the quarter whence the wind blew.'* This was an old superstition, for Shakspeare, speaking of sycophants, says, they

'Turn their halcyon beaks
With every gale and vary of their masters.' †

The learned but somewhat credulous author of the 'Physicæ Curiosæ,' asserts the same upon the testimony of his own observation. 'Father Athanasius Kircher,' he says, 'had one of those birds sent him in a present by a friend, and being disembowelled and dried, it was suspended from the ceiling of his celebrated museum from 1640 to 1655, when I left Rome, and though all the doors and windows were shut, it constantly turned its bill towards the wind; and this I myself observed with admiration and pleasure almost every day for the space of three years.'‡ It would be useless to follow the author in the fanciful philosophy by which he pretends, after

* Nat. Hist. of Birds, i, 73. † King Lear.
‡ Phys. Cur., pars ii, p. 1367. See also Kircher, Magia, iv, 4, § 3, c. 5.

Kircher, the possessor of the bird, to account for the phenomenon; for, notwithstanding his personal testimony, the whole story is evidently no less fabulous than the tradition of the dried body of the same bird having the property of preserving cloth and woollen stuffs from the moth, which once induced drapers to hang it up in their shops. But this is nothing to the pretended power of the lifeless skin of averting thunder, augmenting hidden treasure, bestowing grace and beauty on the person who carries it, and renewing its plumage each season of moulting.*

Gmelin tells us that the Tartars pluck the feathers from a kingfisher, 'cast them into the water, and carefully preserve such as float, pretending that, if with one of these feathers they touch a woman, or even her clothes, she must fall in love with them. The Ostiacs take the skin, the bill, and the claws of this bird, shutting them up in a purse, and so long as they preserve this sort of amulet they believe they have no ill to fear. The person who taught me this means of living happy could not forbear shedding tears while he told me that the loss of a kingfisher's skin had caused him to lose both his wife and his goods.'† Forster, our navigator, records a similar superstition in the people of Ulietea.‡

Allied to the kingfisher in form as well as in habits, the green tody (*Todus viridis*) may be recorded as a sort of miner. According to Vieillot, who speaks from personal observation, 'the female makes her nest in dry earth, but prefers soft friable sandstone (*le tuf tendre*). She makes choice, for this purpose, of ravines and small crevices, and often

* Aldrovand, Ornith., iii, 621.
† Gmelin, Voyage en Siberie, ii, 112.
‡ Cook's Second Voyage.

breeds in the lower galleries of houses, though always on the ground. These birds dig with their bill and claws, forming a round hole, widened at the extremity, where they place pliable leaves, moss, and cotton, which they arrange with considerable skill.'*

We shall only mention another example of a mining bird, which Azara calls the miner lark (*Alauda fossor*), 'because,' says he, 'it digs a hole in some small ravine to the depth of about two feet and a half, in order to deposit its eggs on a bed of straw, spread over the bottom in a rounded form. I have not seen them in Paraguay, but have found them along the La Plata, and in the Pampas of Buenos Ayres.'† From its cry, resembling a peal of laughter, it might be appropriately called the laughing lark.

According to some accounts, our own skylark (*Alauda arvensis*) is partly a miner, and also exhibits no little skill in the art of draining, under certain circumstances, in the locality chosen for its nest; and though our own observation would lead us to think that it does nothing more than clear away whatever withered herbage or other rubbish may be lying where the foundation is to be placed, we shall give the statement alluded to, leaving it to our readers to verify it when opportunity offers. 'The lark selects her ground with care, avoiding clayey places, unless she can find two clods so placed as that no part of a nest between them would be below the surface. In more friable soils she scrapes till she has not only formed a little cavity, but loosened the bottom of it to some depth. Over this the first layers are placed very loosely, so that, if any rain should get in at the top, it may sink to the bottom, and there be absorbed by the soil. The edges of the nest are

* Nouv. Dict. D'Hist. Naturelle, art. Todier.

† Sonnini's Azara, iii, 320.

also raised a little above the surface, have a slope outwards, and are, as it were, thatched. The position in which the bird sits is a further security; the head is always turned to the weather; the feathers of the breast and throat completely prevent the rain from entering the nest at that side, while the wings and tail act as pent-houses in the other parts; and if the weather is violent, and the rain at a small angle with the horizon, the fore-part of the bird, upon which the plumage is thickest, receives the whole of it.'*

Syme, an English writer on Birds, says, 'they make careless nests of bent, coarse withered grass, lined with horse-hair, and, what is rather singular, we have observed the hair is generally white. The nest is commonly placed, if early in spring, in a slight hollow, beside a clod or stone to screen it from the cold, and always on the sunny side, south or west.'† The lark is a favourite bird both of naturalists and poets, and therefore we may excuse a little exaggeration in the accounts of its labours. The description of Grahame is not very far from the truth: —

'The daisied lea he loves, where tufts of grass
Luxuriant crown the ridge; there, with his mate,
He founds their lowly house, of withered leaves
And coarsest speargrass; next, the inner work
With finer, and still finer fibres lays,
Rounding it curious with his speckled breast.'‡

* British Naturalist, ii, 118.
† Song Birds, p. 73. ‡ Birds of Scotland, p. 3.

Chapter IV.

Ground Builders. — The Virginian Rail. The Grebe. The American Stilt. Swans. The Elder-Duck. The Summer Duck. Variations from common habits in Building. The Readbreast.

The essential requisites of a bird's nest are warmth and security — a certain degree of heat being indispensable for hatching the eggs and fostering the young, while security from enemies and accidents is no less necessary for successfully rearing the brood. The various means resorted to for fulfilling these conditions afford numerous and interesting illustrations of this delightful part of natural history, and have given rise to much curious discussion among those philosophers who severally ascribe the building operations of birds to foresight and reason; to what is termed instinct, meaning mechanism without intelligence in the agent; or to immediate impulses from the great creative mind of the universe. Without entering, at least for the present, into the intricacies of these discussions, we shall enumerate a series of facts from which inferences may be drawn by the advocates of the various systems which attempt to explain the more mysterious operations of the lower animals.

Though the ground is proverbially termed 'cold,' it requires but slight observation to prove that the popular notion is not strictly correct, and consequently that the great number of birds which select

it for their nests are not so foolish as might at first view appear. The researches of Saussure, and more recently of M. Cordier, prove, that at considerable depths the earth does not vary much in temperature, and, without having recourse to the tables drawn up from thermometrical observations, there are two circumstances well known to every body, which prove that the ground cannot, with strict justice, be termed *cold*. In a morning, when the fields are covered with hoar-frost, it may be observed to be much longer on some places than on others; and if the nature of the substances on which it remains longest be examined, they will uniformly be found to be such as are considered by chemists bad conductors of heat — such as wood, cow-dung, and hay; while on the bare ground, particularly in path-ways, where it is hard and beaten, and consequently better fitted to conduct heat, the hoar-frost is always first exhaled, because it is sooner reached by the heat emanating from the interior of the earth. The existence of this interior heat is still more obviously proved by the water of springs, which on its first issuing through the sand will not freeze even in severe frost, till it is cooled down by exposure to the cold atmosphere, when it freezes as readily as the water of the next pond.

These facts will be found, as we proceed, to be closely connected with the subject of birds' nests built on the ground; and on that account we may also mention that the interior temperature of the earth is more uniform than the surface which is exposed to the alternate influence of the sun and the cold air of the night, — a circumstance of no little importance in the hatching of eggs. That birds have a very correct notion of the requisite temperature for hatching, is strikingly proved by the ostrich (*Struthio camelus*), and several sea birds, which only sit on their eggs during the night or in moist or

gloomy weather, and at other times leave them altogether to the influence of the sunshine.*

In by far the greater number of instances, dryness seems to be a no less indispensable condition than warmth. But some birds are known to make use of moist rather than dry materials for their nests. This is well exemplified in a bird peculiar to America, called by Wilson the willet (*Totanus semipalmatus*, LATH.), from its reiterated shrill cry of *Pill-will-willet, Pill-will-willet,* which is loud enough to be heard at the distance of half a mile. This bird is very similar to the snipes, but may readily be distinguished from them by short webs at the joinings of the toes. The willets generally begin to lay about the twentieth of May, which is said, from some unknown cause, to be two weeks later than it was twenty years ago. 'Their nests,' says Wilson, 'are built on the ground, among the grass of the salt marshes, pretty well towards the land or cultivated fields, and are composed of wet rushes and coarse grass, forming a slight hollow or cavity in a tussock. This nest is gradually increased during the period of laying and sitting, to the height of five or six inches. The eggs are usually four in number, very thick at the great end and tapering to a narrower point at the other than those of our barn-door fowls. In every instance which has come under my observation, they are placed during incubation in an almost upright position, with the large end uppermost; and this appears to be the common practice of several other species of birds that breed in these marshes.'†

It is not uncommon, among many other orders of the animal creation, to deposit eggs in a moist place,

* Vaillant, Oiseaux d'Afrique, Autruche; and Wilson, Amer. Ornith. vii, 81, &c.

† Wilson, Amer. Ornith. vii, 28

The Willet (*Totanus semipalmatus*, Lath.) *Length, about fifteen inches.*

which is sometimes quite indispensable to their successful hatching. The common snake (*Coluber natrix*, LINN.), for example, places hers in an irregular hole dug in a heap of moist dung; the earth-worm (*Lumbricus gigas*, DUGES) deposits her eggs at the depth of two feet or more in moist earth; and all the various species of slugs, snails, and leeches are equally careful not to expose their eggs to the evaporation which they would suffer in dry air. Early in March, 1830, we found in Birch Wood, Kent, a group of about fifty eggs, somewhat resembling white-currants in size and colour, but not so transparent, deposited in an irregular cavity by the side

of a felled tree, and as they appeared to be too large to have been laid by any insect, even the great stag-beetle (*Lucanus Cervus*, Linn.), abundant in this district, we were anxious to ascertain to what animal the eggs belonged—conjecturing that they might possibly be those of the nimble lizard (*Lacerta agilis*), which we had in one instance* observed to be viviparous. We therefore brought the whole away, intending to hatch them; but not adverting to the moderate moisture which they received in their original position from rain water dripping down the sides of the tree, we kept them in a dry box, and in the course of a day or two we found them, to our great disappointment, all dry and shrivelled. The dung-beetle (*Geotrupes stercorarius*), apparently afraid of such an accident, is not only careful to wrap her eggs in pellets of moist dung, but to bury these in the earth at some depth; while sub-aquatic animals, such as the warty-eft (*Triton palustris*, Flem.) and the various species of frogs, lay their eggs in the water itself, as fish always do—enveloping them in a mass of jelly.

All these eggs, however, it must be remarked, are destitute of the hard calcareous shell uniformly found in the eggs of birds; and are covered instead with a tough, membranaceous substance, capable of absorbing or admitting moisture. In the case of the eggs which we have just mentioned as shrivelling in our possession, we tried the experiment of moistening them to see whether they would recover their globularity, and so rapid was the absorption that they acquired their original plumpness in a few minutes.† M. Dugés says, that the same revival may be made, after long drying, of the eggs of earth-worms (*Lumbrici*), as well as crustacea and fishes.‡ But the willet's eggs

* See Insect Transformations, p. 108.

† J. R.

‡ Dugés, Annales des Sciences Nat., Nov. 1828.

are, it would appear, only exposed to the moist rushes forming the nest at their lower end, the upper and larger being, according to Wilson, always placed perpendicularly so as to receive all the influence of the heat of the mother,—and it may be from this heat being naturally too high that the moist materials of the nest are required to counteract it. Another circumstance, mentioned by Wilson, confirms this supposition. 'During the term of incubation,' he says, 'the female often resorts to the sea shore, where, standing up to the belly in water, she washes and dresses her plumage, seeming to enjoy great satisfaction from these frequent ablutions.'

Whether this conjecture be correct or not, it is certain that too much moisture proves as fatal to the eggs of other birds which nestle in the same marshes with the willet, as it would certainly be to those which are naturally careful to keep their eggs dry. The Virginian rail (*Rallus Virginianus*, Linn.) constructs its nest of wet materials on a thick tuft of grass, which is often met with by the mowers about Philadelphia and other parts of the United States. One of these nests found by Wilson in the salt marshes of Cape May 'was built,' he tells us, 'in the bottom of a tuft of grass, in the midst of an almost impenetrable quagmire, and was composed altogether of old wet grass and rushes. The eggs had floated out of the nest by an extraordinary rise of the tide in a violent northeast storm, and lay scattered among the drift weed. The female rail, however, still lingered near the spot, to which she was so attached as to suffer herself to be taken by hand. She doubtless intended to repair her nest, and commence laying anew; as, during the few hours that she was in our possession, she laid one egg, corresponding in all respects with the others.

On examining those floated out of the nest, they contained young perfectly formed, but dead.'*

The Virginian Rail (*Rallus Virginianus*, Linn.). *Length, about ten inches.*

When the month of April has been more than usually wet, we have repeatedly found the nests of thrushes and blackbirds containing water, with eggs soaking in it, and we inferred that, from the impossibility of preserving them dry during continued rains, they had been abandoned by the owners as being spoiled for hatching. We have observed

* Wilson, Amer. Ornithol. vii, 115.

the circumstance too often to suppose the abandoning of these nests to have arisen from the accidental death of the birds.*

The effects of moisture, as either beneficial or injurious, might be copiously illustrated, both in the hatching of eggs, and the germination of seeds. We shall content ourselves with one or two instances, in addition to those already mentioned.

The red ant (*Myrmica Rubra*, LATREILLE), whose colonies are common in gardens, as well as those of most of their congeners, cannot well build their ingenious archways and vaulted chambers without the aid of dew or rain to moisten the earth which they knead for the purpose. But though, on this account, they rejoice in refreshing showers, they are well aware that their eggs would be injured or destroyed by the moisture; and if they have previously exposed them on the top of their nest to the influence of the heat during sunshine, they may be observed to display the utmost eagerness in carrying these into the dry chambers of the interior upon the first appearance of rain. A still more remarkable circumstance occurs, with regard to the eggs of a dung-fly (*Scatophaga stercoraria*, MEIGEN), which Réaumur found could not be hatched without a certain degree of moisture, although too much destroyed them. But Providence has furnished these eggs with two projecting arms at the outer end, to prevent their sinking too deep in the cow-dung in which the mother fly deposits them.†

In the germination of seeds, it requires, in many cases, a similar moderate proportion of moisture to insure success, — hence the value of a dry March, the usual sowing season, to our agriculturists and gardeners. We knew a Scotch gardener, the first year he was in England, commit a very excusable mistake

* J. R. † See Insect Transformations, p. 44.

from not adverting to this principle. He had been in the habit of promoting the quick germination of peas and broad-beans by steeping them in water for some time before sowing, and naturally concluded that the same process would insure him an early crop of French beans and scarlet-runners; but, to his no small disappointment, scarcely a plant came up, through the seed rotting in the ground in consequence of the previous soaking it had undergone. When much rain, indeed, falls after the sowing of the earlier crops of these delicate beans, the seeds frequently rot; though, if the summer is further advanced, even the soaking of the Scotch gardener would not be so apt to kill them, from the more rapid evaporation caused by the increased warmth of the weather.*

A native water-bird, the little grebe, or dabchick (*Podiceps minor*, LATH.), not uncommon in lakes, and even ponds, makes a nest, similar to the American birds just mentioned, of wet grass and rushes, augmenting the materials as she continues to lay. Pennant says, 'it forms its nest near the banks, in the water, but without any fastening, so that it rises and falls as that does. To make its nest it collects an amazing quantity of grass, water-plants, &c. It lays five or six white eggs, and always covers them when it quits the nest. It should seem wonderful how they are hatched, as the water rises through the nest and keeps them wet; but the natural warmth of the bird bringing on a fermentation in the vegetables, which are full a foot thick, makes a hotbed fit for the purpose.'† Bewick repeats his legend about fermentation; but Montagu says, he never could discover any indications of heat, from such a cause, in the nests which he examined;‡ and all the nests which we have been acquainted with in Kent, where these birds

* J. R. † Brit. Zool. ii, 399. ‡ Ornithol. Dict.

are plentiful, have uniformly been found cold.* In short, we do not think any body acquainted with chemistry would ever adopt the opinion that fermentation, sufficient to produce heat, could take place in contact with a large body of water. Temminck, in opposition to Pennant, says it 'attaches the nest to the stems of rushes.†

It would appear, indeed, that the practice we have mentioned of heaping up materials, after the laying has commenced, is to be accounted for, in part, from the anxiety of the mother to keep her eggs from the wet. This inference seems to be corroborated by the proceedings of the American stilt (*Himantopus Mexicanus*, Brisson), which is so decidedly gregarious during the breeding season, that a pair is rarely found solitary. On their first arrival on the coast of New Jersey, in spring, they associate in small companies, inhabiting those particular parts of the salt marshes pretty high up towards the land, where they are broken by numerous shallow pools and reedy islets. The water of these pools is generally so shallow, that the long legs of the stilts enable them to wade through them in every direction; and they may be seen at all times perambulating, often up to the breast in water, in search of small shell and water insects, with which the marshes abound.

'In the vicinity,' says Wilson, 'of these *bald places*, as they are called by the country people, and at the distance of forty or fifty yards off, among thick tufts of grass, one of these small associations, consisting perhaps of six or eight pair, takes up its residence during the breeding season. About the first week in May they begin to construct their nests, which are at first slightly formed of a small quantity of old grass, scarcely sufficient to keep the eggs from

* J. R. † Manuel d'Ornithologie, p. 729, second edit.

the wet marsh. As they lay and sit, however, either dreading the rise of the tides, or for some other purpose, the nest is increased in height with dry twigs of a shrub very common in the marshes, roots of the salt-grass, sea-weed, and various other substances, the whole weighing between two and three pounds. This habit of adding materials to the nest after the female begins sitting, is common to almost all other birds that breed in the marshes. These nests are often placed within fifteen or twenty yards of each

The American Stilt (Himantopus Mexicanus, Briss.) *Length, about fourteen inches.*

other; but the greatest harmony seems to prevail among the proprietors.'*

It may have fallen under the observation of some of our readers, that the swans (*Cygnus ferus*, Brisson, and *C. Olor*), sometimes build up a pile of reeds floating on the water, and of course moist;† though at other times they nestle on the dry herbs,‡ near the margin of a lake or river. We have met with their nests in both these circumstances.

The proceedings of the willet, the Virginian rail, the little grebe, and such birds as thus make choice of moist materials for their nests, among which the song-thrush may be mentioned, are strikingly contrasted with those of several other birds which also build on the ground, — leaving out of our consideration, for the present, the snug and warm little nests of moss, down, and feathers, which are situated on trees, and have to be described elsewhere. We allude here to water-birds, chiefly of the duck family. The long-tailed Duck (*Clangula glacialis*, Fleming), for example, an occasional visitant of England, which breeds in Greenland, Hudson's Bay, and other northern parts, makes her nest among the grass near the sea, lining it with down plucked from her own breast, equally fine and valuable with the well known eider-down, though it cannot be procured in such quantity.§

It is not generally known, we believe, that any other bird thus robs herself of her own covering from maternal affection, besides the Eider-duck (*Somateria mollissima*, Leach), whose celebrity requires us to bestow upon it particular attention. For size it approaches nearer to the goose than the duck, being above two feet long, and weighing about seven

* Wilson, Amer. Ornith. vii, 54.
† Frisch, Vorst. der Vögel. ‡ Schwenckfeld.
§ Latham, Synopsis, vi, 528.

The Long-tailed Duck (*Clangula glacialis*, Fleming.)

pounds. Its native country extends from about 45° north to the highest arctic latitudes hitherto explored, both in Europe and America, — the Farn Isles, off the coast of Northumberland, and the rocky islets beyond Portland, in the district of Maine, being the southern boundary of their breeding places; but they are only very plentiful in Behring's Straits, Labrador, Greenland, Iceland, and other arctic regions. Selby, however, thinks that they might be greatly increased in the Farn Islands, by proper attention.*

According to M. T. Brunnich, who wrote an express treatise on the natural history of the eider-duck, their first object, after pairing, is to procure a suitable place for their nest, preferring the shelter of a juniper bush where it can be had, and where there is no juniper, contenting themselves with tufts of sea grass (*Arundo arenaria*, *Poa maritima*, *Elymus*

* Selby, Illustr. of Brit. Ornith.

arenarius, &c,) bundles of sea weed cast up by the tide, the crevices of rocks, or any hollow place which they can find. Some of the Icelandic proprietors of breeding grounds, in order to accommodate them, cut out holes in rows on the smooth sloping banks, where they would not otherwise build, but of which they gladly take possession when thus scooped out.* It is not a little remarkable that, like several other sea birds, they almost always select small islands, their nests being seldom if ever found on the shores of the main land, or even of a large island. The Icelanders are so well aware of this, that they have expended a great deal of labour in actually forming islands, by separating from the main island certain promontories joined to it by narrow isthmuses.†

The reason of this preference of islands seems to be, security from the intrusion of dogs, cattle, and other land animals, to whose vicinity they have so great an aversion that the Icelanders are careful to remove these, as well as cats, to a distance from their settlements. 'One year,' says Hooker, 'a fox got over upon the ice to the island of Vidöe, and caused great alarm; he was, however, though with difficulty, taken, by bringing another fox to the island and fastening it by a string near the haunt of the former, by which means he was allured within shot of the hunter.' The arctic fox (*Canis Lagopus*, Linn.) is traditionally said to have been introduced in Iceland by one of the Norwegian kings to punish the disaffection of the inhabitants.‡

Both the male and the female eider-ducks work in concert in building their nest, laying a rather coarse foundation of drift grass, dry tangle, and sea weed, which is collected in some quantity. Upon this rough mattress the female eider spreads a bed of the finest

* Hooker's Tour in Iceland, p. 53. † Brunnich.
‡ Hooker's Tour, p. 42.

down plucked from her own breast, and by no means sparingly, but, as Brunnich informs us, heaping it up, so as to form a thick puffed roll quite round the nest. When she is compelled to go in quest of food, after beginning to sit, she carefully turns this marginal roll of down over the eggs to keep them warm till her return. Martens says she mixes the down with moss,* but as this is not recorded by any other observer, we think it is not a little doubtful, particularly as in the places chosen for nestling she would find it no easy matter to procure moss. It is worthy of remark, that though the eider-duck lays only five or six eggs, 'it is not uncommon to find more than even ten and upwards in the same nest occupied by two females which live together in perfect concord'† —a circumstance, however, of which we shall meet with other instances as we proceed.

The quantity of down in each nest is said, by Van Troil, to be about half a pound, which, by cleaning, is reduced one half. By Pennant, who examined the eider's nests in the Farn islands, off Northumberland, it is only estimated, when cleaned, at three-quarters of an ounce, and this was so elastic as to fill the crown of the largest hat.‡ The difference of quantity in these two accounts, theoretically ascribed by the translators of Buffon to difference of climate, may have arisen from the one being the first, and the other the second or third nest of the mother duck: for if the first nest be plundered of its down, though she immediately builds a second, she cannot furnish it with the same quantity as before; and, if forced to build a third time, having then stripped her breast of all she could spare, the male is said to furnish what is wanting, which is recognised as being

* Récueil des Voyages du Nord, ii, 93.

† Van Troil's Letters on Iceland.

‡ Pennant, Tour in Scotland, 8vo, edit. p. 36.

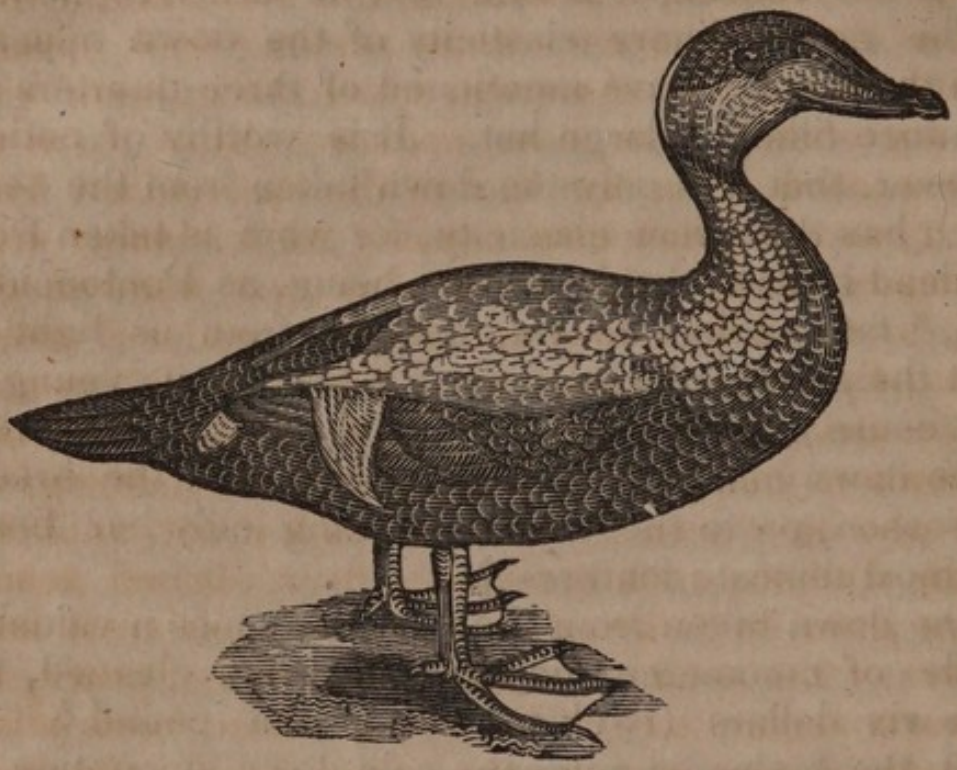
considerably whiter than the female's. When the nest is not robbed, it is said that he furnishes none.*

The extraordinary elasticity of the down appears from the fact we have mentioned of three-quarters of an ounce filling a large hat. It is worthy of notice, however, that it is only the down taken from the nests which has this great elasticity, for what is taken from the dead birds is much inferior, being, as Pontoppidan says, 'fat, subject to rot, and far from as light as what the female plucks to form a bed for its young.'† The cause of the difference has been attributed either to the down being in greater perfection at the breeding season, or to the bird's plucking only her finest and most delicate feathers.‡

The down taken from the nests becomes a valuable article of commerce, being sold, when cleaned, for three rix dollars (twelve shillings) a pound.§ In 1750, the Icelandic company sold down amounting in value to about 850*l*, besides what was sent directly to Gluckstadt.‖ Little or none of it is used in the country where it is found. In that rough climate, as Buffon remarks, the hardy hunter, clothed in a bear-skin cloak, enjoys in his solitary hut a peaceful, perhaps a profound sleep, while, in polished nations, the man of ambition, stretched upon a bed of eider-down and under a gilded roof, seeks in vain to procure the sweets of repose.¶

The example of the eider-duck, in plucking the down from her body in order to keep her offspring warm, is not unmatched in the animal world. The domestic rabbit (*Lepus cuniculus*) is a familiar example, preparing for her delicate young a nest of hay, warmly lined with down plucked from her own fur. It may not be so generally known, that several moths,

* Brunnich. † Pontoppidan, Nat. Hist. of Norway.
‡ Buffon. § Hooker's Tour, p. 53. ‖ Van Troil.
¶ Oiseaux, x.



The Eider-Duck (Somateria mollissima, Leach). *Length, about two feet.*

such as the gypsey (*Hypogymna dispar*) and the golden tail (*Porthesia auriflua*, STEPHENS), are provided with a thick bunch of down on their tails for covering their eggs at the time of laying, and also with a pair of tweezers, likewise situated in the tail, for plucking off this down and spreading it over the eggs.*

It has been remarked by Aristotle, that birds which do not perch build on the ground :— 'Partridges,' he says, 'and other birds which seldom fly, nestle on the ground ; of these, also, the skylark, the woodcock, and the quail never alight on a tree.'† But the converse of this will not hold ; for many birds which perch nestle on the ground, of which the redbreast (*Sylvia rubecula*), the buntings

* See Insect Transformations, p. 84, where figures are given of this curious instrument.

† Aristotle, Hist. Animal. ix, 8.

(*Emberizæ*), and the pheasants, are familiar examples. A very remarkable illustration, however, of the remark of Aristotle, occurs in the summer-duck (*Anas Sponsa*, Linn.) of America, which, though not exactly a ground builder, does not seem out of place to be mentioned here, as one of the birds which line their nests with their own down. At variance with the habits of all other ducks, this one perches on trees, for which its strong sharp claws render it more adapted than its webbed feet. The elegant form and rich colouring of the male (though the female wears a uniform of dull brown) have excited the admiration of all who have seen it ; and we think it not unlikely that the Indians took the hint of their plumed head-dresses from its beautiful crest. With this crest and the skin of the neck, the calumet, or pipe of peace, is frequently ornamented. Linnæus, whose nomenclature exhibits some singular displays of fanciful allusion, imagined that this duck's crest so much resembled the bridal head-dress of his country-women, that he named it the bride (*Sponsa*), though the one is high, stiff, fantastic, and out of all reasonable proportion, while the other is free, elegant, and graceful.

The beautiful pendent crest of the summer-duck arises from a base of glossy golden green, shading off into a rich violet brown, dashed with interrupted streaks of snow white. The feathers covering the wings are of the same glossy brown, which melts into black, with rich purple reflections of burnished steel ; while those on the flanks are delicately fringed and striped with black and white. But as words are not fitted to convey a correct notion of its varying and variegated colours, we shall pass on to our more immediate subject—the nest.

It is stated in the notes to Buffon, by the English translator, that the summer-duck nestles in the holes bored by the woodpeckers ; but this, on considering

its size, must appear impossible. That it does, however, make its nest in the holes of trees has been testified by every observer from Dierville* and Du Pratz to Wilson. The latter informs us that instances have been known in which the nest was constructed with a few sticks laid on the fork of the branches, though it is usually in the inside of a hollow tree, and, as it would appear, very near if not upon the ground. 'On the 18th of May,' continues Wilson, 'I visited a tree containing a nest of a summer-duck, on the banks of Tuckahoe river, New Jersey. It was an old grotesque white oak, whose top had been torn off by a storm. It stood on the declivity of the bank, about twenty yards from the water. In this hollow and broken top, and about six feet down, on the soft decayed wood, lay thirteen eggs, snugly covered with down, doubtless taken from the breast of the bird.

'This tree had been occupied, probably by the same pair, for four successive years, in breeding-time. The person who gave me the information, and whose house was within twenty or thirty yards of the tree, said that he had seen the female, the preceding spring, carry down her young one by one in less than ten minutes. She caught them in her bill by the wing or back of the neck, and landed them safely at the foot of the tree, whence she afterwards led them to the water. Under this same tree, at the time I visited it, a large sloop lay on the stocks nearly finished; the deck was not more than twelve feet distant from the nest, yet, notwithstanding the presence and noise of the workmen, the ducks would not abandon their old breeding-place, but continued to pass out and in as if no person had been near. The male usually perched on an adjoining limb, and kept watch while the female was

* Dierville, Voyage au Port-Royal, p. 112. Le Clerc, Gaspesie, p. 485.

laying, and also often while she was sitting. A tame goose had chosen a hollow space at the root of the same tree to lay and hatch her young in.'*

Summer-Duck (Anas Sponsa, Linn.) *Length, about nineteen inches.*

Darwin would have eagerly snatched at these singular differences from its congeners, in the economy of the summer-duck, as illustrations of his doctrine of accidental habits, transmitted from individual animals to their posterity, accounting, at the same time, for the superior sharpness of its claws, from its efforts to maintain its position on the trees where it began to perch. But rejecting such fanciful explan-

* Wilson, Amer. Ornith. viii, 104.

ations, we may find it more to the purpose to mention one or two examples of what seems to be a similar dereliction of common habits. Mr Galton mentions an instance of this kind of the blackbird (*Merula vulgaris*, Ray), which sometimes builds upon or very near the ground. The pair in question built twice at the bottom of a hedge, but both hatches of their young having fallen a prey to cats, they built a third nest in an apple-tree, eight feet from the ground, in order, as it is conjectured, to be out of the reach of their former enemies.* We should be more disposed to refer this variation in the height of such nests to the difference of leafage in the bushes and trees, of which many birds are evidently most solicitous to take advantage; but in the early part of the spring, when blackbirds first build (we have known their nests begun in February), they are forced to seek that concealment among the long grass, which as the summer advances they find more suitable amidst the thick foliage of trees.

A still more remarkable instance has fallen under our own knowledge, of a redbreast (*Sylvia rubecula*). This bird is also a very early builder, and usually selects for its nest a shallow cavity among grass, or moss, in a bank, or at the root of a tree, sometimes in the hole of a tree in a wood or secluded lane, far distant from its winter haunts about the cottage door or the farm yard. Pennant says it breeds 'in the thickest covers, or the most concealed holes of walls or other buildings'† — the latter statement, if meant to refer to a common occurrence, is certainly a mistake.

The pair of redbreasts just alluded to, from some accidental cause, began to build so early as Christmas; but seeming to be well aware that the woods would not afford them either shelter or subsistence at this inclement season, particularly so far

* Galton's Nat. Hist. of Birds. † Brit. Zool. ii, 261.

north as Kincardineshire, they made choice of a greenhouse belonging to the late Lord Monboddo. Not finding a suitable place in the lower part of the greenhouse, they selected a hole, as a house-sparrow would have done, in the corner of the ceiling; and care being taken to feed them as well as to give them no molestation, they succeeded in rearing a brood of young, to the wonder of all who witnessed the circumstance.*

A singularly fanciful account of the redbreast's nest is given by Turner, an English naturalist, who wrote so long ago as the sixteenth century. 'The robinet,'† says he, 'which hath a red breast both in summer and in winter, nestleth as far as possible from towns and cities, in the thickest copses and orchards, after this manner: when she hath found many oak leaves, she constructeth a nest, and when built, covereth it in with arch work, leaving only one way for entrance, for which purpose she builds with leaves a long porch before the doorway, the which, when going out to feed, she covereth up with leaves.' But as if somewhat sceptical himself respecting his own description, he subjoins, 'these things which I now write, I observed when a boy, though I do not deny that she may nidificate otherwise, and if any one curious in such matters hath observed her build differently, it will be a gratification to me to learn the same: I have related candidly that which I have seen.'‡

There can be scarcely a doubt, we think, that Turner in this instance was deceived by some dreaming fancy; yet is it afterwards copied by almost every ornithologist, from Aldrovand and Willughby,

* J. R.

† Drayton and other old poets call the readbreast Robinet.

‡ Turner Avium Hist. apud Aldrovandi Ornith. iii, 32d edit. Frankf.

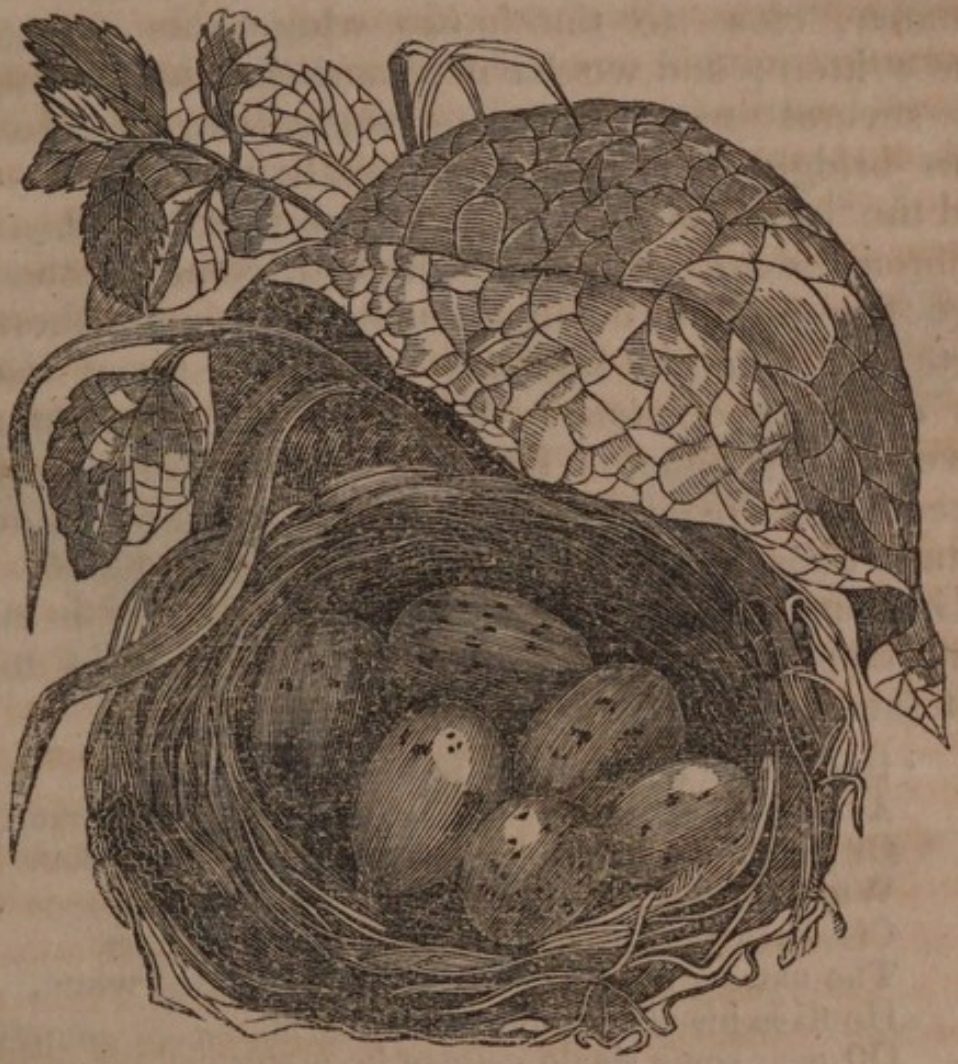
down to Buffon and Bewick. After the nest is built, Willughby tells us, the bird *often* strews it with leaves, preserving only a narrow winding entrance under the heap, and even shuts the mouth of it with a leaf when she goes abroad.* The only circumstance which could have led to such a mistake is, that as the redbreast makes its nest at the root of a tree, a few leaves might have been accidentally drifted over the entrance by the wind; for among some hundreds of these nests which we have seen, we never met with one covered in at top with any sort of material piled up for the purpose by the bird, though we have often observed a tuft of grass, a layer of natural grown moss, or part of the root of a tree projecting over it.

Another part of Turner's original account we should have passed over, had it not been used as an illustration of his peculiar views of instinct by the late Dr Mason Good. 'All the different species of birds,' says he, 'in constructing their nests, not only adhere to a peculiar plan, but, wherever they can obtain them, to peculiar kinds of materials: if these materials be not to be procured, the accommodating power of the instinctive principle directs them to others, and suggests the best substitutes. Thus the redbreast uniformly prefers oak leaves as a lining for her nest, wherever she can acquire them; but if these be not to be had, she supplies the want by moss and hair.'† So far, however, from preferring oak leaves for a lining, we are bold to say that these are seldom if ever used even for the foundation of the redbreasts' nest, which is always neatly made of moss and grass, and lined with hair, and sometimes (not always) with feathers intertwined.‡ Dr Good's

* Willughby, Ornitholog. p. 160, copied by Bewick, i, 236, edit. 1826.

† Good's Book of Nature, ii, 137, 1st edit. ‡ J. R.

inference seems to have been made from a comparison of his book knowledge of Turner's oak leaves, with his personal observation of moss and hair.



Nest of the Redbreast.

It is no less an erroneous notion, that the redbreast, during the summer, flies from the habitations of man, which he has haunted during winter, nestling in wild and solitary places. That many of these birds may be found in woods and forests, we admit; but we are equally certain that a great number do not go farther from their winter haunts than the nearest hedge-row. Even in the near vicinity of London, in Copenhagen fields, Chelsea, Battersea fields, Ken-

nington, Bermondsey, Peckham, Deptford, Greenwich — wherever, indeed, there is a field, and a few trees, we have heard redbreasts singing during the whole summer. One has been in song all the summer, close to the house where this paragraph was written; and we have remarked another singing for several months among some elms at Lewisham bridge, though there are houses all around, and the bustle of the public road just below. The redbreast does not usually, indeed, come to the cottage for crumbs during summer, because then insects are plentiful, and this may have given rise to the common opinion. We once saw an instance, however, at Compton-Basset, in Wiltshire, in which a redbreast made a daily visit in summer *within* a cottage door, to peck up what he could find.*

Grahame's poetical sketch of the redbreast is much more true to nature than the statements of many professed naturalists: —

> 'High is his perch, but humble is his home,
> And well concealed. Sometimes within the sound
> Of heartsome mill-clack, where the spacious door
> White dusted, tells him, plenty reigns around, —
> Close at the root of brier bush, that o'erhangs
> The narrow stream, with shealings bedded white,
> He fixes his abode, and lives at will.
> Oft near some single cottage he prefers
> To rear his little home; there pert and spruce
> He shares the refuse of the good wife's churn.
> Not seldom does he neighbour the low roof
> Where tiny elves are taught.'†

The varying habits of birds, however, with regard to their place of nestling, is no less strikingly illustrated in the case of some American sparrows than in that of the jackdaws in the rabbit-burrows at Chichester. 'The song-sparrow' (*Fringilla melodia*), says Wilson, 'builds in the ground under a tuft of grass; the nest is formed of fine dry grass, and

* J. R. † Birds of Scotland, p. 29.

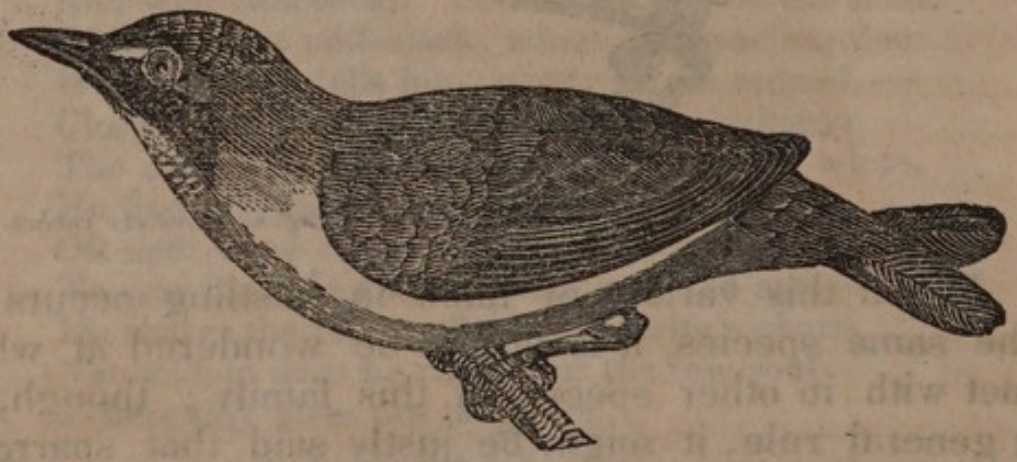
lined with horse-hair. What is singular, the same bird often fixes his nest in a cedar tree, five or six feet from the ground. Supposing this to have been a variety or different species, I have examined the bird, nest, and eggs with particular care, several times; but found no difference. I have observed the same accidental habit in the red-winged blackbird (*Sturnus prædatorius*?), which sometimes builds among the grass, as well as on alder bushes.'*

The Song-sparrow (Fringilla melodia). Length, about six inches.

When this variety of habit in nestling occurs in the same species, it is not to be wondered at when met with in other species of this family; though, as a general rule, it might be justly said that sparrows do not build on the ground, to which there are but few exceptions. Besides the song-sparrow, which only occasionally builds in the ground, Wilson mentions the swamp-sparrow (*Fringilla palustris*), which

* Wilson, Amer. Ornith. ii, 126.

seldom, if ever, alights upon trees, and forms its nest on the ground, usually in a tussock of rank grass, surrounded by water ;* and the yellow-winged sparrow (*Fringilla passerina*), which nestles at the roots of bushes, building with loose, dry grass, and lining with hair and the fibrous roots of plants.† The same author mentions a bird of a very different family — the Kentucky warbler (*Sylvia formosa*), which frequents low, damp woods, and may be heard from Kentucky and Tennessee to New Orleans and the mouths of the Mississippi, twittering among the high rank grass and low bushes of the most desolate and solitary morasses. This bird builds its nest sometimes in the middle of a thick tuft of rank grass, sometimes in the fork of a low bush, and sometimes on the ground ; in all which situations Wilson himself found it. The materials are loose, dry grass, mixed with the light pith of weeds, and lined with hair.‡



The Kentucky Warbler (Sylvia formosa). Length, about five inches.

This manner of building is strikingly contrasted with that of its neighbour and congener, the prairie

* Wilson, Amer. Ornith., iii, 49. † Ibid, iii, 76.
‡ Ibid. iii, 85.

warbler (*Sylvia minuta*), whose elegant pendent nest we shall afterwards describe.

The blue hawk or hen-harrier (*Falco cyaneus*, LINNÆUS), whose favourite haunts are in morasses and level districts, builds in marshy places, among high grass, bushes, or in the low forks or branches of trees. By another account they are stated to breed in open wastes, frequently in thick furze coverts, among reeds, marshy bushes, the low branches of trees, but generally on the

The Heron (Ardea cinerea, Linn). *Length, about three feet.*

ground. The nest is built of sticks, reeds, straw, leaves, and similar materials heaped together, and then lined with feathers, hair, or other soft substances.* What would Pliny have thought of a powerful flier, like the blue hawk, nestling in this manner, when he describes those birds which 'make their nests in the ground as being not able to flie into the aire by reason of their weightie bodies.'† He might have had some colour for saying so of the heron, had he merely looked at the great awkward form of the bird — though this is admirably adapted to its mode of life : yet the heron, unlike most water-fowls, builds on trees ; and has only in one instance been observed to build on the ground, in a small island in Scotland, where there was only one oak tree, every bough of which was so loaded with nests, that many of the birds belonging to the heronry were forced by necessity thus to deviate from the habit of the species.‡

Some ground builders, which collect few or no materials, are remarkable for the care they display in selecting a convenient locality. In the nest of a peahen, for example, which we lately examined, we observed that the mother-bird had taken care to choose a very sheltered spot, the nest being overhung by a low branch of a spruce fir, which was suspended over it like an umbrella, and completely protected it from rain and dew. Another circumstance was still more remarkable. It is well known that female birds for the most part wear off a considerable portion of the feathers from their breasts by their frequent movements in turning their eggs. Now, as her eggs were placed on the bare earth, no grass growing under the

* Bonaparte, Amer. Ornith. ii, 42.
† Holland's Plinie, p. 289. ‡ Ornith. Dict., art. Heron.

drip of the spruce branch, the breast of our pea-hen must soon have been robbed bare of feathers. Foreseeing this event, as it would appear, the careful creature prepared a soft cushion of dry grass, upon which her breast might rest. This cushion was placed on the most exposed side of the nest, but no part of it under the eggs themselves.*

* J. R.

Chapter V.

Mason Birds.—The Nut-Hatch. The Cliff-Swallow. The Window-Swallow. The Barn-Swallow. The Chimney-Swallow.

When the least civilized savages take possession of a natural cavern, or the hollow of a tree, to shelter them from the weather, the indolence of that state in which the ingenuity of man has not been called forth by thought and experience, prevents them from constructing any additional convenience in the form of a door. Even when they take the trouble of making a wigwam of boughs, their substitute for a door consists in narrowing the entrance so that it will only allow of their crawling in on all fours like their fellow foresters, the bears and foxes. It is only after the dawn of refinement, when invention has been stimulated by the desire of comfort, that we meet with doors curiously and tastefully constructed, possessing certain architectural proportions, as well as adapted to the character of the climate. Amongst the lower animals, the contrivance of a door of any description is of rare occurrence, and is, we believe, only to be found among a peculiar family of spiders (*Mygalidæ*).* But all animals, man included, are soon taught by experience, that protection from enemies is no less necessary than shelter from the inclemencies of weather. The Gothic castle and the walled city have low and narrow portals, opposed to the entrance

* See Insect Architecture, p. 362, for a figure of the spider's hinged door.

of a hostile army; and the Indian contracts or barricades his hut to prevent his being devoured by nocturnal beasts of prey.

It is probably both for protection from enemies and for shelter from the weather, that the nut-hatch (*Sitta Europæa*) forms the barricade to her nest, which has suggested the preceding observations. In France the bird is termed the mason-woodpecker.* The older naturalists tell us, that this little mason selects for breeding the hole of a tree, and if this be larger than she requires she narrows the entrance with earth and mud, so neatly kneaded that a potter could not do it more dexterously.† Buffon adds, that she strengthens the fabric of soft earth with small stones, a device which we have observed practised by one of our indigenous mason bees (*Anthophora retusa*, LEACH.)‡

As there is no masonry nor plastering made use of in the interior of the nut-hatch's nest, we might have been inclined to ascribe the preceding account to the same sort of fancy as the floating nest of the kingfisher. But we have the testimony of a recent observer, not only to the fact of the clay barricade, but a confirmatory circumstance, not a little interesting and curious Colonel Montagu discovered that if the clay barrier at the entrance of the hole be destroyed while there are eggs in the nest, it is speedily rebuilt, to prevent, possibly, the unwelcome intrusion of the woodpecker and other birds of superior size and strength which build in similar situations.§ It appears to us no less probable, that the wall may be constructed to prevent the unfledged young from tumbling out of the nest, when they begin to stir about; for all young birds become very restless as

* Buffon, Ois.
† Aldrovandi, Ornith., i, 418, ed. Frankf.
‡ See Insect Architecture, p. 33.
§ Montagu, Ornith. Dict., art. Nut-hatch.

they approach the period when they acquire the power, as well as the desire, for rapid movement. The callow brood of most nests have the same impatience that distinguishes children who are about to use their legs —they pant to 'imp their young wings.'

The Nut-hatch. (Sitta Europæa.) Length, about six inches.

The only other instance which we have met with of something like a door contrived by a bird, is mentioned by M. Montbeillard respecting the ring-necked swallow (*Hirundo Cayanensis*, LATH.) 'It breeds,' he says, 'in houses; I have seen its nest at Mauduyt's; it was very large, well stuffed, and constructed with the cotton of dog's bane (*Apocynum Cannabinum*, LINN.). It had the shape of a truncated cone, of which one of the bases was five inches in diameter and the other three inches; its length was nine inches, and it appeared to have adhered by its large base

composed of a sort of paste-board made of the same substance. Its cavity was divided by an oblique middle partition, extending nearly to the part containing the eggs; beside which, there was a small heap of very soft dog's-bane, which formed a kind of door, intended to screen the young from the external air.*

It may not be known to many of our readers, that the common hive-bee (*Apis mellifica*) is said to construct a similar barricade at the entrance of her hive, to prevent, as it would appear, the intrusion of the death's-head hawk-moth (*Acherontia atropos*). Having ascertained that the moths in question plundered the bees to a considerable extent, M. Huber devised an apparatus of grate-work to contract the entrance of his hives, in such a manner as to exclude any creature larger than a bee — the death's-head-moth being no less than from four to five inches in expanse of wing.† But when the bees were left to themselves, they took care to provide for their own security, by building a thick wall of propolis and wax, rising behind the entrance of the hive and sometimes in the entrance itself, and penetrated by passages for one or two workers at a time.

'The works,' continues Huber, 'which the bees had established were of very various formation; in one there was a single wall with opening arcades at top; in another, several bulwarks flanking each other resembled the bastions of our citadels — gateways, masked by walls in front, opening on the face of those of the second row, while they did not correspond with the apertures of the first row; in a third, a series of intersecting arcades permitted free egress to the bees, while it prevented the entrance of their enemies. All these ramparts were

* Oiseaux, ix, 540.

† Stephens, Illustr. of Brit. Insects, vol. i, Haust. Acherontia.

massive and firm, and compact in substance. The art of warfare among bees, therefore, is not restricted to the offensive; from the part of simple soldiers, they pass to that of engineers.

'But a period arrives when these galleries are no longer of use to the bees. At the time that their harvest is abundant, their hive excessively populous, and the formation of new colonies approaches, they demolish the gateways which had been erected in the hour of danger and which now restrain their impetuosity. Such safeguards have become inconvenient, and they are removed until new alarms demand their reconstruction. The entrances formed in 1804 were accordingly destroyed in spring 1805. The death's-head did not appear that season, nor was it seen in the year following, but it returned in great numbers in autumn 1807. By speedily barricading themselves, the bees prevented their threatened ravages; but, before the departure of the swarms in May 1808, they demolished the fortifications, whose narrow passages prohibited free egress to the multitude.'*

These proceedings are not more surprising than the defence contrived, according to Bruce, by the rhinoceros and elephant, against the attacks of a fly named Isaltaya, which though not larger than a common bee is more terrible to them than the lion himself. This fly is said to have no sting, but insinuates its sucker (*haustellum*) through the thickest hide; and the effects are such that the part not only rises in a blister, but frequently mortifies, and in the end destroys the animal. To prevent this they roll themselves about in the mud till their bodies are covered with it, and when this coating becomes dry it affords them an effectual protection.

Proceedings of this kind may well be credited, since we have instances daily under our eyes of no

* Huber on Bees, p. 311.

less extraordinary displays of prospective contrivance. But we cannot extend the same belief to the ancient tale of a community of swallows uniting their efforts to throw up an embankment for the purpose of opposing the inundation of the Nile? The following is Pliny's account of this marvellous masonry. 'In the mouth of Nilus, near Heraclea in Ægypt, there is a mightie banke or causey, raised only of a continuall ranke and course of swallowe's nests, piled one upon and by another thicke, for the length almost of halfe a quarter of a mile; which is so firme and strong that being opposed against the inundations of Nilus, it is able to breake the force of that river when it swelleth, and is it selfe inexpugnable: a peece of work that no man is able to turne his hand unto. In the same Ægypt, neere unto the town Coptoo, there is an iland, consecrated unto the goddess Isis, which every yeare these swallowes doe rampier and fortifie for feare least the same Nilus should eat the bankes thereof and breake over into it. In the beginning of the spring, for three nights together, they bring to the cape of that iland, straw, chaffe, and such like stuffe, to strengthen the front thereof; and for the time, they plie their businesse so hard, that for certaine, it is knowne, many of them have died with taking such paines and moiling about this worke. And verily every yeare they goe as daily to this taske againe, as the spring is sure to come about; and they faile not, no more than souldiers, that by vertue of their militaire oth and obligation, goe forth to service and warfare.'*

The origin of this legendary story may, we imagine, be readily traced to the proceedings of the bank-swallows, described in a preceding page, whose numerous burrowings in the sand seem to have led the inaccurate observers in ancient times to give

* Plinie's Nat. Hist. by Ph. Hollande, p. 288.

them the credit of actually building the bank into which they had only mined. This explanation is farther confirmed by what is said of their carrying 'strawe, chaffe, and such like stuffe,' not, however, 'to strengthen the front thereof,' but to prepare a bed warmer for their eggs and softer for their young, than the bare sand afforded. Neither does it impair this explanation, that Pliny introduces in the same page a separate account of the bank-swallows themselves; for he speaks not from his personal knowledge, and only relates what he had learned from the testimony of others, — obtaining from one source the marvellous legend of the embankment, and from another the more simple and genuine account of the holes mined into the bank. Belon, however, who had been in Egypt, and was expressly devoted to the study of birds, thinks that Pliny must have meant the chimney-swallow (*Hirundo rustica*), but he does not say that he saw any thing of the embankment.* Aldrovand† and Montbeillard think, on the other hand, that Pliny refers to the window-swallow (*Hirundo urbica*), 'the temple-haunting-martlet' of Shakspeare, which is frequently observed to nestle on rocks‡ and crags of precipices that overhang lakes.§ Pennant says, he has seen them build in cliffs overhanging the seas.‖ We are acquainted with one locality where the latter builds in this manner — at the beautifully romantic dell of Howford, near Catrine in Ayrshire, where the river Ayr winds among wooded and overhanging rocks from one to three hundred feet above its channel. But here these nests are scattered singly among the cliffs, and not crowded together. In this country, at least, the species is only sub-gregarious; parties of some three, four, or half a dozen, selecting the same

* L'Histoire des Oyseaux, p. 381. † Ornithologia, ii, 297.
‡ Hebert in Montbeillard, Ois. x, 490.
§ Gesner, Aves. 565. ‖ Brit. Zool. ii, 248.

window or several windows on the same frontage. The greatest number we ever saw was about fifty nests, arranged in a contiguous line under the north eave of some stables at Compton House, Wiltshire.* This is not the case, however, with an American species of which Charles Bonaparte has given an interesting history.

The cliff-swallow (*Hirundo fulva*, VIEILLOT) is strikingly characterized by having an even and not a forked tail, like its congeners. Instead of a white rump, also, like our window-swallow, it has an iron-brown one, and the same colour, but of a darker shade, under the chin, where our chimney-swallow is red. The upper part of the body, however, has the same glossy violet-black, and the wings the same deep brown as the former. 'This active little bird,' says Bonaparte,† 'is, like its congeners, almost continually on the wing, and feeds on flies and other insects while performing its aërial evolutions. Its note is different from that of other swallows, and may be well imitated by rubbing a moistened cork around the neck of a bottle. The species arrive in the west, from the south, early in April, and immediately begin to construct their symmetrical nests, which are perfected by their united and industrious efforts. At the dawn of day they commence their labours by collecting the necessary mud from the borders of the rivers and ponds adjacent, and they persevere in their work until near mid-day, when they relinquish it for some hours, and amuse themselves by sporting in the air, pursuing insects, &c. As soon as the nest acquires the requisite firmness, it is completed, and the female begins to deposit her eggs, — four in number, which are white spotted with dusky brown. The nests are extremely friable, and will readily crumble to pieces; they are assembled in

* J. R. † See Bonaparte's Birds.

communities, as represented in the engraving. In unsettled countries, these birds select a sheltered situation, under a projecting ledge of rock; but in civilized districts, they have already evinced a predilection for the abodes of man, by building against the walls of houses, immediately under the eaves of the roof, though they have not in the least changed their style of architecture. A nest from the latter situation is now before me: it is hemispherical, five inches wide at its truncated place of attachment to the wall, from which it projects six inches, and consists exclusively of a mixture of sand and clay, lined on the inside with straw and dried grass, negligently disposed for the reception of the eggs. The whole external surface is roughened by the projection of the various little pellets of earth which compose the substance. The entrance is near the top, rounded, projecting, and turning downwards, so that the nest may be compared to a chemist's retort, flattened on the side applied to the wall, and with the principal part of the neck broken off. So great is the industry

Nests of the Cliff-swallow (Hirundo fulva, Vieillot).

of these interesting little architects, that this massive and commodious structure is sometimes completed in the course of three days.'*

According to the theory that men acquired their first notions of architecture from birds, we are told that Doxius, the inventor of clay houses, took the hint from swallows ;† and Aristotle thinks there is more ingenuity displayed in the construction of these nests than in some of the greater efforts of human intelligence.‡ We cannot, however, give the swallows the credit of one feat of contrivance, which we find echoed from one author to another, from Pliny, Plutarch, and St Basil, down to the Abbé de la Pluche and Mrs Charlotte Smith. 'It is curious,' says the latter, as if from personal remark, 'to observe them dipping their breasts swiftly into pools, and then immediately resorting to their nests to temper the mortar with the moisture.'§ 'I have frequently seen from my window,' says the Abbé, 'the swallow either beginning or repairing her nest, which is a structure entirely different from all others. She wants neither wood, nor hay, nor bands, but knows how to make a kind of plaster, or rather cement, with which she erects a dwelling equally secure and convenient for herself and all her family. She has no vessels to receive the water she uses, nor a barrow to convey her sand, nor a shovel to mix her mortar ; but I have seen her pass and repass over the basin in the parterre : she raises her wings, and wets her breast on the surface of the water, after which she sheds the dew over the dust, and then tempers and works it up with her bill.'‖ Goldsmith also says, 'the nest is built with mud from some neighbouring brook, well tempered

* Bonaparte, Amer. Ornith. i, 67.
† Plinii Hist. Nat. vii, c. 56.
‡ Hist. Animal. ix, c. 7. § Nat. Hist. of Birds, ii, 96.
‖ Spectacle de la Nature, i, 162.

with the bill moistened with water for the better adhesion.'* The ancient account of the swallow's nest, given by Pliny, runs thus : ' Surely in no one thing is the wit of sillie birds more admirable. The Swallows frame their nests of clay and earth, but they strengthen and make them fast with straw. In case at any time they cannot meet with soft and tough clay, for want thereof they drench and wet their feathers with good store of water, and then bestrew them over with dust.'†

However plausible these several modes of making building-mortar may appear, we have no hesitation in pronouncing them to be altogether fabulous. Swallows, we admit, may be frequently seen both drinking and washing on the wing, and also collecting mud from cart-ruts and other places. But they never carry water in their bills, or on their feathers. They are incapable of performing either operation ; for they want the necessary muscles to carry water in their mouths, as we can do, and whatever water might adhere to their feathers would be instantly shaken off in flying, for, according to our observations, it runs off from them as it does from the feathers of ducks and other water-fowl. Besides, their inability to find materials sufficiently moist is a supposition altogether improbable, with respect to a bird of such powerful wing, whose flight is so excursive, and usually in the vicinity of water.

That some liquid is requisite, however, to make their mortar more adhesive, will be evident to any person who will take the trouble of picking up a little mud from the same place where the swallows collect it, and endeavour to make it adhere to a wall as they do their nests. We have more than once tried such an experiment without success. We have further ascertained, by examining nests during the pro-

* Animated Nature, iii, 233. † Holland's Plinie, p. 288.

cess of building, that the portion of clay just added is considerably more moist than that of the ruts from which it has been taken. The natural conclusion is that the swallows employ some salivary fluid besides the water which may be in the mud. That this is the fact, and not a fancy, we shall find numerous occasions to prove as we proceed. That the bird moistens the clay with saliva is confirmed by anatomical examination, the presence of large salivary glands being shown upon dissection.

M. Montbeillard, in his elaborate and otherwise excellent account of the window-swallow's nest, has fallen into mistake from not being aware of this circumstance. 'The nest,' he says, 'which I observed in the month of September, and which had been broken off from a window, was composed externally of earth, particularly the soft mould thrown up in the morning by worms in new-delved borders.'* Now, looking at the outside of one of these curious nests, we are not surprised that the ingenious naturalist should have fancied it thus composed; for the process by which it is constructed is precisely similar to that pursued by the worms. The swallow not requiring to have the outside of her nest smooth and neat, like the interior plastering of the thrush, only rough-casts it, as our workmen say, by daubing in the little pellets of clay as she brings them, rounded and moistened with saliva; and of course, when these dry, the external wall of the nest appears as if it were composed of worm-casts, though no swallow, we are well persuaded, has ever been seen collecting these for her building materials, as Montbeillard conjectures.

It may be interesting, by way of illustration, to advert for a moment to the masonry of these worms, — particularly as it seems not to have been

* Oiseaux, viii, 490.

hitherto understood. According to White, they are 'great promoters of vegetation, which would proceed but lamely without them, by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves and twigs into it; and, most of all, by throwing up such infinite numbers of lumps of earth called worm-casts, which, being their excrement, is a fine manure for grain and grass.' He adds, 'earth-worms make their casts most in mild weather, about March and April.'* The fact is, that the casts are not their excrements, but a sort of masonry, somewhat rude, indeed, but not the less efficient in protecting their burrows both from too much rain, which would destroy them, and from the intrusion of enemies, (*Carabidæ, Staphylinidæ, &c.*) The reason that they are most observed in spring, seems to us to arise from their anxiety to protect their eggs, which are then deposited, as well as from the scarcity at this period of leaves and other vegetable refuse. They always prefer some vegetable matter for the closure of their hole when it can be obtained, because when it has arrived at a certain stage of decay it forms their choicest dainty; and hence it is that they become so destructive in gardens to seedling and pricked out plants by unrooting them and dragging them into their holes. But they are not contented with a leaf, a blade of grass, a straw, or a fallen blossom, till they have first constructed an out-work of clay into which these may be fitted.

By cautiously removing the leaf door and the clay out-work of an earth-worm's hole, we have repeatedly seen it reconstructed. The worm, in such cases, perceiving from the free entrance of air and

* Nat. Hist. of Selborne, i, 14, 279. See also Knapp, Journ. of a Naturalist, p. 330, 1st edit. — p. 343, 4th edit.

light that the barricade is gone, advances (not without manifesting some fears of danger) to the threshold, and soon sets about repairing the damage. For this purpose, it sucks a few grains of earth into its mouth, moistens it as the swallow does with saliva, and, using its broad tongue for a trowel, plasters it round the mouth of the hole, smoothing it very neatly on the inside, but leaving it rough without like the swallow's nest. When it has built this clay vestibule to its mind, it next searches about at greater distance for a leaf or a stone, and if it do not find one it is forced to complete the closure with hay. In the same way we have observed that a marine species (*Lumbricus marinus*, Linn.) which lives in the sands within the tide mark, being no less afraid of drought than the earth-worm is of rain (both dislike light), constructs a similar outwork of agglutinated sand over its hole every time the tide ebbs.*

It is very rarely that the observations of the ingenious naturalist of Selborne require correction. We can testify to the minute accuracy of his excellent description of the building process of the window-swallow, or martin (*Hirundo urbica*). 'About the middle of May,' he says, 'if the weather be fine, the martin begins to think in earnest of providing a mansion for its family. The crust or shell of this nest seems to be formed of such dirt or loam as comes most readily to hand, and is tempered and wrought together with little bits of broken straws to render it tough and tenacious. As this bird often builds against a perpendicular wall without any projecting ledge under, it requires its utmost efforts to get the first foundation firmly fixed, so that it may safely carry the superstructure. On this occasion, the bird not only clings with its claws, but partly supports itself by strongly inclining its tail against the wall,

* J. R.

making that a fulcrum; and thus steadied, it works and plasters the materials into the face of the brick or stone. But then, that this work may not, while it is soft and green, pull itself down by its own weight, the provident architect has prudence and forbearance enough not to advance her work too fast; but by building only in the morning, and by dedicating the rest of the day to food and amusement, gives it sufficient time to dry and harden. About half an inch seems to be a sufficient layer for a day. Thus careful workmen, when they build mud-walls (informed at first perhaps by this little bird,) raise but a moderate layer at a time and then desist; lest the work should become top-heavy, and so be ruined by its own weight. By this method, in about ten or twelve days, is formed a hemispheric nest with a small aperture towards the top, strong, compact, and warm, and perfectly fitted for all the purposes for which it was intended.

'The shell or crust of the nest is a sort of rustic-work full of knobs and protuberances on the outside; nor is the inside of those that I have examined smoothed with any exactness at all; but is rendered soft and warm and fit for incubation, by a lining of small straws, grasses, and feathers; and sometimes by a bedding of moss interwoven with wool. They are often capricious in fixing on a nesting place, beginning many edifices and leaving them unfinished; but when once a nest is completed in a sheltered place, after so much labour is bestowed in erecting a mansion, as nature seldom works in vain, the same nest serves for several seasons. Those which breed in a ready finished house, get the start in hatching of those that build new by ten days or a fortnight. These industrious artificers are at their labours in the long days before four in the morning; when they fix their materials, they plaster them on with

their chins, moving their heads with a quick vibratory motion.

'It has been observed, that martins usually build to a north-east or north-west aspect, that the heat of the sun may not crack and destroy their nests; but instances are also remembered where they bred for many years in vast numbers in a hot stifled inn-yard, against a wall facing to the south. Birds in general are wise in their choice of situation; but in this neighbourhood, every summer, is seen a strong proof to the contrary at a house without eaves in an exposed district, where some martins build year by year in the corners of the windows. But as the corners of these windows (which face to the south-east and south-west) are too shallow, the nests are washed down every hard rain; and yet these birds drudge on to no purpose from summer to summer, without changing their aspect or house. It is a most piteous sight to see them labouring when half their nest is washed away.'*

The same circumstance has been recorded by Mr Knapp. 'I remember no bird,' says he, 'that seems to suffer so frequently from the peculiar structure of its nest, and, by reason of our common observance of its sufferings, obtains more of our pity than the house martin. The rook will at times have its nest torn from its airy site or have its eggs shaken from it by the gales of spring; but the poor martin, which places its earthy shed beneath the eave of the barn, the roof of the house, or the corner of the window, is more generally injured. July and August are the months in which these birds usually bring out their young; but one rainy day at this period, attended with wind, will often moisten the earth that composes the nest, the cement then fails, and all the unfledged young ones are dashed upon the ground;

* White's Selborne, i, 272.

and there are some places to which these poor birds are unfortunately partial, though their nests are annually washed down. The projecting thatch of the old farm house appears to be their safest asylum. The parent birds at times seem aware of the misfortune that awaits them; as, before the calamity, we observe them hovering with great anxiety about their nests.'*

An extraordinary circumstance respecting the masonry of swallows is mentioned by M. Montbeillard, who, after telling us that they carry the mortar both with their bills and feet, though they only use their bills in plastering, adds, that it often happens that several of them are seen labouring at the same nest. 'I have counted five,' he continues, 'standing within the same nest or clinging round it, without reckoning comers and goers, and the more numerous they are, the more expeditious the work.'† We think it is probable that M. Montbeillard was deceived in this; for though several of these nests may often be found near together, the birds are not always gregarious. When they are so, they never form a community in consequence of any other uniting interest than eligibility of situation. In the same way we often find what may be called a colony of the solitary bees, that is, numerous individual nests in the same post, or the same sandbank, without one offering to another either assistance or molestation.‡ The explanation, we think, of the statement of the French naturalist may be found in a circumstance mentioned by White, who tells us, that the young of the first brood of swallows, though shaken off and rejected by their nurses as soon as they are able to shift for themselves, do not quit their abodes altogether; but the more forward

* Journal of a Naturalist, p. 170; Note, 3d ed.
† Oiseaux,
‡ See Insect Transformations, chap. iii.

birds, getting away some days before the rest, approach the eaves and play before them, making people think that several old ones attend one nest.*

In a preceding page, we have remarked that the bank-swallow makes its hole circular by employing its bill as a central pivot, while it turns with its feet round the circumference. The mason-swallows, on the contrary, according to Frisch,† make the foot the centre of gyration, in forming their semicular nest. This, we may remark, can only be after they are so far advanced as to work on the outer crust, while they sit within; for, at the commmencement, while working on the outside and clinging to the wall below, they have no apparent central director, and must, we think, depend upon the eye, reserving any error for future amendment.

The swallow is a general favourite. He comes to us when nature is putting on her most smiling aspect, and he stays with us through the months of sunshine and gladness. 'The swallow,' says Sir H. Davy, 'is one of my favourite birds, and a rival of the nightingale; for he glads my sense of seeing, as much as the other does my sense of hearing. He is the joyous prophet of the year, the harbinger of the best season; he lives a life of enjoyment amongst the loveliest forms of nature; winter is unknown to him, and he leaves the green meadows of England in autumn, for the myrtle and orange groves of Italy, and for the palms of Africa.'‡

The sentiment is from Anacreon, and it is worthy of the joyousness of the old Grecian.

'Gentle bird! we find thee here
When Nature wears her summer vest;
Thou com'st to weave thy simple nest;

* White's Selborne, i, 270.
† Vorstellung der Vögel in Deutschland.
‡ Salmonia, p. 79, 1st edit.

And when the chilling winter lowers,
Again thou seekest the genial bowers
Of Memphis, or the shores of Nile,
Where sunny hours of verdure smile.'*

The places which the swallow loves are consecrated, too, by our great dramatic poet, in one of his most characteristic passages, in which, after the turmoil of dark passions, the mind is for a moment relieved by the contrast of pure feelings, clothed in the most exquisite language.

'This guest of summer,
The temple-haunting martlet, does approve
By his lov'd mansionry, that the heaven's breath
Swells wooingly here: no jetty, frieze, buttress,
Nor coign of vantage, but this bird hath made
His pendent bed, and procreant cradle: where they
Most breed and haunt, I have observed, the air
Is delicate.'†

But the attractions of poetry are not required to give a charm to the 'loved mansionry' of this delightful bird. The simple description of an Italian poet interprets the delight which its cheerful industry affords to an imaginative mind: —

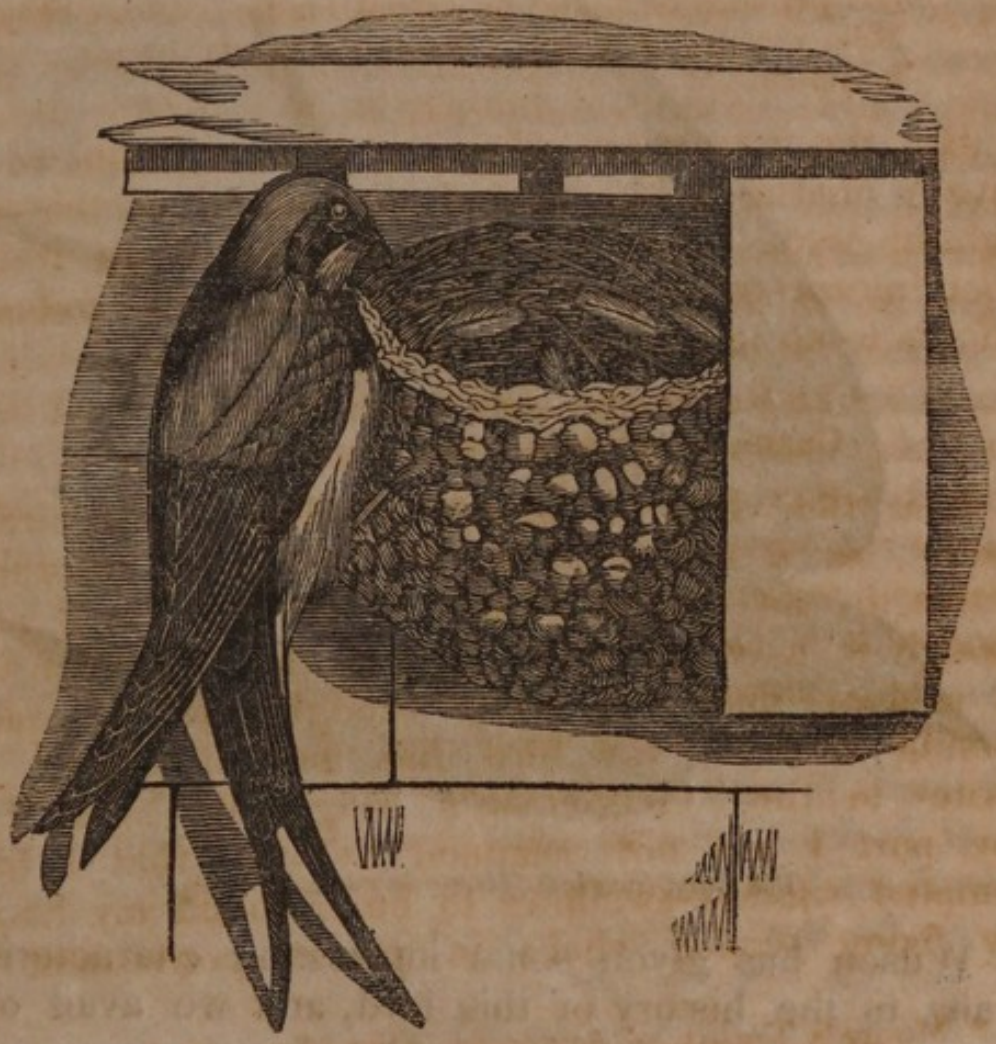
'La Rondinella, sopra il nido allegra,
Cantando salutava il nuovo giorno.'‡

It is the voice of innocent gladness; the bird is happy, as it seems to us, because it is constantly active in its proper duties. The swallow's nest, though it may appear to deform the trim mansion, is seldom disturbed, even though the old pious feeling towards the bird has passed away. A writer in the 'Gentleman's Magazine' says, 'for my part I am not ashamed to own, that I have tempted window-swallows to build round my house, by fixing scollop shells in places convenient for

* Moore's Transl. of Anacreon, Ode 12.
† Macbeth, Act I, scene 6.
‡ The swallow, joyful on its nest, singing salutes the new day.

their 'pendent beds and procreant cradles;' and have been much pleased in observing with what caution the little architect raises a buttress under each shell, before he ventures to form his nest on it.'

Some of the less poetical of our northern neighbours, however, it would appear, have a dislike to the window-swallow, and have even gone so far as to endeavour to banish it by preventing it from building. In this vein, we are instructed, by a recent periodical writer, how to discard them. It appears, he says, from experiments made at Granton, that if the places in the corners of windows and under eaves, where the swallows build, are well rubbed with oil and soft soap, they will not be able to make



The Window Swallow (Hirunda urbica).

their clay adhere to the wall, and being once foiled, they will not renew their attempt for some years afterwards.

The Anglo-Americans have many contrivances for enticing birds to build near their houses. Being peculiarly partial to the barn-swallow (*Hirundo rufa* GMELIN), they fix up boxes for it to nestle in.* This species is considerably different from our chimney-swallow (*H. rustica*), and is of a bright chestnut colour on the belly and vent, where ours is pure white; but it resembles it in its habits of nestling on the rafters or beams of sheds, barns, and other outhouses, though not in chimneys.

The Barn-Swallow (Hirundo rufa, Gmelin*).*

Wilson has given some interesting characteristic traits in the history of this bird, and we avail our-

* Bingley, Anim. Biog. iii, 369.

selves of so much of these as refer to our present subject. 'On the 16th of May,' says he, 'being on a shooting expedition on the top of Pocano mountain, Northampton, when the ice on that and on several successive mornings was more than a quarter of an inch thick, I observed with surprise a pair of these swallows which had taken up their abode on a miserable cabin there. It was about sunrise, the ground was white with hoar-frost, and the male was twittering on the roof by the side of his mate with great sprightliness. The man of the house told me, that a single pair came regularly there every season, and built their nest on a projecting beam under the eaves, about six or seven feet from the ground. At the bottom of the mountain, in a large barn belonging to the tavern there, I counted upwards of twenty nests, all seemingly occupied. In the woods they are never met with; but as you approach a farm they soon catch the eye, cutting their gambols in the air. Scarcely a barn, to which these birds can find access, is without them; and as public feeling is universally in their favour, they are seldom or never disturbed. The proprietor of the barn last mentioned, a German, assured me, that if a man permitted swallows to be shot, his cows would give bloody milk, and also, that no barn where swallows frequented, would ever be struck with lightning.

'Early in May,' continues Wilson, 'they begin to build. From the size and structure of the nest, it is nearly a week before it is completely finished. One of these nests, taken on the 21st of June from the rafter to which it was closely attached, is now lying before me. It is in the form of an inverted cone, with a perpendicular section cut off on that side by which it adhered to the wood. At the top, it has an extension of the edge or offset, for the male or female to sit on occasionally, as appeared by the

dung ; the upper diameter was about six inches by five, the height externally seven inches. This shell is formed of mud, mixed with fine hay, as plasterers do their mortar with hair, to make it adhere the better ; the mud seems to have been placed in regular strata or layers, from side to side; the hollow of this cone (the shell of which is about an inch in thickness) is filled with fine hay, well stuffed in ; above that is laid a handful of very large downy geese feathers. Though it is not uncommon for twenty and even thirty pair to build in the same barn, yet every thing seems to be conducted with great order and affection; all seems harmony among them, as if the interest of each were that of all. Several nests are often within a few inches of each other ; yet no appearance of discord or quarrelling takes place in this peaceful and affectionate community.'*

Aristotle must have meant a different species from either of our mason-swallows, when he remarked that they 'rarely build in houses;' for besides this being the locality which ours generally select, we have numerous instances in which the chimney-swallow (*H. rustica*) both built within houses and also made choice of the most singular parts of houses for its abode. On the authority of Sir John Trevelyan, Bart., we are told by Bewick, that at Camerton Hall, near Bath, a pair built their nest on the upper part of the frame of an old picture over the chimney, coming into the room through a broken pane in one of the windows. They came three years successively, and in all probability would have continued to do so if the room had not been put in repair, which prevented their access to it. Wilson was as much in error as Aristotle when he supposed that this species is distinguished from his barn-swallow by never building in barns and outhouses. In Scotland, on the contrary, we have observed that

* Wilson, Amer. Ornithology, v, 41.

these are its chosen haunts, and that it more rarely builds in chimneys than in England.* In Sweden it is the same, and hence it is called the Barn-swallow (*Ladu swala*); while in the south of Europe, where chimneys are rare, it builds in gateways, porches, and galleries, or against the rafters of outhouses, as in Virgil's time:

'——— Ante
Garrula quam tignis nidum suspendat hirundo.' †

In 1829, we observed about a dozen of these nests, suspended from the rafters of a large coach-house at the village of Hockheim, on the Maine.‡

When a chimney is selected, it seems to prefer one where there is a constant fire, most probably for the sake of warmth. 'Not,' remarks White, 'that it can subsist in the immediate shaft, where there is a fire, but prefers one adjoining to that of the kitchen, and disregards the perpetual smoke of that funnel, as I have often observed with some degree of wonder. Five or six or more feet down the chimney, does this little bird begin to form her nest about the middle of May, which consists, like that of the window-swallow, of a crust or shell composed of dirt or mud, mixed with short pieces of straw to render it tough and permanent; with this difference, that whereas the shell of the former is nearly hemispheric, that of the latter is open at the top, and like half a deep dish: this nest is lined with fine grasses and feathers, which are often collected as they float in the air. Wonderful is the address which this adroit bird shows all day long in ascending and descending with security through so narrow a pass. When hovering over the mouth of the funnel, the vibrations of her wings, acting on the confined air, occasion a rumbling like thunder. It is not improbable that the dam submits to this inconvenient situation, so low in the

* J. R. † Geor. iv, 306. ‡ J. R.

shaft, in order to secure her broods from rapacious birds, and particularly from owls, which frequently fall down chimneys, perhaps in attempting to get at these nestlings.'*

It might not be readily supposed that a bird, thus building in an elevated chimney, would have thought of going under ground for a nestling place; yet Mr White remarks, that he has known a swallow build down the shaft of an old well, through which chalk had been formerly drawn up for the purpose of manure. To us this is not at all remarkable ; for we have seen them very commonly build in the shafts of coal-pits, such as at Sorn, in Ayrshire; Quarreltown, Renfrewshire ; and Musselburgh, near Edinburgh. What was more singular, they did not seem deterred by the continual passing and repassing of the workmen, who consider it unlucky to injure the birds; and though they might, for the most part, find a sufficient number of old abandoned shafts, they do not appear to have any peculiar preference for these.†

The window-swallow is no less celebrated than the chimney-swallow, for selecting singular situations. M. Hebert saw a pair build on the spring of a bell, the bottom of the nest resting on the spring, while the upper semicircular brim leaned against the wall by its two ends, three or four inches below the eave. The two birds, during the time they were employed in the construction, passed the nights on the iron spike to which the spring was fastened. The frequent concussion given by the spring could not fail to disturb the action of nature in the development of the young, and the hatch, accordingly, did not succeed; yet would not the pair forsake their tottering mansion, but continued to inhabit it for the rest of the season. The semicircular form, which on this occasion was given

* Nat. Hist. of Selborne, i, 286. † J. R.

to the nest, proves that these birds can, upon occasion, change the usual arrangement of their architecture.

Another pair, mentioned by Bingley, built for two successive seasons on the handles of a pair of garden-shears, which had been stuck up against the boards in an out-house. A still more singular instance is recorded of another pair, which built their nest on the wings and body of a dead owl, hung up on the rafter of a barn, and so loose as to be moved by every gust of wind. This owl, with the nest on its wings, and the eggs in the nest, was brought as a curiosity to the museum of Sir Ashton Lever, who, struck with the oddity of the thing, desired a large shell to be fixed up where the owl had hung; and the following season a nest, as had been anticipated, was built there, and was transmitted to the Leverian Museum as a companion to the owl.*

The chimney-swallow differs from the window-swallow, according to Montbeillard, in not occupying the same nest more than one season, building annually a new nest, and, if the spot admits it, fixing it above that occupied the preceding year. 'I have found them,' says he, 'in the shaft of a chimney, thus ranged in tiers, and have counted four, one above another, and all of equal size, plastered with mud mixed with straw and hair. There were some of two different sizes and shapes, — the largest resembled a shallow half-cylinder, open above, a foot in height, and attached to the sides of the chimney; the smallest were stuck in the corners of the chimney, forming only a fourth of a cylinder, or almost an inverted cone. The first nest, which was the lowest, had the same texture at the bottom as at the sides; but the two upper tiers were separated from the lower by their lining only, which consisted of straw, dry herbs,

* Anim. Biog. iii, 363.

and feathers. Of the small nests, built in the corners, I could find only two in tiers, and I inferred that they were the property of young pairs, as they were not so compactly built as the larger ones.'*

The ingenious masonry of the swallows, which we have thus described from competent authorities, is very similar to that of some of the mason-bees (*Megachile muraria, &c*); but the bees, though they sometimes mix stones with their clay, never, so far as we know, chop up straw and hay, like the swallows, in order to strengthen their fabric, probably because their salivary cement is a more efficient binder. A mason-bee also makes a separate nest, smoothly polished within, for every egg she deposits, and covers it in with a coping of masonry; but the swallow leaves her clay wall rough on the inside, because the soft bedding which she afterwards lays there would render it a waste of time to be very nice. Moreover, as the female bee always dies before her eggs are hatched, she requires to be more careful in providing for their security than the swallows, who affectionately take care of their offspring till they can forage for themselves.†

* Montbeillard, Oiseaux.

† See Insect Architecture, p. 34, &c.

Chapter VI.

Mason-Birds, continued. — The Flamingo. Crested Penguin. Song-Thrush.

A remarkable contrast to the snug little clay nest of the swallow, is presented by the massive Egyptian-like edifice of a very singular bird, who builds, however, with somewhat similar materials, — the flamingo, or crimson-wing, of the ancients (*Phœnicopterus ruber*, Linn.) The increase of population seems to have partly banished this species, with many other birds, from the shores of Europe to the less frequented waters of America and Africa,* where it may be seen, as Campbell describes it,

'Disporting like a meteor on the lakes.'†

Roberts, a traveller who viewed the bird through a plain prosaic medium, compares a line of them to a brick wall, for which, he says, their colour and attitude may cause them to be taken.‡ Indeed the appearance of this bird has led to many misconceptions. During the French revolutionary war, when the English were expected to make a descent upon St Domingo, a Negro having perceived, at the distance of some miles, in the direction of the sea, a long file of flamingoes, ranked up and preening their wings, — forthwith magnified them into an army of English soldiers: their long necks were mistaken

* Temminck is doubtful whether the American flamingo is the same species with that of Europe. Manuel d'Ornith, ii, 587.

† Gertrude of Wyoming, i, 3.

‡ Hist. Générale des Voyages, xi, 364.

for shouldered muskets, and their scarlet plumage had suggested the idea of a military costume. The poor fellow accordingly started off to Gonaïves, running through the streets and vociferating that the English were come. Upon this alarm the commandant of the garrison instantly sounded the tocsin, doubled the guards, and sent out a body of men to reconnoitre the invaders; but he soon found, by means of his glass, that it was only a troop of red flamingoes, and the corps of observation marched back to the garrison, rejoicing at their bloodless expedition.* Somewhat similar mistakes have occurred in military operations. It is said that the French were prevented, during the late war, from landing on the coast of Ireland, by the gathering of the women on the hills, in their red market-cloaks; and the land-crabs of Jamaica, by the clattering they made in a night excursion, once alarmed a party of English soldiers, who supposed them to be a troop of Maroons.† During the Mexican invasion by Cortes, a similar mistake occurred; fire-flies being mistaken for an army of matchlock men.

The great length of the legs of flamingoes obviously unfits them for sitting or squatting upon a flat or low nest, as is the practice of the families allied to them; — and hence, according to Linnæus, they select for their nests some projecting shelf of a rock, upon which they can sit astride, like a man on horseback, without bending their legs. Without discrediting this account, we subjoin that which Dampier gives of the flamingoes observed by him at Rio de la Hacha, at an island opposite Curaçoa, and at the Isle of Sal. 'They make their nests,' he says, 'in the marshes, where they find plenty of slime, which they heap with their

* Descourtilz, Voy. d'un Naturaliste, ii, 218.
† Dallas, Hist. of the Maroon War.

claws, and form hillocks, resembling little islets, and which appear a foot and a half above the water. They make the base broad, and taper the structure gradually to the top, where they leave a small hollow to receive their eggs When they lay or hatch, they stand erect, not on the top, but very near it, their feet on the ground and in the water, leaning them-

The Flamingo (Phœnicopterus ruber, Linn.) *The Female is represented in the background on the nest.*

selves against the hillock, and covering the nest with their tail. Their eggs are very long, and as they make their nest on the ground, they could not, without injuring their eggs or their young, have their legs in the nest, nor sit, nor support their whole body, but for this wonderful instinct which nature has given them.'*

A similar account is furnished by Catesby, who compares the flamingo, sitting across its nest, to a man on a desk-stool, with his legs hanging down.† Labat, who found these birds breeding in multitudes on the coasts of Cuba and of the Bahama Islands, on the deluged shores and low islets, says, 'I was shown a great number of these nests; they resembled truncated cones, composed of fat earth, about eighteen or twenty inches high, and as much in diameter at the base. They are always in the water; that is, in meres or marshes. Their cones are solid to the height of the water, and then hollow, like a pot, baned at top; in this they lay two eggs, which they hatch by resting on them, and covering the hole with their tail. I broke some, but found neither feathers nor herbs, nor anything that might receive the eggs: the bottom is somewhat concave, and the sides are very even.' M. Descourtilz represents the standing position of the female, while hatching, as so fatiguing that the male is under the necessity of relieving her, though he does so with great reluctance and when he has no longer the heart to refuse her importunate cries.‡ This is probably little more than the fancy of the naturalist's.

The only other bird which appears to make a similar structure to the flamingo is the crested penguin, or hopping wauchot (*Aptenodytes chrysocome*, Linn.) This species, which is smaller than its con-

* Dampier's Voy., i, 70.
† Catesby, Carolina, i, 74.
‡ Voy. d'un Naturaliste, ii, 279.

geners, is distinguished from them by its liveliness in hopping about, as well as by a tuft of gold-coloured feathers shorter than those of the egrets, and by a similar set of feathers which resemble eyebrows.* These birds are said, by Penrose, to resort to certain places in the Falkland Islands in incredible numbers, and the places, which by their long residence have been entirely stripped of grass, he denominates *towns*. Their nests are composed of mud, raised into hillocks, about a foot high, and placed close to each other. 'Here,' says Penrose, 'during the breeding season, we were presented with a sight that conveyed a most dreary and, I may say, awful idea of the desertion of the islands by the human species. A general stillness prevailed in these penguin *towns*, and whenever we took our walks among them, in order to provide ourselves with eggs, we were regarded, indeed, with side-long glances, but we carried no terror with us.'† It may be remarked, however, that Bougainville represents these birds as breeding on high rocks; and others in holes dug by their bills, while the earth is thrown back with their feet. These discrepancies arise no doubt from confounding one species with another.

We are not acquainted with any nest similar to those of the flamingo and crested penguin, except that of a creature whose form certainly gives no indication of its talents for masonry — we mean the American crocodile or alligator (*Lacerta alligator*, Linn.) Bartram has given so interesting an account of these, that we shall make no apology for introducing it by way of illustration. 'Keeping close along shore,' says he, 'on turning a point or projection of the river bank, at once I beheld a great number of hillocks or small pyramids, resembling hay-cocks, ranged

* Bougainville, voy., p. 64-5.

† Penrose, Exped. to the Falkland Islands in 1772.

like an encampment along the banks. They stood fifteen or twenty yards distant from the water, on a high marsh about four feet perpendicular above the water. I knew them to be the nests of the crocodile, having had a description of them before, and now expected a furious and general attack, as I saw several large crocodiles swimming abreast of the buildings. These nests being so great a curiosity to me, I was determined at all events immediately to land and examine them. Accordingly, I ran my bark on shore at one of their landing places, which was a sort of nick or little dock from which ascended a sloping path or road up to the edge of the meadow where their nests were; most of them were deserted, and the great whitish egg-shells lay broken and scattered upon the ground round about them. The nests or hillocks are of the form of an obtuse cone, four feet high and four or five feet in diameter at their bases; they are constructed with mud, grass, and herbage. At first they lay a floor of this kind of tempered mortar on the ground, upon which they deposit a layer of eggs, and upon this a stratum of mortar seven or eight inches in thickness, and then another layer of eggs; and in this manner, one stratum upon another, nearly to the top. I believe they commonly lay from one to two hundred eggs in a nest. These are hatched, I suppose, by the heat of the sun; and perhaps the vegetable substances mixed with the earth, being acted upon by the sun, may cause a small degree of fermentation, and so increase the heat in those hillocks.'*

A later writer, M. Descourtilz, while he denies the employment of vegetable substances in the nest, and proves the number of eggs, to be exactly twenty-eight, adds the interesting fact that the mother alligator slopes the top of the nest in order to let the rain run

* Bartram's Travels, p. 125, edit. London, 1794.

off, — and that the earth immediately around each egg is cemented with a sort of enveloping gluten.*

It will not be necessary here to do more than allude to the partial masonry of the magpie (*Pica caudata*, Ray), as it will afterwards be described under a subsequent division of our subject. But there is one of this kind of nests, whose construction is so ingenious that we shall minutely examine it. We allude to the nest of the song-thrush (*Turdus musicus*); for though it must be familiar to most of our readers, they may not have considered all the interesting points in which it may be viewed. In books of natural history it has often been strangely misrepresented, or passed over in silence as unworthy of notice. The most fanciful account is given by Aldrovand. 'Although,' says he, 'the industry of the swallow in fabricating her nest has been the most highly praised by all, the thrush, nevertheless, appears to excel her; for if the philosopher (Aristotle) write truly (and I have not myself seen the nest), it is built with clay, like that of the swallow, upon lofty trees, in such a manner, that, by successively continuing the work, it appears like a chain of nests. What is still more marvellous, in the same manner as swallows can make their nests upon beams and similar substances, thrushes fix theirs to the branches of trees, which are both round and are shaken by the wind. According to Pliny, "they nestle in the tops of trees, building with clay, so near as if they were linked together."'† The original passage in Aristotle, we find, runs thus: — 'Thrushes (κιχλαι) form their nests from mud, in the same manner as swallows, in lofty trees, and they frame them in such successive connexion with each other as to resemble from their continuity a chain of nests.'‡

* Voyages d'un Naturaliste, iii, 52. † Ornithologia, ii, 217.
‡ Aristotle, Hist. of Animals, by T. Taylor, p. 202.

Our more modern writers, though not so fanciful as to suppose that thrushes build a chain of nests, or that they fasten these by means of clay to the smooth, round, top branch of a tree, are far from correct in their description of them. Buffon, after telling us justly that 'they cover the outside with moss, straw, dried leaves, &c, but they line the inside with a hard case,' adds, most erroneously, 'formed of mud, compacted with straws and small roots.'* Bewick, no less incorrectly, says, the nest 'is composed of dried grass, with a little earth or clay intermixed, and lined with rotten wood;'† while Fleming‡ and Knapp confound it with the nest of the blackbird, which is very different, and the latter says the lining is of 'loam.'§ Syme says it 'is composed of twigs, bent, moss, and grass; the inside neatly plastered with clay.'‖ Temminck, as if aware of these discrepancies, omits all mention of the subject.

Dr Turner and Colonel Montagu are the first modern authors we have met with, who, speaking from their own observation, have not fallen into error; and their account is followed by Atkinson, and, in part, corresponds with that of Jennings. Turner says, the thrush 'forms her nest in the branches of trees or shrubs, on the outside of moss, and on the inside with clay or rotten wood mixed with some fluid, and artificially smoothed.'¶ Jennings says, the nest 'is exteriorly composed of green or other moss and a few straws; interiorly it is plastered all over with some paste, apparently composed of rotten wood with something to cement it; it is generally of a light buff colour. When dry it is quite hard, so that the

* Oiseaux, iii, 289. † Brit. Birds, i, 115.
‡ Brit. Anim. p. 65. § Jour. of a Nat. p. 170.
‖ Brit. Song Birds, p. 49.
¶ Avium Præcip. Hist. Turdus tertius.

eggs, if moved, rattle in the nest. The statement in many of our books of natural history, that it is lined with clay, is, as far as my experience goes, founded in mistake.'* Again, says Mr Jennings, 'although I am not prepared to deny that, sometimes and in some places, the nest of the song-thrush might be plastered within with cow-dung, yet I do strongly suspect that no clay enters, even as a cement, into the composition of the plaster, and I am led to this conclusion chiefly by the lightness of the nest.'†

In the latter conclusion, Mr Jennings is unquestionably right, as he is with respect to the rotten wood, which forms only the interior coating, and in a considerable number of these nests which we have cut up in order to ascertain their composition, is little thicker than writing paper;—the layer in contact with the rotten wood was decidedly composed of dung. But no writer which we have met with has taken notice of the singular ingenuity of the workmanship. The interior of these nests is about the form and size of a large breakfast tea-cup, being as uniformly rounded, and, though not polished, almost as smooth. For this little cut the parent birds lay a massive foundation of moss, chiefly the proliferous and the fern-leaved feather moss (*Hypnum proliferum* and *H. filicinum*), or any other which is sufficiently tufted. As the structure advances, the tufts of moss are brought into a rounded wall by means of grass stems, wheat-straw, or roots, which are twined with it and with one another up to the brim of the cup, where a thicker band of the same materials is hooped round like the mouth of a basket. The rounded form of this frame-work is produced by the bird measuring it, at every step of the process, with its body, particularly the part extending from the thigh to the chin; and when any of the straws or

* Ornithologia, p. 19, note. † Mag. of Nat. Hist, ii, 111.

other materials will not readily conform to this gauge, they are carefully glued into their proper place by means of saliva, — a circumstance which may be seen in many parts of the same nest if carefully examined. When the shell, or frame, as it may be called, is completed in this manner, the bird begins the interior masonry by spreading pellets of horse or cow dung on the basket-work of moss and straw, beginning at the bottom, which is intended to be the thickest, and proceeding gradually from the central point. This material, however, is too dry to adhere of itself with sufficient firmness to the moss, and on this account it is always laid on with the saliva of the bird as a cement ; yet it must require no little patience in the little architect to lay it on so very smoothly with no other implement besides its narrow pointed bill. It would indeed puzzle any of our best workmen to work so uniformly smooth with such a tool ; but from the frame being nicely prepared, and by using only small pellets at a time, which are spread out with the upper part of the bill, the work is rendered somewhat easier.

This wall being finished, the birds employ for the inner coating little short slips of rotten wood, chiefly that of the willow ; and these are firmly glued on with the same salivary cement, while they are bruised flat at the same time so as to correspond with the smoothness of the surface over which they are laid. This final coating, however, is seldom extended so high as the first, and neither of them are carried quite to the brim of the nest, the birds thinking it enough to bring their masonry near to the twisted band of grass, which forms the mouth. The whole wall, when finished, is not much thicker than pasteboard, and though hard, tough, and water-tight, is more warm and comfortable than at first view might appear, and admirably calculated for pro-

tecting the eggs or young from the bleak winds which prevail in the early part of the spring, when the song-thrush breeds.

Nest of the Song-thrush (Turdus musicus).

The song-thrush usually builds in a thick bush, hawthorn, holly, silver-fir, furze, ivied tree, or sometimes in a dead fence, where the grass grows high; but it has occasionally been known to nestle within out-buildings. We saw one, during the spring of 1829, in a garden summer-house at Southend, Lewisham; and another is mentioned in the Magazine of Natural History, as having been built upon a harrow. A mill-wright 'had been making a threshing-machine for a farmer in the neighbour-

hood of Pitlessie, in Fife, and had three of his men along with him. They wrought in a cart-shed, which they had used for some time as their workshop; and one morning they observed a mavis (thrush) enter the wide door of the shed, over their heads, and fly out again after a short while; and this she did two or three times, until their curiosity was excited to watch the motions of the birds more narrowly; for they began to suspect that the male and female were both implicated in this issue and entry. Upon the joists of the shed were placed, along with some timber for agricultural purposes and old implements, two small harrows, used for grass-seeds, laid one above the other; and they were soon aware that their new companions were employed with all the diligence of their kind in making their nest in this singular situation. They had built it, he said, between one of the butts of the harrow and the adjoining tooth; and by that time, about seven o'clock, and an hour after he and his lads had commenced their work, the birds had made such progress, that they must have begun by the break of day. Of course, he did not fail to remark the future proceedings of his new friends. Their activity was incessant; and he noticed that they began to carry mortar (he said), which he and his companions well knew was for plastering the inside. Late in the same afternoon, and at six o'clock next morning, when the lads and he entered the shed, the first thing they did was to look at the mavis's nest, which they were surprised to find occupied by one of the birds, while the other plied its unwearied toil. At last the sitting bird, or hen, as they now called her, left the nest likewise; and he ordered one of the apprentices to climb the baulks, who called out that she had laid an egg; and this she had been compelled to do some time before the nest was finished; only plastering the

bottom, which could not have been done so well afterwards. When all was finished, the cock took his share in the hatching; but he did not sit so long as the hen, and he often fed her while she was upon the nest. In thirteen days the young birds were out of the shells, which the old ones always carried off.'*

Grahame gives, as usual, a very exact account of the localities chosen by the song-thrush, though he is wrong in thinking the nest lined with loam.

'In the hazel bush or sloe is formed
The habitation of the wedded pair,
Sometimes below the never-fading leaves
Of ivy-close, that overtwisting binds,
And richly crowns, with clustered fruit of spring,
Some river rock, or nodding castle wall;
Sometimes beneath the jutting root of elm,
Or oak, among the sprigs, that overhang
A pebble chiding stream, the *loam-lined* house
Is fixed, well hid from ken of hovering hawk,
Or lurking beast, or school-boy's prowling eye.'†

Syme, on the other hand, says, the thrush 'displays little ingenuity in concealing its nest; it is therefore easily found, and thence becomes an easy prey to boys, cats, and weasels. Both male and female are employed in constructing the nest, which is placed in a hedge or bush pretty near the ground. We have found them in hedges, thorn-bushes, and amongst the under branches of spruce and silver firs. These last conceal it, for the branches must be lifted up or put aside before the nest can be discovered; but in hedges it is easily seen, as instinct compels the bird to build so early in spring, that the foliage has not time to conceal it.'‡

The blackbird (*Merula vulgaris*, Ray), the wood-robin of America (*T. migratorius*), the purple grakle (*Quiscalus versicolor*, Bonap.), the pewit fly-catcher

* Vol. iii, p. 238. † Birds of Scotland, p. 40.
‡ Brit. Song Birds, p. 50.

(*Muscicapa nunciola*), and a few others, employ a portion of masonry either on the outside or in the middle of their nests; but the material used being chiefly mud, or clay, the workmanship is rude and unfinished when compared with the neat execution of the song-thrush. In the case of the blackbird, the outer frame-work differs little from that of the song-thrush, except perhaps in being more massive, as is also the clay lining, which is put on in a very wet state, probably to save the saliva of the bird. But to prevent this moisture from injuring the eggs, it is lined with a thick bedding of dry hay, which in some nests is very neatly worked into the hollow formed by the clay, while in others it is laid less skilfully, and hence renders the nest very shallow. Syme is wrong, therefore, in saying the nest is

Nest of the Blackbird (Merula vulgaris, Ray).

of nearly the same materials with that of the song-thrush. In two of the nests in our possession, the masonry of the clay is carried round the branch of the bush where they were built, in order to make it fast; which circumstance, as it is not of usual occurrence, shows that the little architect was guided by intelligence akin to rationality, and not by what is usually understood by blind instinct.*

Azara, in his history of the birds of South America, mentions one under the name of the Baker (*Merops rufus*), which appears to be one of the most skilful mason-birds on record. 'It builds its nest in an exposed situation on the large leafless branch of a tree, upon windows, crucifixes, palisades, or posts, at a considerable height. It is hemispherical, in form of a baker's oven, whence its popular name. It is composed of earth, and though it is of considerable size, it is often completed by two days' labour, the male and female engaging equally in the task, each carrying alternately a ball of mortar about the size of a filbert. It is six inches and a half in diameter, and an inch thick. The opening, which is lateral, is twice as high as it is wide, and the interior is divided into two chambers, by a partition beginning at the entrance and carried circularly backwards, the eggs being placed on a bed of dried grass at the end.'†

* J. R. † Sonnini's Azara, iii, 435.

Chapter VII.

Carpenter Birds. — The Toucan. Tom-Tit. Marsh-Tit. Wryneck. Nut-hatch. Woodpeckers.

The ancient Peruvians called all birds which chisel out holes in trees *Tacatacas*. This name has been literally rendered *Carpenteros* by the Spaniards, and the appellation is continued to the present time. Amongst these *carpenteros* they rank the toucans (*Ramphastidæ*), but whether they are correct in this it is difficult to decide, in the absence of any very accurate evidence. The bill of the toucan, indeed, seems upon a slight inspection to be sufficiently powerful for the task assigned it; but it is found on examination to be much inferior in strength to that appearance of it which is indicated by its size. If it were not, indeed, of light materials, it would be impossible for the bird to carry its head. It is not solid, but full of reticular cells, as thin as paper, over which Dr Traill, of Liverpool, has shown that the nasal nerves are expanded. Yet the universal opinion of the people where these birds are indigenous is, that it employs its large bill in the formation of a nest in the trunk of a decayed tree. Willughby, speaking of its resemblance to the woodpeckers, says, 'it not only hath a like situation of toes, but also in like manner hews holes in trees to build its nest in, as Friar Peter Alvaysa, and other Spaniards and Indians, who had long lived in America, told Faber for a certain truth; and as Oviedo, in his summary of the history of the West

Indies, writes.' 'Faber,' he adds, 'doth not undeservedly inquire how, seeing the bill so light and thin, the bird can pierce trees with it? Which difficulty he thus satisfies, — that though it be thin and light, yet is it of a bony substance, and therefore not to be wondered at, that, dexterously used by the living animal, it should therewith by many repeated strokes pierce a tree, having perchance the instinct to choose a rotten one, as we see drops of rain wear holes in flints.'*

Head and Bill of a Toucan (Ramphastos Toco).

The toucan is omnivorous, feeding (like the magpie) on young birds and eggs, and on fruits. For the former purpose the bill is admirably adapted, enabling it to delve into the deep and narrow nests of the South American Birds, while the delicacy of the nerves enables it, like the snipe, to search out its prey. The bill is equally well fitted for feeding on soft tropical fruits. A living specimen of this bird kept for seven years in the possession of Mr Vigors,

* Ornithology, by Ray, 129.

afforded full opportunity of ascertaining the correctness of these statements.

The greater number of those birds which nestle in the holes of trees are capable of hewing them out when they cannot find suitable hollows ready excavated, or at least of enlarging them when they are too small. The bill, for example, of the little blue tom-tit (*Parus cæruleus*), though short, is exceedingly strong; and from the active industry of the bird we have little doubt that it often makes use of it for this purpose. In one of these nests, which we lately examined in the hole of an oak at Shooter's Hill, the wood, which was indeed decayed and soft, had evidently been cut away so as to give an upward winding entrance to the nest; and we have remarked a similar winding, either upwards or on one side, in the nests of this bird built in old stone walls, — mortar or small stones having probably been removed with this design. We had an opportunity of witnessing the power of its bill, in one which was kept in a cage. In a common wire cage it could not be confined for many minutes, as it always warped the wires aside, first with its bill and then with its body, till it got out. But it did not find it so easy to escape from a cage made with netted wax thread. Upon finding this substance unmanageable, it attacked the wood-work, and into one of the dove-tailings of this it thrust its bill, employing it in the manner of a wedge. We have no doubt that half the force and skill which it thus exhibited would have proved amply sufficient to hew out a nest hole in a decayed tree.*

We have the testimony of Colonel Montagu to the carpentry of another British species, the marsh tit (*Parus palustris*). It 'appears,' he says, 'partial to low wet ground, where old willow trees abound, in the holes of which it frequently makes

* J. R.

its nest. We have seen it artfully excavating the decayed part of that tree, carrying the chips in its bill to some distance, always working downwards, making the bottom for the reception of the nest larger than the entrance. The nest is composed of moss and thistle-down, and sometimes a little wool."*

Another of these little carpenters is the wryneck (*Yunx torquilla*), provincially called the *snake-bird*, from its hissing when its nest is assailed, and the *cuckoo's mate*, from its appearing about the same time with the cuckoo in spring. It is a finely marked and very pretty bird, notwithstanding the singular twist which it gives to its neck, which, with its shrill vociferous cry of *queak*, *queak*, *queak*, readily distinguish it from the rest of our summer visitants. Its carpentry consists in pulling down with its bill a mass of chips and dust of rotten wood from the sides of the hole of some tree, which it selects to breed in. M. Montbeillard says he had ten wryneck's eggs brought him from the hole of an old apple-tree, five feet from the ground, and which had been deposited on a bed of rotten wood; and M. Gueneau had young ones taken from a similar situation in a crab-tree. A wryneck has bred for several years in a hole of an old willow at Lee, in Kent, to which, as in the case of M. Montbeillard's bird, it seems to be fondly attached.

The nuthatch (*Sitta Europæa*), whose skill in masonry we have already recorded, is also said to have some notion of carpentry. M. Montbeillard tells us that when this bird cannot find a convenient hole in a tree, it hews out an excavation with its bill, if it can meet with a spot that is worm-eaten. Its manner of proceeding in this operation may be understood from the wedge-like form and abrupt truncation of its bill.

* Ornith. Diot.

The following observations were made upon one accidentally wounded by a sportsman, and being taken, was placed in a small cage of plain oak-wood and wire. 'Here he remained all night, and the next morning his knocking or tapping with his beak was the first sound I heard, though sleeping in an apartment divided from the other by a landing-place. He had food given to him, minced chicken and bread crumbs, and water. He ate and drank with a most perfect impudence, and the moment he had satisfied himself, turned again to his work of battering the frame of his cage, the sound from which, both in loudness and prolongation of noise, is only to be compared to the efforts of a fashionable footman upon a fashionable door in a fashionable square. He had a particular fancy for the extremities of the corner pillars of the cage; on these he spent his most elaborate taps, and at this moment, though he has only occupied the cage a day, the wood is pierced and worn like a piece of old worm-eaten timber. He probably had an idea that if these main beams could once be penetrated the rest of the superstructure would fall and free him. Against the doorway he had also a particular spite, and once succeeded in opening it; and when, to interpose a further obstacle, it was tied in a double knot with string, the perpetual application of his beak quickly unloosed it. In ordinary cages a circular hole is left in the wire for the bird to insert his head to drink from a glass: to this hole the nuthatch constantly repaired, not for the purpose of drinking, but to try to push out more than his head, but in vain, for he is a thick bird, and rather heavily built; but the instant he found the hole too small he would withdraw his head, and begin to dig and hammer at the circle, and where it is rooted in the wood, with his pickaxe of a beak, evidently with a design to enlarge the orifice. His

labour was incessant, and he ate as largely as he worked, and I fear it was the united effects of both that killed him. His hammering was peculiarly laborious, for he did not perch as other birds do, but, grasping his hold with his immense feet, he turned upon them as upon a pivot, and struck with the whole weight of his body, thus assuming the appearance, with his entire form, of the head of a hammer, or, as I have sometimes seen birds on mechanical clocks, made to strike the hour by swinging on a wheel. We were in hopes that when the sun went down he would cease from his labours, and rest; but no, at the interval of every ten minutes, up to nine or ten o'clock in the night, he resumed his knocking, and strongly reminded us of the coffinmaker's nightly and dreary occupation. It was said by one of us, 'he is nailing his own coffin,' and so it proved. An awful fluttering in the cage, now covered with a handkerchief, announced that something was wrong: we found him at the bottom of his prison with his feathers ruffled, and nearly all turned back. He was taken out, and for some time he lingered amidst convulsions and occasional brightenings up; at length he drew his last gasp.'*

The Reverend W. T. Bree, of Allesley, states, that having caught a nuthatch in the common brick trap used by boys, he was struck with the singular appearance of its bill, so unlike that of any bird he had ever seen. It was blunt at the end, and presented the appearance of having been truncated in an oblique direction, as if the natural beak had been cut off; and he naturally inferred that it had been fairly ground down to about two-thirds of its original length by the bird's pecking at the bricks in its efforts to escape from the trap.'†

The faculty of digging into wood, though not de-

* Loudon's Mag. of Nat. Hist., i, 329. † Ibid, ii, 248.

signed by nature to enable these birds to make their escape from confinement, was, it would appear from the instances we have given, singularly applied by them for that purpose. Many animals who are endowed with similar habits of carpentry would not have thus employed them, either from want of versatility of instinct and intelligence, or from being distracted and puzzled by confinement. A wasp, for example, whose powerful mandibles can rasp the woody fibres from a piece of weathered deal board to make paper for her nest, never attempts to gnaw through a pasteboard box in which she may be shut up; and we have had still more striking instances in the case of some of the carpenter bees. When forming their nests, these will chisel out holes several inches in length, even in oak planks, as we have repeatedly witnessed; but, under other circumstances, they never endeavour to make their way through obstacles which they would not find it very difficult to penetrate. We have, for the sake of experiment, confined carpenter bees both in chip and pasteboard boxes, to see whether they would cut their way out; but instead of attempting this, they did not try to gnaw any of the materials. In the case of those which had been caught while busy in excavating their galleries, this might probably be referred to the interruption offered to their interesting labours; but this could not be the case with one which was reared by us, almost from the egg, in a chip box.* When this bee made its appearance from the cocoon, in April, 1830, we imagined that it would cut its way out of the box; yet, though it was purposely shut up in order to try this, it never made the attempt. This was the more singular, as this is in the routine of its instinctive actions to gnaw a passage for itself out of the original nest. The substance, however, left by the mother bee to be

* See Insect Architecture, p. 47.

gnawed through, presents a much slighter obstacle than even the thin materials of a chip box ; but this is not the case with many of the gall flies (*Cynipidæ*, Westwood), which have to gnaw themselves a passage to day-light and liberty through a substance much harder than the wood of their native trees. The bedeguar of the rose and the root-gall of the oak are of this description ; yet we have, in numerous instances, had the insects from these produced in boxes through which they never attempted to gnaw their way, although they could have most easily done so in a few minutes .*

How different are the proceedings of those animals who have often to make use of their power of gnawing through wood in order to procure food ; for example, the mouse and the rat. The ground-floor of a house belonging to a friend of ours was so infested with rats, that the edges of the floor contiguous to the walls were literally riddled with their holes. As all the means used to extirpate them proved abortive, recourse was had to pieces of old ship oak plank nailed over their holes, under the notion that they would find it too hard to gnaw through. But the rats were not to be thus foiled, for usually every morning several new holes were hewn through the hardest pieces of the oak ; and though everything which might have tempted them was removed from the room, and the new holes replanked every morning, the determined animals persevered in cutting fresh holes every night for many weeks successively.† The perseverance of these rats in hewing holes in the floor reminds us more of the manners of the woodpeckers than any other animal ; and the history of their proceedings will bring us back to the carpentry of birds, from which these illustrations have led us into a brief digression.

* J. R. † J. R.

Woodpeckers of every species (*Picidæ*, VIGORS), probably without exception, are carpenters in the sense in which we have used the term,—that is, they not only bore into trees in pursuit of insects for food, but chisel out holes for the purpose of nestling. Being endowed by Providence with admirable organs for this purpose, we have a right to infer that they take as much pleasure in the employment of the faculties bestowed upon them as we do in the most agreeable occupations. Buffon, on the other hand, considers such labours a slavish misery to the race of woodpeckers, whom he represents as peculiarly wretched examples of the inequality to be found in the distribution of happiness.

'Animals,' says Buffon, 'constantly engaged in the pursuit of prey, urged by want and restrained by apprehensions of danger, depend for subsistence on the vigour of their own exertions; and having scarcely time to satisfy their immediate desires, they can have no leisure to cherish the benevolent affections. Such is the solitary condition of all the carnivorous birds, except a few cowardly tribes, which prowl on putrid carrion, and rather combine like robbers than unite as friends.

'But of all the birds which earn their subsistence by spoil, none leads a life so laborious and so painful as the woodpecker. Nature has condemned it to incessant toil and slavery; while others freely employ their courage or address, and either shoot on rapid wing, or lurk in close ambush, the woodpecker is constrained to drag out an insipid existence, in boring the bark and hard fibres of trees to extract its humble prey. Necessity never suffers any intermission of its labours — never grants an interval of sound repose: often during the night it sleeps in the same painful posture as in the fatigues of the day. It never shares the cheerful sports of the

other inhabitants of the air — it joins not their vocal concerts; and its wild and saddening tones, while they disturb the silence of the forest, express constraint and effort. Its movements are quick; its gestures full of inquietude; its looks coarse and vulgar; it shuns all society, even that of its own kind.

'Such is the narrow and gross instinct suited to a mean and a gloomy life. The organs with which the woodpecker is furnished correspond to its destination: four thick nervous toes, two turned forwards, and two backwards, the one resembling a spur being longest and stoutest, all of them armed with thick hooked nails, connected to a very short and extremely muscular foot, enable the bird to cling firmly, and to creep in all directions on the trunks of trees. Its bill is edged, straight, wedge-shaped, square at the base, channelled longwise, flat, and cut vertical at its tip, like a chisel; this is the instrument with which it pierces the bark, and bores into the wood, to extract the insects or their eggs. The substance of the bill is hard and solid, and rises out of the cranium, which is very thick. Powerful muscles act upon its short neck, and direct its incessant blows, which sometimes penetrate even to the pith of the wood; it darts its long tongue, which is tapered, and rounded like an earth-worm, and tipt with a hard bony point, like a needle. Its tail consists of ten stiff quills, bent inwards, truncated at the ends, beset with hard bristles; and this often serves it as a rest, while employed in a constrained and often inverted posture. It breeds in the cavities which it has in part formed itself. The progeny issue from the heart of the tree, and, though furnished with wings, they are almost confined to the verge of its circumference, and condemned to tread the dull round of life.'*

* Buffon, Oiseaux, xiii, p. 8.

It would be difficult to conjecture what train of thinking led the French naturalist to so singular a conclusion. He might, with equal plausibility, have given a similar account of any other animal, whose life is spent in active exertion. The squirrel, for example, the woodpecker's fellow forester, is equally obliged to hunt incessantly for his scanty fare of nuts, which, for eight months in the year, are rarely to be met with; and when he gathers together a little store against the day of need, he has many chances of being robbed of it by the first dormouse or nuthatch that discovers his hole, and watches the opportunity of his absence. Nor does all his agility in skipping from tree to tree always enable him to escape from the crafty fox, or the rapacious kite; while he is liable to be pounced upon when asleep by the prying owl, or the insidious cat. But 'the playful squirrel on his nut-grown tree' has, undoubtedly, as other animals have, his full share of the enjoyments of life, to counterbalance whatever evils are incident to his situation in the scale of existence. We turn with pleasure to the enthusiastic defence of the bird, by Wilson, in his account of the gold-winged woodpecker (*Colaptes auratus*, SWAINS.)

'The abject and degraded character,' says he, 'which the Count de Buffon, with equal eloquence and absurdity, has drawn of the whole tribe of woodpeckers, belongs not to the elegant and sprightly bird now before us. How far it is applicable to any of them, will be examined hereafter. He is not "constrained to drag out an insipid existence in boring the bark and hard fibres of trees, to extract his prey," for he frequently finds in the loose moulder-ing ruins of an old stump (the capital of a nation of pismires), more than is sufficient for the wants of a whole week. He cannot be said to "lead a mean

and gloomy life, without an intermission of labour," who usually feasts by the first peep of dawn, and spends the early and sweetest hours of morning on the highest peaks of the tallest trees, calling on his mate or companions, or pursuing and gamboling with them round the larger limbs and body of the tree for hours together; for such are really his habits. Can it be said that "necessity never grants an interval of sound repose" to that bird, who, while other tribes are exposed to all the peltings of the midnight storm, lodges dry and secure in a snug chamber of his own constructing; or that "the narrow circumference of a tree circumscribes his dull round of life," who, as seasons and inclination inspire, roams from the frigid to the torrid zone, feasting on the abundance of various regions? Or is it a proof that "his appetite is never softened by delicacy of taste," because he so often varies his bill of fare, occasionally preferring to animal food the rich milkiness of young Indian corn, and the wholesome and nourishing berries of the wild cherry, sour gum, and red cedar? Let the reader turn to the faithful representation of him given in our figure, and say whether his looks be "sad and melancholy?" It is truly ridiculous and astonishing that such absurdities should escape the lips or pen of one so able to do justice to the respective merits of every species; but Buffon had too often a favourite theory to prop up, that led him insensibly astray: and so, forsooth, the whole family of woodpeckers must look sad, sour, and be miserable, to satisfy the caprice of a whimsical philosopher, who takes it into his head that they are, and ought to be so.'

The American naturalist has given the following interesting history of a bird of this species, which he wounded, and which reminds us of the preceding anecdote of the nuthatch. 'In rambling through

the woods one day,' says he, 'I happened to shoot one of these birds, and wounded him slightly in the wing. Finding him in full feather, and seemingly but little hurt, I took him home, and put him into a large cage, made of willows, intending to keep him in my own room, that we might become better acquainted. As soon as he found himself inclosed on all sides, he lost no time in idle fluttering, but, throwing himself against the bars of the cage, began instantly to demolish the willows, battering them with great vehemence, and uttering a loud piteous kind of cackling, similar to that of a hen when she is alarmed and takes to wing. Poor Baron Trenck never laboured with more eager diligence at the walls of his prison than this son of the forest in his exertions for liberty; and he exercised his powerful bill with such force, digging into the sticks, seizing and shaking them so from side to side, that he soon opened for himself a passage; and though I repeatedly repaired the breach, and barricaded every opening in the best manner I could, yet on my return into the room I always found him at large, climbing up the chairs, or running about the floor, where, from the dexterity of his motions, moving backwards, forwards, and sideways with the same facility, it became difficult to get hold of him again. Having placed him in a strong wire-cage, he seemed to give up all hopes of making his escape, and soon became very tame; fed on young ears of Indian corn; refused apples, but ate the berries of the sour gum greedily, small winter grapes, and several other kinds of berries; exercised himself frequently in climbing, or rather hopping perpendicularly along the sides of the cage; and, as evening drew on, fixed himself in a high hanging or perpendicular position, and slept with his head on his wing. As soon as dawn appeared, even before it was light

enough to perceive him distinctly across the room, he descended to the bottom of the cage, and began his attack on the ears of Indian corn, rapping so hard as to be heard from every room in the house. After this, he would sometimes resume his former position, and take another nap. He was beginning to become very amusing, and even sociable, when, after a lapse of several weeks, he became drooping, and died, as I conceived, from the effects of his wound.'*

Not contented with the defence of his gold-winged woodpecker, Wilson returns with renewed spirit to the vindication of the designs of Providence when he comes to the history of a much smaller bird of the same species, the downy woodpecker (*Picus pubescens*). 'The principal characteristics,' he says, 'of this little bird, are diligence, familiarity, perseverance, and a strength and energy in the head and muscles of the neck which are truly astonishing. Mounted on the infected branch of an old apple-tree, where insects have lodged their corroding and destructive brood in crevices between the bark and wood, he labours sometimes for half an hour incessantly at the same spot before he has succeeded in dislodging and destroying them. At these times you may walk up pretty close to the tree, and even stand immediately below it, within five or six feet of the bird, without in the least embarrassing him; the strokes of his bill are distinctly heard several hundred yards off; and I have known him to be at work for two hours together on the same tree. Buffon calls this "incessant toil and slavery;" their attitude "a painful posture;" and their life "a dull and insipid existence;" expressions improper because untrue, and absurd because contradictory. The pos-

* Wilson, Amer. Ornith., i, 46, &c.

ture is that for which the whole organization of his frame is particularly adapted; and though to a wren or a humming-bird the labour would be both a toil and a slavery, yet to him it is, I am convinced, as pleasant and as amusing as the sports of the chase to the hunter, or the sucking of flowers to the humming-bird. The eagerness with which he traverses the upper and lower sides of the branches; the cheerfulness of his cry; and the liveliness of his motions, while digging into the tree and dislodging the vermin, justify this belief.'

The Downy Woodpecker. (Picus pubescens.)

Our author's account of the nestling of this active little bird is equally lively. 'About the middle of May,' says he, 'the male and female look out for a suitable place for the reception of their eggs and young. An apple, pear, or cherry-tree, often in the near neighbourhood of the farm-house, is

generally pitched upon for this purpose. The tree is minutely reconnoitred for several days previous to the operation, and the work is first begun by the male, who cuts out a hole in the solid wood, as circular as if described with a pair of compasses. He is occasionally relieved by the female, both parties working with the most indefatigable diligence. The direction of the hole, if made in the body of the tree, is generally downwards, by an angle of thirty or forty degrees, for the distance of six or eight inches, and then straight down for ten or twelve more; within roomy, capacious, and as smooth as if polished by the cabinet-maker; but the entrance is judiciously left just so large as to admit the body of the owner. During this labour they regularly carry out the chips, often strewing them at a distance, to prevent suspicion. This operation sometimes occupies the chief part of a week. The female, before she begins to lay, often visits the place, passes out and in, examines every part, both of the exterior and interior, with great attention, as every prudent tenant of a new house ought to do, and at length takes complete possession. The eggs are generally six, pure white, and laid on the smooth bottom of the cavity.'*

The carrying out the chips and strewing them at a distance, to prevent suspicion, recorded also of the marsh-tit, in a preceding page, is precisely similar to the proceedings of the mason-wasps, and some of the carpenter-bees, which our readers may observe at work, in most of the summer months, in old posts, garden-gates, and similar places, chiseling out galleries for the reception of their eggs. The carpenter-bees also work much in the same way as this woodpecker, boring at first horizontally, and then perpendicularly downwards.† The same plan of

* Wilson, Amer. Ornith. i, 154.

† See Insect Architecture, p. 27 — 47.

excavation is followed by many of the species of the Woodpecker family: for example, the American hairy woodpecker (*Picus villosus*); which, if a hollow

The Hairy Woodpecker (Picus villosus).

ready formed is not readily found, will dig first horizontally into the body of a tree, for six or eight inches, and then downwards, in a sloping direction, for about a foot, carrying out the chips piecemeal in his bill, or scraping them out with his feet. They not un-

frequently breed in orchard-trees, or even in the old stake of a fence, which they hollow out for the purpose. The great mass of hairs that cover the nostril appears to be designed as a protection to the front of the head when engaged in digging into wood.

The red-bellied woodpecker (*Picus Carolinus*) also digs a cavity for its nest, but seems anxious to procure all possible shelter from the weather by selecting the lower side of some lofty branch, that makes a considerable angle with the horizon. It prefers, however, a hollow limb of a tree, making the ex

The Yellow-bellied Woodpecker (Picus varius.)

cavation twelve or fifteen inches above where it becomes solid. The same anxiety for protection leads most of the species to cut out a very narrow opening. That of the yellow-bellied woodpecker (*Picus varius*) Wilson describes as almost exactly circular, and so small, for the size of the bird, that it can creep out and in with difficulty ; but within it suddenly widens, descending by a small angle, and then running downwards about fifteen inches, the eggs being laid on the smooth solid wood. This plan is also pursued by the red-headed woodpecker (*Picus erythro-*

The Red headed Woodpecker (Picus erythrocephalus).

cephalus,*) which is so little afraid of man, that it not unfrequently breeds in the trees growing in the streets of the American cities. Wilson found several of these nests within the boundaries of the city of Philadelphia: two in the button-wood (*Platanus occidentalis*), and one in the decayed limb of an elm. 'The old ones,' he says, 'I observe, make their excursions regularly to the woods beyond the Schuylkill, about a mile distant; preserving great silence and circumspection in visiting their nests; precautions not much attended to by them in the depth of the woods, because there the prying eye of man is less to be dreaded. But notwithstanding the care which this bird, in common with the rest of its genus, takes to place its young beyond the reach of enemies, within the hollows of trees, yet there is one deadly foe, against whose depredations neither the height of the tree, nor the depth of the cavity, is the least security. This is the black snake (*Coluber constrictor*), who frequently glides up the trunk of the tree, and, like a skulking savage, enters the woodpecker's peaceful apartment, devours the eggs or helpless young, in spite of the cries and flutterings of the parents; and, if the place be large enough, coils himself up in the spot they occupied, where he will sometimes remain for several days. The eager schoolboy, after hazarding his neck to reach the woodpecker's hole, at the triumphant moment when he thinks the nestlings his own, and strips his arm, launching it down into the cavity, and grasping what he conceives to be the callow young, starts with horror at the site of a hideous snake, and almost drops from his giddy pinnacle, retreating down the tree with terror and precipitation. Several adventures of this kind have come to my knowledge; and one

* Wilson, Amer. Ornith. i, 145 — 7.

of them that was attended with serious consequences, where both boy and snake fell to the ground, and a broken thigh, and long confinement, cured the adventurer completely of his ambition for robbing woodpeckers' nests.'*

Other birds of this family, as we have already mentioned, instead of laying their eggs on the bare ground, employ a portion of the rotten chips which they have dug out, to form a sort of bedding. This is the case with the pileated woodpecker (*Picus pileatus*, LINN.), which Wilson designates the great northern chief of the woodpeckers. He excels in carpentry, and almost every old trunk in the forests, from Canada to the Gulf of Mexico, bears marks of his chisel; for wherever he perceives a tree beginning to decay, he examines it round and round with great skill and dexterity, strips off the bark in sheets of five or six feet in length, to get at the hidden cause of the disease, and labours with a gaiety and activity really surprising. 'I have seen him,' says Wilson, 'separate the greatest part of the bark from a large dead pine-tree, from twenty to thirty feet, in less than a quarter of an hour. Whether, indeed, he is engaged in flying from tree to tree, in digging, climbing, or barking, he seems perpetually in a hurry. He is extremely tenacious of life, clinging close to the tree even after he has received his mortal wound; nor yielding up his hold but with his expiring breath. If slightly wounded in the wing, and dropt while flying, he instantly makes for the nearest tree, and strikes with great bitterness at the hand stretched out to seize him, and can rarely be reconciled to confinement.'†

Were we merely to judge from the bill alone, we should be disposed to consider the ivory-billed wood-

* Wilson, Amer. Ornith. i, 146.
† Wilson, American Ornithology.

pecker (*Picus principalis*) the prince of the carpenter birds. This powerful instrument is as white, and much tougher, if not harder, than ivory, and elegantly fluted. With this he can dig into the hardest trees, either for food or for nestling. In the low countries of the Carolinas, this bird usually prefers the large timbered cypress swamps for breeding in; and in the trunk of one of these trees, at a considerable height, the male and female alternately, and in conjunction, dig out a large and capacious cavity for their eggs and young. Trees thus dug out have frequently been cut down with sometimes the eggs and young in them: the hole being said to be generally a little winding, the better to keep out the weather, and from two to five feet deep. The labour of digging out a hole of such dimensions may be considered almost beyond the execution of these birds; but when we read of some of their other feats in carpentry, the fact does not appear in the least surprising. Wilson gives the following interesting history of one which he captured.

'The first place,' says he, 'I observed this bird at, when on my way to the south, was about twelve miles north of Wilmington, in North Carolina. There I found the bird from which the drawing of the figure was taken. This bird was only wounded slightly in the wing, and on being caught uttered a loudly reiterated and most piteous note, exactly resembling the violent crying of a young child, which terrified my horse so, as nearly to have cost me my life. It was distressing to hear it. I carried it with me in the chair, under cover, to Wilmington. In passing through the streets, its affecting cries surprised every one within hearing, particularly the females, who hurried to the doors and windows with looks of alarm and anxiety. I drove on, and on arriving at the piazza of the hotel, where I intended

to put up, the landlord came forward, and a number of other persons who happened to be there, all equally alarmed at what they heard; this was greatly increased by my asking whether he could furnish me with accommodations for myself and my baby. The man looked blank and foolish, while the others stared with still greater astonishment. After diverting myself for a minute or two at their expense, I drew my woodpecker from under the cover, and a general laugh took place. I took him up stairs, and locked him up in my room, while I went to see my horse taken care of. In less than an hour I returned, and on opening the door he set up the same distressing shout, which now appeared to proceed from grief that he had been discovered in his attempts at escape. He had mounted along the side of the window, nearly as high as the ceiling, a little below which he had begun to break through. The bed was covered with large pieces of plaster, the lath was exposed for at last fifteen inches square. and a hole, large enough to admit the fist, opened to the weather-boards; so that in less than another hour he would certainly have succeeded in making his way through. I now tied a string around his leg, and fastening it to the table, again left him. I wished to preserve his life, and had gone off in search of suitable food for him. As I reascended the stairs, I heard him again hard at work, and on entering had the mortification to perceive that he had almost entirely ruined the mahogany table to which he was fastened, and on which he had wreaked his whole vengeance. While engaged in taking the drawing, he cut me severely in several places, and on the whole displayed such a noble and unconquerable spirit, that I was frequently tempted to restore him to his native woods. He lived with me nearly three days, but refused all sustenance;

and I witnessed his death with regret. The head and bill of this bird is in great esteem among the southern Indians, who wear them by way of amulet, or charm, as well as ornament, and, it is said, dispose of them to the northern tribes at considerable prices. An Indian believes that the head, skin, or even feathers of certain birds confer on the wearer all the virtues or excellencies of those birds. Thus I have seen a coat made of the skins, heads, and claws of the raven ; caps stuck round with heads of butcher-birds, hawks, and eagles ; and as the disposition and courage of the ivory-billed woodpecker are well known to the savages, no wonder they should attach great value to it, having both beauty, and, in their estimation, distinguished merit to recommend it.'*

A singular circumstance, which occurred at Chelmsford in 1807, places the carpentry of birds in a very striking light. An elm was cut down on the estate of Mr Parker, and, upon being sawed into planks, a hollow was discovered near the centre of the tree, containing a bird's nest and several eggs, which were unfortunately broken by the saw. How long it had lain in this recess cannot be known ; but as the yolks of the eggs were not dried up, one would suppose that it could not be a very long period ; though it is not apparent how any part of an elm, naturally a slow growing tree, should increase so rapidly as to enclose the nest and eggs before the latter were destroyed by moisture or insects, — particularly as the cavity in question was covered with five or six inches of solid timber.† Yet this is not more unaccountable than the circumstance which has been repeatedly recorded by authentic witnesses, of live toads being found enclosed in growing trees, and other instances of a very simi-

* Wilson, Amer. Ornith. iv. p. 24.
† Wakefield, Instinct Displayed, p. 166.

lar description. On examining an elm, near Brockley in Kent, in which the cross-bar of a stile was fixed a few years ago, we found that over this the elm had grown so as to enclose it for more than a foot in the live timber, the bark being so closely compacted around the dead stile-bar that the blade of a knife cannot be inserted between. We have watched the progress of this for several years, and find that it makes a regular advance every summer. Had a pair of red-starts or creepers built a nest at the end of the cross-bar within the elm, and been accidentally killed after the eggs were deposited, it would have been inclosed in the same manner as the end of the bar.* Several very curious facts, of a similar kind, are mentioned in the first chapter of '*Insect Transformations.*'

* J. R.

Chapter VIII.

Platform Builders. — Wood-Pigeon. American Pigeons. Eagles.

It seems an essential property of a nest that it should be constructed so as to secure the eggs from rolling out; and the term accordingly always suggests the idea of a cup-shaped cavity, more or less hollow. Many species, however, which nestle on the ground are neither at the trouble of selecting a hollow place nor of excavating one, but content themselves with a horizontal flat, their being little danger in such positions of the eggs tumbling about. Even should they be moved, the mother bird can easily rearrange them. In cases, also, such as the rotch (*Mergulus melanoleucus*, Ray), which nestles on bare rocks, the mother bird lays only a single egg. We can easily understand why the nests of birds which nestle on the ground are constructed with little art; but what are we to say to the practice of a considerable number of birds which nestle on trees and other lofty and exposed situations, and form a flat horizontal nest without the slightest cavity or depression for containing the eggs and young?

The best known nest of this description is that of the cushat, ring-dove, or wood-pigeon, (*Columba Palumbus*, Linn.) which is by no means rare in those parts of the empire where there is much woodland. But it does not always confine itself to the shelter of thickets, for we knew a pair breed for several years at the edge of a corn-field, in a large

solitary hawthorn overhanging the river Ayr, at Sorn in Ayrshire, although there was a wood of considerable extent on the opposite bank. This, however, must be considered rather an exception to the general rule. In Darent Wood, in Kent, we have observed half a dozen wood-pigeons' nests, all within sight, about eight or ten feet from the ground, and usually upon the forks of an oak-branch, without any apparent protection for them from above. On the contrary, the situation of most of them was peculiarly unsheltered and exposed. The nest itself, again, is a very slight structure, and still less calculated for warmth or shelter, the hot nature of the parent birds, according to Albertus Magnus, not requiring this. It may with the utmost propriety be called a platform, being composed of a flat pile of twigs, not artfully interwoven, as is stated in some books, but laid cross-ways upon one another in a rather loose manner, though not without neatness and attention to symmetry, for when completed the structure is always very nearly circular. The larger and longest twigs, chiefly those of birch, are laid as a foundation, the sizes chosen becoming smaller as the work advances. It is mentioned that in some instances the eggs may be seen through the twigs from below ; but the nests which we found on the exposed oak boughs in Darent Wood were more than an inch thick. We have remarked, indeed, that the quantity of materials forming the nest is regulated by the particular situation in which it is placed. Those in the forks of oak-boughs were thick, because the boughs themselves afforded no secure platform ; but when the nest is, as we have frequently seen it, on the flat branch of a spruce or silver fir, a very thin layer of fine twigs only is constructed.*

* J. R.

The turtle-dove (*Columba turtur*) builds a nearly similar nest, choosing the tallest trees in the darkest and coolest woods. In the southern counties of England its nests are frequently to be met with.

Nest of the Turtle-dove (Columba turtur.)

The platform mode of building affords very strong evidence that the ring-dove is not the original species of the numerous varieties of the domestic pigeon, which never attempts to build on trees or any similar situation, and does not even use the same materials —

but selects hay or straw instead of twigs. This circumstance has led recent authors to derive the domestic pigeon from the stock-dove (*Columba œnas*), which has a somewhat similar manner of nestling. White of Selborne, however, was much inclined to believe that the stock-dove constructs its nest on trees like the ring-dove; but it appears to be ascertained that it does not. Temminck says positively, that 'the nest is always found in the holes of trees,' and we know that it is built with twigs; though even this will be far from proving their identity with the house-pigeon, which never makes its nest in such a situation, and never uses twigs. On the contrary, Pallas tells us, that in the south of Russia, the common pigeons breed wild in the turrets of the village-churches, and the steep rocky banks of rivers. Colonel Montagu, on the other hand, is quite decided that the stock-dove is the domestic pigeon in a wild state; and Latham, though not without hesitation, is disposed to agree with him. Mr Selby thinks that Montagu never saw a specimen of the stock-dove at all, but mistook the rock-dove for it.

We are of opinion that Montagu and Latham have confounded the stock-dove with the rock-pigeon (*Columba livia*, Brisson). This species is distinguished by the constant character of two black bands crossing the wings, which the stock-dove never has, while the latter is also an inch or two longer. The only place where we have ever seen the rock-pigeon in a wild state was at Howford, near Mauchline in Ayrshire, where two or three pairs nestle on the cliffs of the romantic rocks overhanging the river, but in situations so inaccessible that we never knew them robbed by the most daring boys. It would be hard to say whether these had strayed from some neighbouring dovecot, or had originally come thither from some wild brood,

though the former is not so probable, as instances we believe are rare of domestic pigeons voluntarily deserting their birth-place.* They breed, we are told, on rocks on the coast at Brighton and other places. They are also found in great numbers in the cliffs at St Aldhelm's Head, in the Isle of Purbeck.

With respect to the domestication of the ring-dove (*C. Palumbus*), White says, 'I had a relation in this neighbourhood who made it a practice, for a time, whenever he could procure the eggs of a ring-dove, to place them under a pair of doves that were sitting in his own pigeon-house; hoping thereby, if he could bring about a coalition, to enlarge his breed, and teach his own doves to beat out into the woods, and to support themselves by mast. The plan was plausible, but something always interrupted the success; for though the birds were usually hatched and sometimes grew to half their size, yet none ever arrived at maturity. I myself have seen these foundlings in their nest displaying a strange ferocity of nature, so as scarcely to bear to be looked at, and snapping with their bills by way of menace. In short they always died, perhaps for want of proper sustenance; but the owner thought that by their fierce and wild demeanour they frighted their foster-mothers, and so were starved.'†

Salerne says, that the poulterers of Orleans buy, in the season of nests, a considerable number of ring-pigeons, as well as turtle-doves and rock-pigeons, which are found nestling in churches, towers, the walls of old castles, and rocks. They are considered to be deserters from dove-cots. Buffon thinks this proves that the ring-doves, like other pigeons and turtles, can be reared in domestication, and that these

* J. R.

† Nat. Hist. of Selborne, i, 194.

may have given origin to the largest and most beautiful of the dovecot pigeons. M. Le Roy, also, assured Buffon that young ring-pigeons, taken from the nest, were easily tamed, and fattened very well; and even that the old ones caught in nets were easily reconciled to live in confinement.

The American pigeons seem to be also platform builders like our ring-dove and turtle; for example, the Carolina pigeon (*Columba Carolinensis*), which, according to Wilson, commences building about the beginning of May, the nest being 'very rudely constructed, generally in an evergreen, among the thick foliage of the vine, in an orchard, on the horizontal branches of an apple-tree, and in some instances on the ground. It is composed of small twigs, laid with little art, on which are scattered dry fibrous roots of plants, and in this almost flat bed are deposited two eggs of a snowy whiteness.'*

A similar mode of building is practised by the American passenger pigeon (*Columba migratoria*), the most prolific of the whole family, and perhaps of all other birds, if the numbers reared be regarded, though it seems to be ascertained that the female only lays a single egg at one hatch. This singular bird inhabits a wide and extensive region of North America, though it does not seem to be known westward of the Great Stony Mountains; but spreads all over Canada, and ranges as far south as the Gulf of Mexico.

The numbers of these birds which associate in their breeding-places, almost surpass belief; but the facts are too well authenticated to admit of any doubt. These breeding-places are always in the woods, and sometimes occupy a large extent of forest. 'When

* Wilson's Amer. Ornith. v, 93.

they have frequented,' says Wilson, 'one of these places for some time, the appearance it exhibits is surprising. The ground is covered to the depth of several inches with their dung; all the tender grass and underwood destroyed; the surface strewed with large limbs of trees, broken down by the weight of the birds clustering one above another; and the trees themselves, for thousands of acres, killed as completely as if girdled with an axe. The marks of this desolation remain for many years on the spot; and numerous places could be pointed out where, for several years after, scarce a single vegetable made its appearance. By the Indians, a pigeon-roost, or breeding-place, is considered an important source of national profit and dependence. The breeding-place differs from the former in its greater extent. In the western countries above mentioned, these are generally in beech woods, and often extend in nearly a straight line across the country for a great way. Not far from Shelbyville, in the state of Kentucky, about five years ago, there was one of these breeding-places, which stretched through the woods nearly in a north and south direction; was several miles in breadth, and was said to be upwards of forty miles in extent! In this tract almost every tree was furnished with nests, wherever the branches could accommodate them. The pigeons made their first appearance there about the 10th of April, and left it altogether, with their young, before the 25th of May. As soon as the young were fully grown, and before they left their nests, numerous parties of the inhabitants, from all parts of the adjacent country, came with wagons, axes, beds, cooking utensils, many of them accompanied by the greater part of their families, and encamped for several days at this immense nursery. Several of them informed me, that

the noise in the woods was so great as to terrify their horses, and that it was difficult for one person to hear another speak without bawling in his ear. The ground was strewed wtih broken limbs of trees, eggs, and young pigeons, which had been precipitated from above, and on which herds of hogs were fattening. Hawks, buzzards, and eagles were sailing about in great numbers, and seizing the young from their nests at pleasure, while, from twenty feet upwards to the top of the trees, the view through the woods presented a perpetual tumult of crowding and fluttering multitudes of pigeons, their wings roaring like thunder, mingled with the frequent crash of falling timber; for now the axe-men were at work cutting down those trees that seemed to be most crowded with nests, and contrived to fell them in such a manner, that in their descent they might bring down several others; by which means the falling of one large tree sometimes produced two hundred young, little inferior in size to the old ones, and almost one mass of fat. On some single tree, upwards of one hundred nests were found, each containing a single young one only, a circumstance in the history of this bird not generally known to naturalists. It was dangerous to walk under these flying and fluttering millions, from the frequent fall of large branches, broken down by the weight of the multitudes above, and which in their descent often destroyed numbers of the birds themselves; while the clothes of those engaged in traversing the woods were completely covered with the excrements of the pigeons.

'These circumstances were related to me by many of the most respectable part of the community in that quarter; and were confirmed in part by what I myself witnessed. I passed for several miles through this same breeding-place, where every tree

was spotted with nests, the remains of those above described. In many instances I counted upwards of ninety nests on a single tree; but the pigeons had abandoned this place for another, sixty or eighty miles off, towards Green River, where they were said at that time to be equally numerous. From the great numbers that were constantly passing over head to or from that quarter, I had no doubt of the truth of this statement. The beech mast had been chiefly consumed in Kentucky, and the pigeons every morning, a little before sunrise, set out for the Indiana territory, the nearest part of which was about sixty miles distant. Many of these returned before ten o'clock, and the great body generally appeared on their return a little after noon. I had left the public road to visit the remains of the breeding-place near Shelbyville; and was traversing the woods with my gun, on my way to Frankfort, when, about one o'clock, the pigeons, which I had observed flying the greater part of the morning northerly, began the return in such immense numbers as I never before had witnessed. Coming to an opening, by the side of a creek called the Benson, where I had a more uninterrupted view, I was astonished at their appearance. They were flying with great steadiness and rapidity, at a height beyond gun-shot, in several strata deep, and so close together that, could shot have reached them, one discharge could not have failed of bringing down several individuals. From right to left, as far as the eye could reach, the breadth of this vast procession extended; seeming everywhere equally crowded. Curious to determine how long this appearance would continue, I took out my watch to note the time, and sat down to observe them. It was then half-past one. I sat for more than an hour, but, instead of a diminution of this prodigious pro-

cession, it seemed rather to increase, both in numbers and rapidity ; and anxious to reach Frankfort before night, I rose and went on. About four o'clock in the afternoon I crossed the Kentucky river, at the town of Frankfort, at which time the living torrent above my head seemed as numerous and as extensive as ever. Long after this I observed them in large bodies that continued to pass for six or eight minutes, and these again were followed by other detached bodies, all moving in the same south-east direction till after six in the evening. The great breadth of front which this mighty multitude preserved would seem to intimate a corresponding breadth of their breeding-place, which, by several gentlemen who had lately passed through part of it, was stated to me at several miles. It was said to be in Green County, and that the young began to fly about the middle of March. On the 17th of April, forty-nine miles beyond Danville, and not far from Green River, I crossed this same breeding-place, where the nests for more than three miles spotted every tree ; the leaves not being yet out I had a fair prospect of them, and was really astonished at their numbers. A few bodies of pigeons lingered yet in different parts of the woods, the roaring of whose wings were heard in various quarters around me. All accounts agree in stating, that each nest contains only a single young one. These are so extremely fat, that the Indians, and many of the whites, are accustomed to melt down the fat for domestic purposes, as a substitute for butter and lard. At the time they leave the nest they are nearly as heavy as the old ones ; but become much leaner after they are turned out to shift for themselves.'*

The platforms, however, which are thus built by

* Wilson's Amer. Ornith. v, 207.

some of the pigeon family, are mere miniatures of the strong, substantial, and extensive structures of the same kind which are formed by a considerable number of birds of prey (*Falconidæ*, LEACH). But of the latter we have not many accounts, in consequence of their being usually placed in solitary and inaccessible places, where they are seldom seen, and much seldomer reached. The few sketches of these nests which have been published are for the most part of considerable interest. Amongst these platform builders on the large scale, we have the griffard, or martial eagle (*Aquila bellicosa*), of Southern Africa, a powerful bird, which preys on antelopes, hares, and similar animals, and is in the habit of soaring so high as to elude the sight. According to Vaillant, who ranks among the very best observers of the manners of animals, the griffard builds either on the tops of the loftiest trees, or among the most inaccessible and rugged rocks, making its nest quite flat, in the manner of a floor, without any perceptible hollow. It is so firmly constructed, that it will bear the weight of a man upon it without giving way, and it will consequently last for a number of years. It is composed at first of several strong rafters of different lengths, according to the distance of the branches or cliffs upon which it is erected. These rafters, again, are interwoven with smaller and more flexible branches, which unite them strongly together, and serve as the foundation of the platform. Over this is piled a considerable quantity of brushwood, moss, dry leaves, heath, and sometimes rushes, if they can be found in the vicinity. The second floor, if we may call it so, is covered with a bed of small pieces of dry wood, upon which, without the addition of any softer materials, the female deposits her eggs. The eyry or nest thus constructed is about four or five feet in diame-

ter, and two feet thick, but it is not very regular in its form. The strong, massive structure of the nest causes it to endure for many years, perhaps during the lives of the couple who build it, if they are not compelled to abandon it on account of danger or alarm. The necessity of building it so very strong will be more obvious when it is considered that the parent birds weigh from twenty-five to thirty pounds, the female being the larger of the two, as is common among birds of prey, exceeding the male in length by about a foot.

It is worthy of remark, that the same eagles vary their mode of building, when they cannot find a tree sufficiently large for their purpose, in the vicinity of their hawking grounds. In this case they make choice of a rocky pinnacle, forming the nest of the same materials in the upper portion, but dispensing with the rafters, which are there unnecessary, and placing the brushwood, moss, and leaves directly over the stone; but the eggs are always deposited among chips of wood or sticks, and never upon softer materials.* Of this principle of variation in the mode of building nests, we shall have occasion, as we proceed, to give a considerable number of examples, which are highly interesting from the light they are calculated to throw on the faculties termed instinctive.

The bald eagle (*Haliætus leucocephalus*, Savigny) seems to make a still more substantial nest. This bird is asserted by Wilson to be identical with the sea eagle (*Haliætus albecilla*, Savigny); upon which point Latham is undecided; but Temminck rejects the opinion without hesitation, as he says he has seen more than fifty individuals of the sea eagle

* Vaillant, Oiseaux d'Afrique, i, 3.

reared without ever assuming at any age the plumage of the bald eagle.*

The bald eagle (*H. leucocephalus*), according to Hutchins, arrives about Hudson's Bay in May, building on the highest trees, and forming a nest, of a large size, of sticks and grass, turf, and other rubbish. It selects for this purpose a very tall tree, usually a pine or a cypress, keeping to the same nest, season after season, for a long period. Those observed in Georgia by Mr Abbot built a large compact nest, sometimes on high cypress trees, and at other times on rocks. But the best account of this nest which we have met with is given by Wilson and Ord, in the American Ornithology.

'In the month of May,' says Wilson, 'while on a shooting excursion along the sea-coast not far from Great Egg Harbour, accompanied by my friend Mr Ord, we were conducted about a mile into the woods to see an eagle's nest. On approaching within a short distance of the place, the bird was perceived slowly retreating from the nest, which we found occupied the centre of the top of a very large yellow pine. The woods were cut down, and cleared off for several rods around the spot, which circumstance gave the stately, erect trunk, and large, crooked, wriggling branches of the tree, surmounted by a black mass of sticks and brush, a very singular and picturesque effect. Our conductor had brought an axe with him to cut down the tree; but my companion, anxious to save the eggs, or young, insisted on ascending to the nest, which he fearlessly performed, while we stationed ourselves below, ready to defend him in case of an attack from the old eagles. No opposition, however, was offered; and on reach-

* Manuel d'Ornith., 2d ed. pp. 50, 51.

ing the nest, it was found, to our disappointment, empty. It was built of large sticks, some of them several feet in length ; within it lay sods of earth, sedge, grass, dry reeds, &c, piled to the height of five or six feet, by more than four in breadth ; it was well lined with fresh pine tops, and had little or no concavity. Under this lining lay the recent exuviæ of the young of the present year, such as scales of the quill, feathers, down, &c. Our guide had passed this place late in February, at which time both male and female were making a great noise about the nest ; and, from what we afterwards learnt, it is highly probable it contained young even at that early time of the season.'*

'The following year,' says Mr Ord, 'on the first day of March, a friend of ours took from the same nest three eggs, the largest of which measured three inches and a quarter in length, two and a quarter in diameter, upwards of seven in circumference, and weighed four ounces, five drachms, apothecaries' weight ; the colour, a dirty yellowish white, one was of a very pale bluish white ; the young were perfectly formed. Such was the solicitude of the female to preserve her eggs, that she did not abandon the nest until several blows, with an axe, had been given the tree.'†

'A few miles from this,' continues Wilson, 'is another eagle's nest, built also on a pine tree, which, from the information received from the proprietor of the woods, had been long the residence of this family of eagles. The tree on which the nest was originally built had been for time immemorial, or at least ever since he remembered, inhabited by these eagles. Some of his sons cut down this tree to procure the

* Wilson, Amer. Ornith., vii, 19.
† Ord, in Amer. Ornith. ix, p. 129.

young, which were two in number; and the eagle soon after commenced building another nest on the very next adjoining tree, thus exhibiting a very particular attachment to the spot. The eagles, he says, make it a kind of home and lodging place in all seasons. This man asserts, that the gray, or sea-eagles, are the young of the bald eagles, and that they are several years old before they begin to breed. It does not drive its young from the nest like the osprey, or fish-hawk; but continues to feed them long after they leave it.'*

It would appear that this eagle is partial to the vicinity of cataracts, great numbers of them frequenting the falls of Niagara; and in Lewis and Clark's expedition, we meet with the following account of one of their nests, which must have added not a little to the picturesque effect of the magnificent scenery at the falls of the Missouri. 'Just below the upper pitch,' say these travellers, 'is a little island in the middle of the river well covered with timber. Here, on a cotton wood tree, an eagle had fixed its nest, and seemed the undisputed mistress of the spot, to contest whose dominion neither man nor beast would venture across the gulfs which surround it, and which is further secured by the mist rising from the falls.'†

The structure reared by the golden eagle (*Aquila chrysaëta*, Ray) is very similar to the preceding, being quite flat, without any perceptible hollow, and commonly placed between two rocks in a dry inaccessible place, the same nest serving for a whole generation. It is constructed nearly like a floor with sticks five or six feet long, supported at the extremities and crossed with pliant branches. It is not covered above, but is

* Wilson, Amer. Ornith, vii, 20.

† Hist. of the Expedition, vol. i, p. 264.

said to be sheltered by the projection of the upper part of the rock; but the latter is probably nothing more than a fancy, or a circumstance quite accidental, for it is not mentioned in the description of any individual eagle's nest which we have met with. Willughby, for example, describes one found in the peak of Derbyshire, which 'was made of great sticks, resting one end on the edge of a rock, the other on two birch trees. Upon these was a layer of rushes, and over them a layer of heath, and upon the heath rushes again; upon which lay one young one and an addle egg; and by them a lamb, a hare, and three heath poults. The nest was about two yards square and had no hollow in it. The young eagle was of the shape of a gos-hawk, of almost the weight of a goose, rough footed, or feathered down to the foot, having a white ring about the tail.'*

In Scotland, where these birds are more numerous than in England, pairs have been observed to nestle in the same cliffs for centuries. 'One of these places,' says a recent author, 'is Lochlee, at the head of the North Esk, in Forfarshire. That lake lies in a singular basin, between two perpendicular cliffs on the north, and high and precipitous mountains on the south. A pair of eagles inhabit each side, so that three may sometimes be seen floating in the air at once; but those that have their abode in the inaccessible cliffs on the north seem to be lords of the place, as the south ones do not venture to beat the valley while these are on the wing. The pair, though they drive off their young, and every creature but man, whose haunts they shun, are closely associated together; when one is seen for any length of time

* Ornithology, by Ray, p. 97.

the other is sure not to be far distant; and the one may often be seen flying low and beating the bushes, while the other floats high in air, in order to pounce upon the frightened prey.'*

These accounts agree with the description in the book of Job, which is throughout rich in natural history. 'Doth the eagle mount up at thy command and make her nest on high? She dwelleth and abideth on the rock, upon the crag of the rock, and the strong place. From thence she seeketh her prey, and her eyes behold afar off.'†

We may remark, in passing, that the descriptions of the golden eagle given by systematic authors correspond but little with the name. Willughby says, that, 'the small feathers of the whole body are a dark ferruginous or chestnut;' Linnæus, that 'the body is variegated with brown and rusty;' Latham, that the 'head and neck are deep brown, the feathers bordered with tawny, hind-head bright rust colour, body dark brown;' Bewick, that 'the general colour is deep brown, mixed with tawny on the head and neck;' Fleming, that 'the acuminated feathers on the head and neck are bright rust colour, the rest of the plumage dusky brown;' Baron Cuvier, that it is 'more or less brown;' Temminck, that 'the young at the age of one or two years have all the plumage of a ferruginous or reddish brown, clear and uniform on all parts of the body; and in proportion as they advance in age the colours of the plumage become more embrowned (*rembrunissent*);' while Buffon alone says, the plumage 'at first is white, then faint yellow, and afterwards it becomes a bright copper colour.' Belon even ventures to infer that when Aristotle first used the term golden (χρυσαετος), he

* British Naturalist, p. 68-9. † Job, chap. xxxix, 27-29.

did not mean that it was gilded, but only rather more reddish than other species.* But, on turning to the passage in Aristotle, we find that he says expressly, that 'the colour is yellow' (χρωμα ξανθος).†

During the summer of 1829, we saw an eagle kept in the garden of Mr Perkins, at Lee in Kent, whose plumage fully merited Aristotle's epithet of golden, for though it had little metallic lustre, it had that peculiar shade of russet yellow which gold exhibits when alloyed with copper, the feathers appearing indeed as if they had been powdered with gold dust. Previous to this we had seen, both in menageries and museums, many birds called golden eagles, but without the slightest claim to the title, which now first struck us as highly appropriate. In the following August, we saw another bird of this species at large a league or so above Bonn, on the Rhine. It was beating about among the orchards, and on the look-out, no doubt, for a hare or a rabbit, to carry to its eyry, which was probably situated on 'the castled crag of Drachenfels,' immediately opposite, or some other precipice on the Seven Mountains. It was not in the least alarmed at our approach, but alighted on the bough of a fruit tree not fifty yards from the road, where we could distinctly see the same golden tint on its plumage which we had admired in Mr Perkins's eagle. It did not remain long on the branch, but skimmed away slowly under the trees more like a fern-fowl than an eagle. But when we afterwards saw one sailing majestically in the upper air above the Lurlei rocks, we could scarcely believe it was the same species of bird we had previously seen prowling about the

* Belon, Oyseaux, p. 91.

† Aristotle, Hist. Anim., ix, c. 32.

The Golden Eagle (*Aquila chrysaeta*, Ray).

orchard hedge-rows at Mehlem; and we at once acknowledged the accuracy of our great poet, who describes the 'eagle towering in his pride of place.'*

* J. R.

Chapter IX.

Platform Builders Continued.—Washington Eagle. Osprey. Herons. Stork.

It seems to be a singular deviation from the habits of this family (*Falconidæ*, Leach), that the fine species named by Audubon the bird of Washington (*Falco Washingtoniensis*, Aud.) seems to nestle in the holes as well as the shelves of rocks; although, as only one nest is recorded to have been observed, it is not improbable that this may have been accidental like the nestling of herons on the ground, or of jackdaws in rabbit-burrows, which we have elsewhere mentioned. The bird itself is so very rarely met with that the circumstance may never be satisfactorily ascertained. M. Audubon has given a very animated and interesting narrative of his discovery of this magnificent eagle, with a portion of which we shall enrich our pages.

'It was on a winter's evening,' says he, 'in the month of February, 1814, that, for the first time in my life, I had an opportunity of seeing this rare and noble bird, and never shall I forget the delight it gave me. Not even Herschel, when he discovered the famous planet which bears his name, could have experienced more happy feelings; for to have something new to relate, to become yourself a contributor to science, must excite the proudest emotions of the human heart. We were on a trading voyage, ascending the Upper Mississippi, the keen winter blasts whistled over our heads, and the cold from which I suffered had, in

a great degree, extinguished the deep interest which, at other seasons, this river has been wont to awake in me. I lay stretched beside our patroon, the safety of the cargo was forgotten, and the only thing that called forth my attention was the multitude of ducks, of different species, accompanied by vast flocks of swans, which, from time to time, would pass us. My patroon, a Canadian, had been engaged many years in the fur-trade; he was a man of much intelligence, who, perceiving that these birds had engaged my curiosity, seemed only anxious to find some new object to divert me. The eagle flew over us. "How fortunate!" he exclaimed, "this is what I could have wished. Look, sir! the great eagle; and the only one I have seen since I left the lakes." I was instantly on my feet, and having observed it attentively, concluded, as I lost it in the distance, that it was a species quite new to me. My patroon assured me that such birds were indeed rare; that they sometimes followed the hunters, to feed on the carcases of the animals they had killed, when the lakes were closed by the ice; but when open, they would dive in the daytime after fish, and snatch them up in the manner of the fishing-hawk; that they roosted, generally, on the shelves of the rocks, where they built their nests, of which he had discovered several by the quantity of white exuviæ scattered below. His account will be found to accord with the observations which I had afterwards an opportunity of making myself. Being convinced that the bird was unknown to naturalists, I felt particularly anxious to learn its habits, and in what particulars it differed from the rest of its genus. In the United States, from Massachusetts to Louisiana on the seaboard, or as high as the mouth of the Missouri to the north-west (I speak only of the extent of country I have visited, and where I have

seen them), these birds are very rare. This will appear to all, when I say, that during my many long peregrinations I never found more than eight or nine, and only one nest. My next meeting with this bird was a few years afterwards, whilst engaged in collecting cray-fish, in one of those flats which border and divide Green River, in Kentucky, near its junction with the Ohio, from the range of high cliffs which, for some distance, follow the meanders of that stream. I observed on the rocks, which at that place are nearly perpendicular, a quantity of white ordure; thinking that owls resorted thither, I mentioned it to my companions, when one of them, who lived within a mile and a half of the place, told me that it was from the nest of the brown eagle, meaning the young of the white-headed eagle, with which he was acquainted. I assured him this could not be; and remarked, that this species never built in such places, but always in trees. Although he could not answer my objection, he stoutly maintained that a brown eagle of some kind, above the usual size, had built there; he added, that he had espied the nest some days before, and had seen one of the old birds dive and catch a fish. This he thought strange, having, till then, always observed that brown and bald eagles procured this kind of food by robbing the fish-hawks: but if I felt particularly anxious to know what nest it was, I might soon satisfy myself, as the old birds would come and feed their young with fish; he had seen them do so before. In high expectation, I seated myself about a hundred yards from the foot of the rock. Never did time pass more slowly; I could not help betraying the most impatient curiosity, for my hopes whispered it was the great eagle's nest. Two long hours had elapsed before the old bird made his appearance, which was announced to us by the loud hissings of

the two young ones, who crawled to the extremity of the hole to receive a fine fish. I had a perfect view of this noble bird, as he held himself to the edging rock, his tail spread, and his wings partly so, and hanging something like the bank swallow. I trembled, lest a word should escape from my companions — the slightest murmur had been treason from them; they entered into my feelings, and, although little interested, gazed with me. In a few minutes the other parent joined her mate, which, from the difference in size (the female being much larger), we knew to be the mother-bird. She, also, had brought a fish; but, more cautious than her mate, ere she alighted she glanced her quick and piercing eye around, and instantly perceived her procreant bed had been discovered; she dropped her prey, with a loud shriek communicated the alarm to the male, and hovering with him over our heads, kept up a growling threatening cry, to intimidate us from our suspected design. This watchful solicitude I have ever found peculiar to the female. The young having hid themselves, we went and picked up the fish which the mother had let fall; it was a white perch, weighing about $5\frac{1}{2}$ lbs, the upper part of the head was broken in, and the back torn by the talons of the eagle. We had plainly seen her bearing it in the manner of the fish-hawk. This day's sport being at an end, as we journeyed homewards we agreed to return the next morning, being most anxious to procure both the old and young birds; but rainy and tempestuous weather setting in, our expedition was obliged to be postponed till the third day following, when, with guns and men all in readiness, we reached the rock. Some posted themselves at the foot, others upon it, but in vain. We passed the entire day without either seeing or hearing an eagle; the sagacious birds, no doubt, having anticipated an

invasion, had removed their young to fresh quarters. I come at last to the day I had so often and so ardently desired. Two years had gone by since the discovery of the nest, in fruitless excursions; but my wishes were no longer to remain ungratified. In returning from the little village of Henderson to the house of Doctor R*****, about a mile distant, I saw one rise from a small inclosure not a hundred yards before me, where the doctor had, a few days before, slaughtered some hogs, and alight upon a low tree branching over the road. I prepared my double-barrelled piece, which I constantly carry, and went slowly and cautiously towards him; quite fearless he awaited my approach, looking upon me with an undaunted eye. I fired, and he fell; before I reached him he was dead. With what delight I surveyed this magnificent bird! I ran and presented him to my friend, with a pride which those can only feel, who, like me, have devoted their earliest childhood to such pursuits, and have derived from them their first of pleasures; to others, I must seem 'to prattle out of fashion.' The doctor, who was an experienced hunter, examined the bird with much satisfaction, and frankly acknowledged he had never before seen or heard of it. The name I chose for this new species of eagle, was 'The bird of Washington,' from its being indisputably the noblest of the genus known to naturalists.'*

The fish-hawk of the Americans, or osprey (*Pandion haliætus*, SAVIGNY) of the old continent, which seems to be the same bird, does not consider an elevated or inaccessible situation indispensable for the protection of its nest, trusting to the means for defence which nature has bestowed upon it, in its formidable talons and beak. The nest is usually built on the top of a dead or decaying tree, sometimes not more than fif-

* Loudon's Mag. of Nat. Hist. i, p. 118.

teen, but often upwards of fifty, feet from the ground. The people of the sea-coast of North America, where these birds frequently build, are of opinion that the most thriving tree will die in a few years, after being taken possession of by a fish-hawk, a circumstance which has been ascribed to the quantities of fish-oil and the excrements of the bird destroying vegetation; others think it is occasioned by the great mass of salt materials of which the nest is composed. It would be well, however, to ascertain the fact, before we speculate upon it. Wilson says, 'In my late excursions to the sea shore, I ascended to several of these nests that had been built in from year to year, and found them constructed as follows: externally, large sticks from half an inch to an inch and a half in diameter, and two or three feet in length, piled to the height of four or five feet, and from two to three feet in breadth; these were intermixed with corn-stalks, sea-weed, pieces of wet turf in large quantities, mullein stalks, and lined with dry sea-grass; the whole forming a mass very observable at half a mile's distance, and large enough to fill a cart, and form no inconsiderable load for a horse. These materials are so well put together, as often to adhere in large fragments after being blown down by the wind.'*

The extraordinary number of these nests, considering the fish-hawk as a large bird of prey, is not the least remarkable circumstance attending them. In some parts, Wilson says, he has counted more than twenty of their nests within half a mile; and his correspondent, Mr Gardiner, informed him that on a small island, where he resided, there were at least three hundred nests of fish-hawks, whose young, on an average, he calculated to consume not less than six hundred fish daily.

* Wilson, Amer. Ornith. v, 13.

These birds, like our own rooks, leave their breeding places in autumn; and like them, also, before departing, regularly repair their nests, carrying up sticks, sods, &c, to fortify them against the violence of the winter storms. This indicates a very remarkable degree of prospective contrivance, irreconcilable, as it appears to us, with the common theories of instinct. But notwithstanding all their precautions, they frequently, on their return in spring, find their nests in ruins, lying around the roots of trees, and sometimes the tree itself uprooted and fallen. It has been observed, when a number of fish-hawks, to the amount of twenty and upwards, collect together on one tree, making a loud squalling noise, there is generally a nest built soon after on the same tree, and hence the noisy assemblage has been conjectured to be a kind of property-court for settling the right of a pair to the premises, or a kind of wedding or joyous festive meeting upon the occasion. We have observed similar noisy assemblies of house-sparrows, early in spring, probably for some similar purpose. In their communities, thus established, the fish-hawks are of a mild and peaceable disposition, living together in great peace and harmony, not only among themselves, but with the crow-blackbirds (*Quiscalus versicolor*, BONAPARTE), which breed on the very edge of their nests; consequently instances of individual attack and robbery are very rare amongst them.

It would appear that the Americans are very fond of these birds, from some prevalent superstition connected with them. 'It has been considered,' says Dr S. Mitchell, of New York, 'a fortunate incident to have a nest and a pair of these birds on one's farm. They have, therefore, been generally respected, and neither the axe nor the gun has been lifted against them. Their nest continues from year

to year. The same couple, or another, as the case may be, occupies it season after season. Repairs are duly made; or, when demolished by storms, it is industriously rebuilt. There was one of these nests, formerly, upon the leafless summit of a venerable chestnut-tree, on our farm, directly in front of the house, at the distance of less than half a mile. The withered trunk and boughs, surmounted by the coarse-wrought and capacious nest, was a more picturesque object than an obelisk. And the flights of the hawks, as they went forth to hunt, returned with their game, exercised themselves in wheeling round and round and circling about it, were amusing to the beholder, almost from morning till night. The family of these hawks, old and young, was killed by the Hessian jagers. A succeeding pair took possession of the nest; but, in the course of time, the prongs of the trunk so rotted away that the nest could no longer be supported. The hawks have been obliged to seek new quarters. We have lost this part of our prospect, and our trees have not afforded a convenient site for one of their habitations since.'*

The several species of Herons may not improperly be ranked among the platform builders; for though they construct a shallow depression in the centre of the nest, which is by all the species, if we mistake not, lined with some sort of soft material, such as dry grass, rushes, feathers, or wool; the body of the nest is quite flat, and formed much in the manner of an eagle's eyry, of sticks crossing one another, and supported upon the branches or between the forks of high trees. All the species also are social, nestling in large communities, after the manner of rooks; though instances are not uncommon of individual pairs breeding solitary. Belon tells us, that 'the

* Wilson, Amer. Ornith. v, 15.

heron is royal meat, on which the French nobility set great value,' and he mentions it as one of the extraordinary feats performed by the 'divine king,' Francis I, that he formed two artificial heronries at Fontainbleau, — 'the very elements themselves,' he adds, 'obeying the commands of this divine king (whom God absolve!); for, to force nature is a work partaking of divinity!'* In order to enhance the merit of these French heronries, he undertakes to assert that they were unknown to the ancients, because they are not mentioned in any of their writings; and, for the same reason, he concludes that there are none in Britain! Before Belon's time, on the contrary, and before the 'divine' constructor of heronries in France was born, there were express laws enacted in England for the protection of herons, it being a fine of ten shillings to take the young out of the nests,† and six shillings and eight-pence for a person, without his own grounds, killing a heron, except by hawking or by the long-bow;‡ while, in subsequent enactments, the latter penalty was increased to twenty shillings, or three months' imprisonment.§ At present, however, in consequence of the discontinuance of hawking, little attention is paid to the protection of heronries. Not to know a hawk from a *heronshaw* (the former name for a heron), was an old adage, which arose when the diversion of heron-hawking was in high fashion; it has since been corrupted into the absurd vulgar proverb, 'not to know a hawk from a handsaw!'‖ The flesh of the heron is now looked upon as of little value, and rarely if ever brought to market, though formerly a heron was estimated at thrice the value of a goose, and six times the price of a partridge.¶

* Oiseaux, p. 189. † 19 Henry VII, c. 11. ‡ Ibid.
§ 1 James, c. 27, s. 2. ‖ Pennant, Brit. Zool. ii, 341.
¶ Northumberland Household-Book, p. 104.

The heronries recorded to be existing at present in this country are in Windsor Great Park, on the borders of Bagshot Heath; at Penshurst-place, Kent; at Hutton, the seat of Mr Bethel, near Beverley, in Yorkshire; at Pixton, the seat of Lord Carnarvon; in Gobay Park, on the road to Penrith, near a rocky pass called Yew Crag, on the north side of the romantic lake of Ulswater; at Cressi Hall, six miles from Spalding, in Lincolnshire; at Downington-in-Holland, in the same county; at Brockley Woods, near Bristol;* at Brownsea Island, near Poole in Dorsetshire; and, in Scotland, Colonel Montagu mentions one in a small island, in a lake, where, there being only a single scrubby oak, much too scanty to contain all the nests, many were placed on the ground.† Besides these, we are acquainted with a small one in the parish of Craigie, near Kilmarnock, in Ayrshire.‡ We have little doubt but there are several more unrecorded, for the birds may occasionally be seen in every part of the island. In Lower Britany, heronries are frequently to be found on the tall trees of forests; and as they feed their young with fish, many of these fall to the ground and are greedily devoured by swine, which has given rise to the story that the swine of that country are fattened by fish which drop from the trees like beech-mast.§

Aristotle, Pliny, and Ælian, tell us that a friendship subsisted between the crow and the heron; an opinion which M. Montbeillard imagines to have originated in their sometimes building their nests contiguous to each other, in consequence of their selecting similar breeding places;‖ but we think this is not at all probable, from the crow being a solitary and unsocial bird. If the rook has been meant, the

* Jennings, Ornithologia, p. 199, note.
† Ornith. Dict. Art. Heron. ‡ J. R.
§ Belon, Oiseaux, p. 189. ‖ Oiseaux, art. Le Heron Huppé.

following interesting circumstance, which occurred not long ago at Dallam Tower, in Westmoreland, the seat of Daniel Wilson, esq., somewhat confirms this alleged friendship, although, like human alliances, it was subject to the interruption of rival interests. 'There were,' says Dr Heysham, of Carlisle, 'two groves adjoining to the park: one of which, for many years, had been resorted to by a number of herons, which there built and bred; the other was one of the largest rookeries in the country. The two tribes lived together for a long time without any disputes. At length the trees occupied by the herons, consisting of some very fine old oaks, were cut down in the spring of 1775, and the young had perished by the fall of the timber. The parent birds immediately set about preparing new habitations in order to breed again; but as the trees in the neighbourhood of their old nests were only of a late growth, and not sufficiently high to secure them from the depredations of boys, they determined to effect a settlement in the rookery. The rooks made an obstinate resistance; but, after a very violent contest, in the course of which many of the rooks, and some of their antagonists, lost their lives, the herons at last succeeded in their attempt, built their nests, and brought out their young.

'The next season the same contests took place, which terminated like the former, by the victory of the herons. Since that time peace seems to have been agreed upon between them; the rooks have relinquished possession of that part of the grove which the herons occupy; the herons confine themselves to those trees they first seized upon, and the two species live together in as much harmony as they did before their quarrel.'*

The plumes of the heron were formerly in high request in Europe, as ornaments for the caps and

* Heysham, in Bewick's Birds, ii, 11, note.

helmets of the nobility; and they still form a part of the splendid costume of a knight of the garter. In the East they bear a high value. Chardin tells us, that the Persians catch the heron, and after depriving it of its long feathers suffer it to depart;* and these plumes even form a part of the royal coronet or crown of Persia. Not only so, but diamonds and other precious stones, set in the shape of heron's feathers, adorn the dhul-bandt of the Persian monarch,—some of which are said to be worth more than twenty thousand pounds sterling.† In North America also, the Indians, who are very choice in feathers, hold those of the several species of heron in high estimation, for ornamenting their hair or top-knot, and Wilson tells us, they are sometimes seen in the market place of New Orleans with bunches of them for sale.‡

It is not improbable that the notion of head-dresses with waving plumes was derived from several species of the birds in question; for though the crest of the common heron is small and proportionally inconspicuous, that of the egret (*Ardea egretta*,) and still more of the demoiselle (*Anthropoides Virgo*, VIEILLOT), is exceedingly elegant. In the latter, a tuft of very long white silky feathers flows gracefully down from above each eye, while the feathers of the neck and breast are pendent for nearly a foot over the other parts of the plumage. But though we may suppose the fashion to have originated from the elegant crests of these birds, it was chiefly, we believe, their tail feathers which were in request. These are more light and graceful than the thick heavy plumes of the ostrich which have superseded them.

The picture which Wilson has drawn of the breeding-places of some of the American herons is worth

* Chardin's Travels, p. 82.
† Coronat. of Solyman, iii, p. 40-1.
‡ Amer. Ornith., vii, 112.

quoting. The great heron (*Ardea Herodias*), for example, builds a spacious platform of sticks, covered with small twigs, on the top of a tall cedar, a community of ten or fifteen pairs usually building in company. 'Many of their breeding-places,' says Wilson, 'occur in both Carolinas, chiefly in the vicinity of the sea. In the lower parts of New Jersey they have also their favourite places for building and rearing their young. These are generally in the gloomy solitudes of the tallest cedar swamps, where, if unmolested, they continue annually to breed for many years. These swamps are from half a mile to a mile in breadth, and sometimes five or six in length, and appear as if they occupied the former channel of some choked-up river, stream, lake, or arm of the sea. The appearance they present to a stranger is singular: a front of tall and perfectly straight trunks, rising to the height of fifty or sixty feet without a limb, and crowded in every direction, their tops so closely woven together as to shut out the day, spreading the gloom of a perpetual twilight below. On a nearer approach they are found to rise out of the water, which, from the impregnation of the fallen leaves and roots of the cedars, is of the colour of brandy. Amidst this bottom of congregated springs, the ruins of the former forest lie piled in every state of confusion. The roots, prostrate logs, and in many places the water, are covered with green mantling moss; while an undergrowth of laurel, fifteen or twenty feet high, intersects every opening so completely as to render a passage through laborious and harassing beyond description: at every step you either sink to the knees, clamber over fallen timber, squeeze yourself through between the stubborn laurels, or plunge to the middle in ponds made by the uprooting of large trees, and which the moss concealed from observation. In calm weather the

silence of death reigns in these dreary regions; a few interrupted rays of light shoot across the gloom; and, unless for the occasional hollow screams of the herons, and the melancholy chirping of one or two species of small birds, all is silence, solitude, and desolation. When a breeze rises, at first it sighs mournfully through the tops; but, as the gale increases, the tall, mast-like cedars wave like fishing-poles, and rubbing against each other, produce a variety of singular noises, that, with the help of a little imagination, resemble shrieks, groans, or the growling of beasts of prey.'*

Wilson gives a similarly interesting account of the breeding-places of the night heron or Qua bird (*Nycticorax Germanis*, WILLUGHBY), which has been occasionally seen in Britain as a straggler. 'The night heron,' he tells us, 'arrives in Pennsylvania early in April, and immediately takes possession of his former breeding-place, which is usually the most solitary and deeply-shaded part of a cedar-swamp. Groves of swamp-oak, in retired and inundated places, are also sometimes chosen; and the males not unfrequently select tall woods on the banks of a river to roost in during the day. These last regularly direct their course, about the beginning of evening twilight, towards the marshes, uttering in a hoarse and hollow tone the sound *qua*. At this hour also all the nurseries in the swamps are emptied of their inhabitants, who disperse about the marshes, and along the ditches and river shore, in quest of food. Some of these breeding-places have been occupied, every spring and summer for time immemorial, by from eighty to one hundred pair of qua birds. In places where the cedars have been cut down for sale, the birds have merely removed to another quarter of the swamp; but when personally attacked, long teazed,

* Wilson, Amer. Ornithol., viii, 29.

and plundered, they have been known to remove from an ancient breeding-place, in a body, no one knew where. Such was the case with one on the Delaware, near Thompson's Point, ten or twelve miles below Philadelphia; which, having been repeatedly attacked and plundered by a body of crows, after many severe encounters, the herons finally abandoned the place. Several of these breeding-places occur among the red cedars on the sea-beach of Cape May, intermixed with those of the little white heron, green bittern, and blue heron. The nests are built entirely of sticks, in considerable quantities, with frequently three or four nests on the same tree. The eggs are generally four in number, measuring two inches and a quarter in length, by one and three quarters in thickness, and of a very pale light blue colour. The ground or marsh below is bespattered with their excrements lying all around like white-wash, with feathers, broken egg-shells, old nests, and frequently small fish, which they have dropped by accident and neglected to pick up. On entering the swamp in the neighbourhood of one of these breeding-places, the noise of the old and the young would almost induce one to suppose that two or three hundred Indians were choking or throtling each other. The instant an intruder is discovered, the whole rise in the air in silence, and remove to the tops of the trees in another part of the woods; while parties of from eight to ten make occasional circuits over the spot to see what is going on. When the young are able, they climb to the highest part of the trees; but knowing their inability, do not attempt to fly. Though it is probable that these nocturnal birds do not see well during the day, yet their faculty of hearing must be exquisite, as it is almost impossible, with all the precautions one can use, to penetrate near their residence without being

discovered. Several species of hawks hover around, making an occasional swoop among the young ; and the bald eagle himself has been seen reconnoitring near the spot, probably with the same design.'*

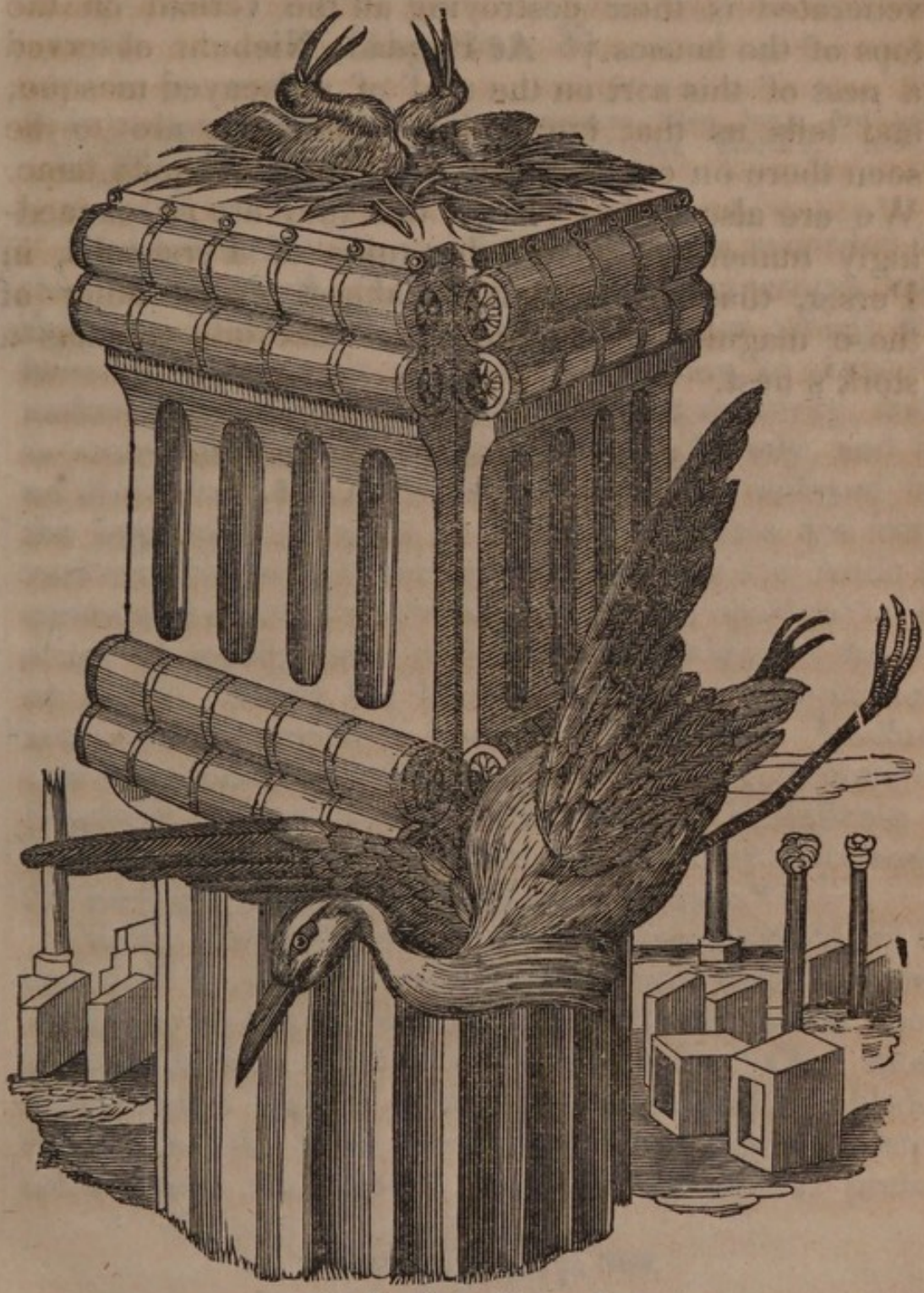
We shall only take notice of one other species of these social birds, the little white heron (*Ardea candidissima*), which, during summer, is particularly fond of salt marshes, where its white plumage renders it very conspicuous, either while wading or when on the wing. 'On the 19th of May,' says Wilson, 'I visited an extensive breeding-place of the little white heron, among the red cedars of Sommers's beach, on the coast of Cape May. The situation was very sequestered, bounded on the land side by a fresh-water marsh or pond, and sheltered from the Atlantic by ranges of sand-hills. The cedars, though not high, were so closely crowded together as to render it difficult to penetrate through them. Some trees contained three, others four nests, built wholly of sticks. The birds rose in vast numbers, but without clamour, alighting on the tops of the trees around, and watching the result in silent anxiety. Among them were numbers of the night heron, and two or three of the purple-headed (*N. cærulea*). Great quantities of egg-shells lay scattered under the trees, occasioned by the depredations of the crows, who are continually hovering about the place.'†

The two allied species, the stork and the crane, do not build on trees like the herons, but on rocks, or by preference upon houses, churches, or ruined buildings ; and, like all birds which affect such situations, they are everywhere held sacred, or at least protected. Thus we learn from Juvenal, that a stork built its nest on the Temple of Concord‡ at Rome,

* Wilson, Amer. Ornith. vii, 108.

† Wilson, Amer. Ornith. vii, 126. ‡ Satir. i, 116.

in the midst of all the noise and bustle of the capitol, a circumstance which was considered remarkable enough to be commemorated in the medals of Adrian.



Stork's Nest at Persepolis.

Southey says that in Spain the storks build their broad nests on the towers of churches, and are held sacred.* At Seville almost every tower in the city is peopled with them, and they return annually to the same nests One of the causes of their being venerated is their destroying all the vermin on the tops of the houses.† At Bagdad, Niebuhr observed a nest of this sort on the roof of a decayed mosque, and tells us that hundreds of the birds are to be seen there on every house, wall, and tree, quite tame. We are also told by Fryer that they are so exceedingly numerous among the ruins of Persepolis, in Persia, that the summit of almost every pillar of those magnificent monuments of antiquity contains a stork's nest.

* Letters from Spain, i, 126 and 228.

† Dillon's Travels, p. 308.

Chapter X.

Basket-making Birds.—The Jay. American Blue Jay. Bulfinch. Mocking-bird. Solitary Thrush. Red-winged Starling. Missel Thrush. American Basket-making Birds.

Although, in many of the instances recorded in this volume, birds far excel us in the neatness and delicacy of their workmanship, yet those which we have in the present chapter to compare to basket-makers, do not always manifest much dexterity, and, in some cases, make their nests very loosely, and in an ill-finished manner. The materials employed by the ingenuity of man in making baskets are very various; for though the greater number are made of osiers and other flexible twigs, some are constructed of strips of wood, some of leaves, and others of rushes or reeds. Even the least refined of savage nations are often dexterous in such manufactures. Vaillant saw some baskets among the Gonaque Hottentots of Southern Africa worked with reeds in so delicate a manner, and of so close a texture, that they were used for carrying water, milk, and other liquids.*

Birds, however, make use of many more kinds of materials in forming their nest-baskets than is done, so far as we know, in our manufactures; while they seldom, if ever, employ osiers as we do. Our most conspicuous and best-known basket-making birds, indeed, so far from always selecting flexible materials, which we should deem indispensable, prefer

* Travels, vol. i, p. 360.

brittle dead sticks at least for the outworks; which are, in fact, constructed, at the commencement of the nest, much on the model of the platform builders. The jay (*Garrulus glandarius*, Brisson), for example, selects for its nest the fork of a bush or tree in a solitary part of a wood, precisely similar to the ring-dove (*Columba Palumbus*), and commences the structure so exactly like it, that it would not be easy to tell the difference between a finished nest of the one and a half-finished nest of the other. But it would appear that the jay, — a much shrewder bird

Nest of the Jay (Garrulus glandarius, Brisson.)

in many respects than the ring dove, — probably finding its five or six eggs more difficult to manage than the ring-dove's two, makes an addition to the flat nest, which effectually prevents the eggs from rolling off. Upon the platform, as a foundation, the jay constructs a sort of rude basket-work of roots thickly matted together, the hollow being very shallow, just large enough to contain the eggs, and greatly smaller in proportion than the basement, as may be seen in the figure. A specimen of the jay's nest in the British Museum is quite flat, and composed of fewer materials than a ring-dove's. We consider it to be only the inner bottom of the basket, the base and sides having been trimmed off, as is frequently done, by nest collectors. If this is not so, we can only say that it is very unlike any of the jay's nests which we have examined in their original localities both in England and Scotland, all of these having a shallow cup-shaped basket of matted roots placed upon a platform of birch and other small twigs very irregularly piled together.*

It would appear, from Mr Abbot's description, that the blue jay of America (*Garrulus cristatus*, Brisson) builds a very similar nest; but, though smaller than ours, it builds much higher, selecting the fork of an oak or a pine about thirty feet from the ground, whereas ours is seldom more than from seven to twelve feet high, and concealed with so much art that it is seldom discovered.† Wilson says it builds a large nest frequently in the cedar, and sometimes in an apple-tree, and lines it with dry fibrous roots.

Our own jay is a fine bird, of a chestnut-brown coat, contrasting elegantly with his beautiful barred wings of blue and black, and the eyes of a pale blue.

* J. R. † Latham, Gen. Hist. of Birds, iii.

But, if Wilson's description is not over-coloured, it is far surpassed by the American blue jay (*Garrulus cristatus*). 'This elegant bird,' says he, 'which, as far as I can learn, is peculiar to North America, is distinguished as a kind of beau among the feathered tenants of our woods, by the brilliancy of his dress, and, like most other coxcombs, makes himself still more conspicuous by his loquacity, and the address of his tones and gestures. The jay measures eleven inches in length; the head is ornamented with a crest of light blue or purple feathers, which he can elevate or depress at pleasure; a narrow line of black runs along the frontlet, rising on each side higher than the eye, but not passing over it, as Catesby has represented, and as Pennant and many others have described it; back and upper part of the neck a fine light purple, in which the blue predominates; a collar of black proceeding from the hind head passes with a graceful curve down each side of the neck to the upper part of the breast, where it forms a crescent; chin, cheeks, throat, and belly white, the three former slightly tinged with blue; greater wing-coverts a rich blue, exterior sides of the primaries light blue, those of the secondaries a deep purple, except the three feathers next the body, which are of a splendid light blue; all these, except the primaries, are beautifully barred with crescents of black, and tipped with white; the interior sides of the wing-feathers are dusky black; tail long and wedge-shaped, composed of twelve feathers of a glossy light blue, marked at half-inches with transverse curves of black, each feather being tipt with white except the two middle ones, which deepen into a dark purple at the extremities; breast and sides, under the wings, a dirty white, faintly stained with purple; inside of the mouth, the tongue, bill, legs, and claws, black; iris of the eye

hazle. A blue jay,' continues Wilson, 'which I have kept for some time, and with whom I am on terms of familiarity, is a very notable example of mildness of disposition and sociability of manners. An accident in the woods first put me in possession of this bird, while in full plumage, and in high health and spirits; I carried him home with me, and put him into a cage already occupied by a gold-winged woodpecker, where he was saluted with such rudeness, and received such a drubbing from the lord of the manor, for entering his premises, that, to save his life, I was obliged to take him out again. I then put him into another cage, where the only tenant was a female orchard oriole. She also put on airs of alarm, as if she considered herself endangered and insulted by the intrusion; the jay, meanwhile, sat mute and motionless on the bottom of the cage, either dubious of his own situation, or willing to allow time for the fears of his neighbour to subside. Accordingly, in a few minutes, after displaying various threatening gestures (like some of those Indians we read of in their first interviews with the whites), she began to make her approaches, but with great circumspection, and readiness for retreat. Seeing, however, the jay begin to pick up some crumbs of broken chestnuts in a humble and peaceable way, she also descended, and began to do the same, but, at the slightest motion of her new guest, wheeled round and put herself on the defensive. All this ceremonious jealousy vanished before evening, and they now roost together, feed, and play together in perfect harmony and good humour. When the jay goes to drink, his messmate very impudently jumps into the water to wash herself, throwing the water in showers over her companion, who bears it all patiently, venturing now and then to take a sip between every splash without betraying the smallest token of irritation. On the

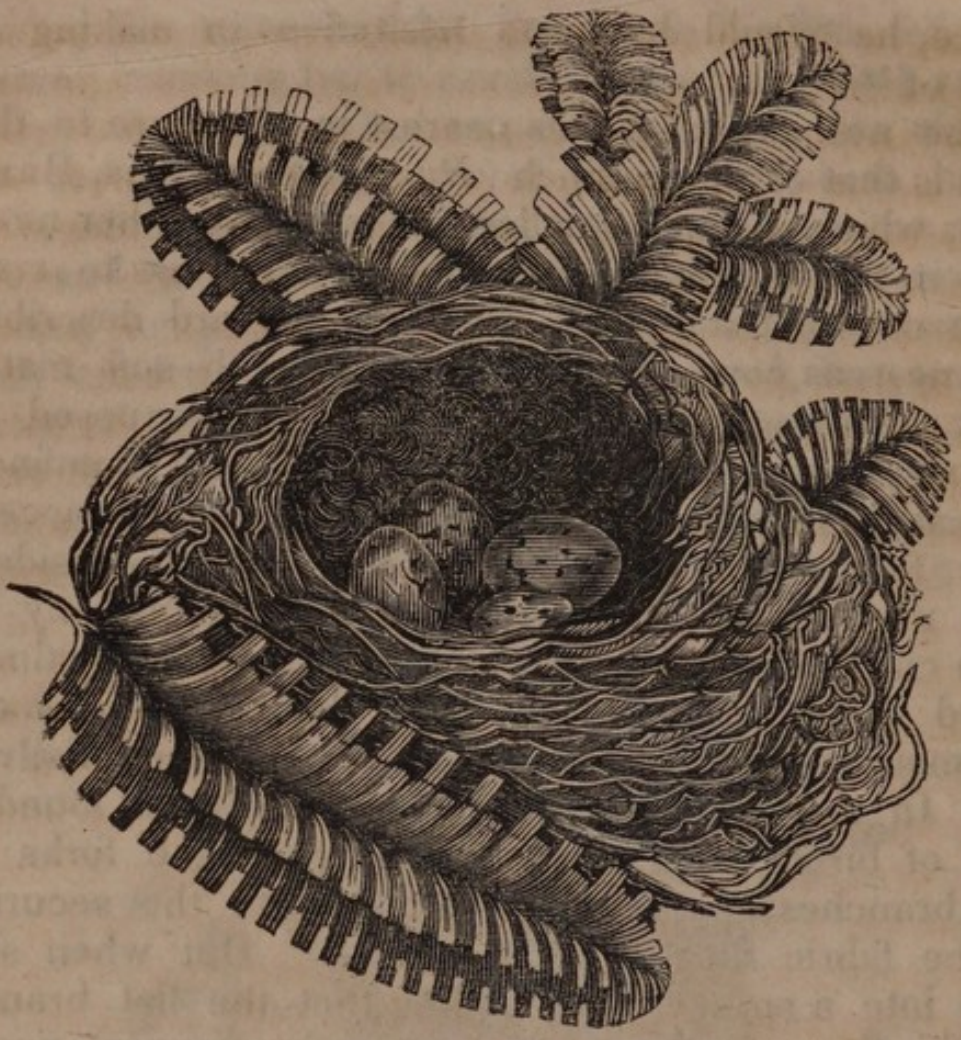
contrary, he seems to take pleasure in his little fellow-prisoner, allowing her to perch (which she does very gently) about his whiskers, and to clean his claws from the minute fragments of chestnuts which happen to adhere to them. This attachment, on the one part, and mild condescension on the other, may, perhaps, be partly the effect of mutual misfortunes, which are found not only to knit mankind, but many species of inferior animals more closely together, and shows that the disposition of the blue jay may be humanized, and rendered susceptible of affectionate impressions even for those birds which, in a state of

The American Blue Jay (Garrulus cristatus, Brisson)

nature, he would have no hesitation in making a meal of.'*

The nest which comes nearest in structure to the jay's is that of the bulfinch (*Pyrrhula vulgaris*, Brisson), which is much smaller, indeed, and rather more neat in the workmanship. We are at a loss to conceive on what authority M. Montbeillard describes this nest as consisting of moss lined with soft materials, with an opening said to be the least exposed to the prevailing wind; and no less why M. Temminck says it 'builds in the most elevated and least accessible forks of trees.'† We have seen a considerable number of these nests, and never found any of such circumstances correspond. We have sometimes found them built in low thick bushes; but most commonly on the flat branch of a spruce pine, or silver fir. In the former case the bulfinch lays a foundation of birch twigs, placed crossways in the forks of the branches, paying more attention to the security of the fabric than to its neatness. But when she gets into a spruce pine, finding that the flat branch itself is an excellent foundation, she uses a much smaller number of sticks. When she has reared a ground-work to her mind, she proceeds to collect a quantity of flexible fibrous roots, which she intertwines into a sort of basket-work, rather loose, and only sufficient to hold the eggs and young from rolling down. The inside is wholly lined with fine roots without any hair or feathers. Dr Latham says, she rarely uses moss:‡ we should be inclined from our own observation to say, never; nor have we ever found this nest in 'high and inaccessible branches, seldom less than five or six feet from the ground,' as M. Montbeillard says, but usually about four, and sometimes even lower.§

* Wilson, Amer. Ornith., i, 15.
† Manuel d'Ornith. i, 340.
‡ General Hist. vol. vii, p. 380 § J R.



Nest of the Bulfinch (Pyrrhula vulgaris, Brisson).

The celebrated American mocking bird (*Orpheus polyglottus*, Swains.) may not inappropriately follow our bulfinch, making its nest of similar materials, though it would appear from the description, as well as from Audubon's beautiful figure, to be a more substantial structure. 'The precise time,' says Wilson, 'at which the mocking-bird begins to build his nest, varies according to the latitude in which he resides. In the lower parts of Georgia he commences building early in April; but in Pennsylvania rarely before the 10th of May; and in New York and the states of New England still later. There are particular situations to which he gives the preference. A solitary thorn-bush; an almost inpenetrable thicket; an orange-tree,

cedar, or holly-bush, are favourite spots and frequently selected. It is no great objection with him that these happen, sometimes, to be near the farm or mansion house: always ready to defend, but never over anxious to conceal, his nest, he very often builds within a small distance of the house; and not unfrequently in a pear or apple-tree; rarely at a greater height than six or seven feet from the ground. The nest varies a little with different individuals, according to the conveniency of collecting suitable materials. A very complete one is now lying before me, and is composed of the following substances. First a quantity of dry twigs and sticks, then withered tops of weeds of the preceding year intermixed with fine straws, hay, pieces of wool, and tow; and, lastly, a thick layer of fine fibrous roots, of a light brown colour, lines the whole. The eggs are four, sometimes five, of a cinereous blue, marked with large blotches of brown. The female sits fourteen days; and generally produces two broods in the season, unless robbed of her eggs, in which case she will even build and lay the third time. Attempts have been made to induce these charming birds to pair, and rear their young in a state of confinement, and the result has been such as to prove it, by proper management, perfectly practicable. In the spring of 1808, a Mr Klein, living in North Seventh Street, Philadelphia, partitioned off about twelve feet square in the third story of his house. This was lighted by a pretty large wire-grated window. In the centre of this small room, he planted a cedar bush, five or six feet high, in a box of earth; and scattered about a sufficient quantity of materials suitable for building. Into this place, a male and female mocking-bird were put, and soon began to build. The female laid five eggs, all of which she hatched, and fed the young with great affection until they were nearly able to fly. Business calling the proprietor from home,

for two weeks, he left the birds to the care of his domestics; and on his return found, to his great regret, that they had been neglected in food. The young ones were all dead, and the parents themselves nearly famished. The same pair have again commenced building this season, in the same place, and have at this time, July 4, three young, likely to do well. The place might be fitted up with various kinds of shrubbery, so as to resemble their native thickets; and ought to be as remote from noise and interruption of company as possible, and strangers rarely allowed to disturb or even approach them.'*

The Mocking-bird (Orpheus polyglottus).

The hermit or solitary thrush (*Turdus solitarius*), which has been erroneously said to be found in Britain,

* Wilson, Amer. Ornith., ii, 24.

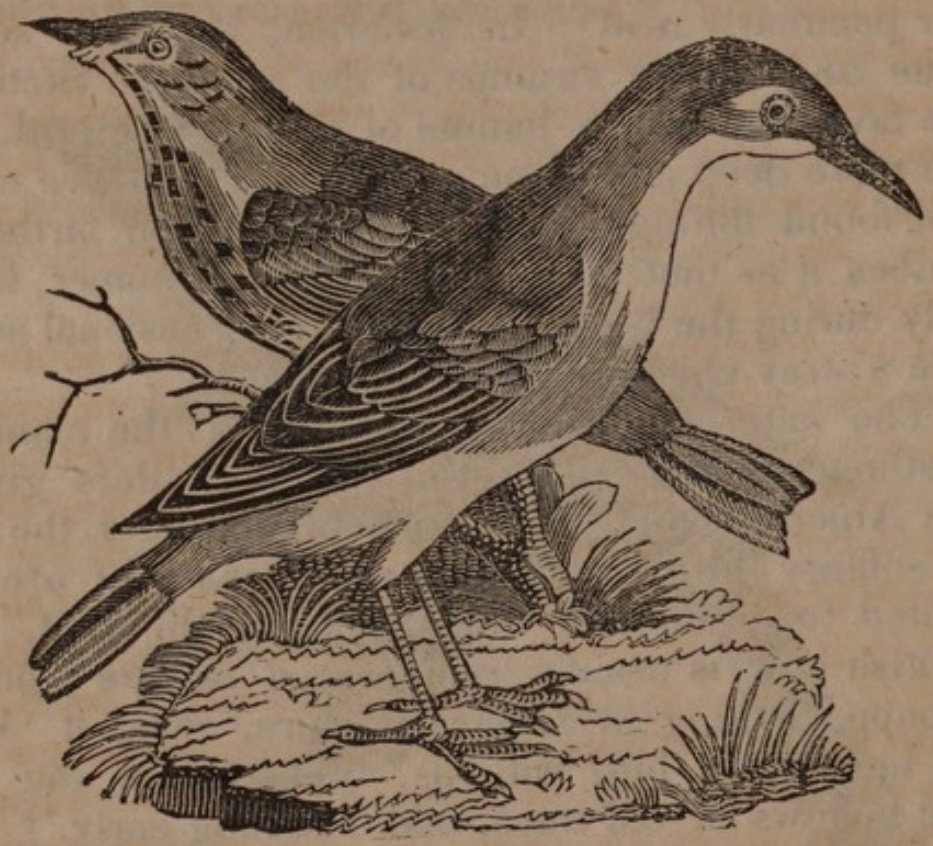
and is reported to be of frequent occurrence both in Europe and America, executes a nest of basket-work still more neatly than the mocking-bird. Wilson describes one which he examined, as having been fixed on the upper part of the body of a branch, and constructed with great neatness ; but without mud or plaster, as is invariably the case with the wood-thrush (*Turdus melodus*). The outside was composed of a considerable quantity of coarse rooty grass, intermixed with horse-hair, and lined with a fine green-coloured, thread-like grass, perfectly dry, laid circular in a manner peculiarly neat. In America, the dark solitary cane and myrtle swamps of the southern States are the favourite native haunts of this recluse bird ; and the more deep and gloomy these are, the more certain is it found flitting among them. Wilson farther describes it as mute both in spring and summer, having only during the breeding season an occasional squeak like a stray chicken.*

The latter circumstance, as well as the manner of nestling, and indeed most of the particulars given of the American and the British birds, under the name of solitary thrush, so little accord, that we are warranted to pronounce them entirely different. The British bird is usually represented as rare ; but Mr Knapp, writing in Gloucestershire, says, it 'is not an uncommon bird with us, breeding in the holes and hollows of old trees, and hatching early.'† Colonel Montagu again says, it frequents mountainous situations, and is always seen alone except in the breeding season, preparing its nest like the starling, in old ruined edifices, church towers, and other similar places ; but two nests are never found in the same place : 'the young,' he adds, 'are easily brought up, and repay the trouble by their sweet

* Wilson, Amer. Ornith., v, 95.

† Journ. of a Naturalist, p. 207, 1st edit.

native song.'* The dull cream colour of the throat, marked with large dark brown pointed spots also in the American bird, accord not at all with the pale yellowish brown, mottled with a darker shade, of the bird described by Montagu ; nor does its general appearance correspond with the bleak and weather-beaten appearance of a way-worn traveller, even in its youth, to use the forcible language of Mr Knapp. The very shape of the birds is different, as may be seen in the figures.



The Solitary Thrushes of England and America, from Wilson and Montagu.

Since both Colonel Montagu and Mr Knapp speak of their solitary thrush as breeding, it would seem to us, unless they may have been deceived in this, that the opinions of some other naturalists on the subject require further investigation. Speaking of the com-

* Sup. to Ornith. Dict.

mon starling (*Sturnus vulgaris*, LINN.), Selby says, 'The young birds, previous to autumn, or the first moult, are of a uniform hair-brown colour, lightest upon the throat, or upper parts. In this state it has been described by Montagu and Bewick as a distinct species, under the name of solitary thrush.'* In this Fleming agrees.† Syme, however, says the solitary thrush has 'all the appearance of a matured adult bird in full feather, its plumage being lighter than that of the young starling; and bird-fanciers know it has a most excellent natural song. Now this is not the case with either young or old starlings; at least those we have had are of a dull, dingy black, somewhat like the young of the black and the ring ousels, — they do not seem matured, their feathers hang loose about them, they have a bunchy appearance, and possess all the characteristics by which young birds are distinguished.'‡

The red-winged starling (*Sturnus prædatorius*, WILSON, *Agelaus phœniceus* of modern naturalists) is not only remarkable for his basket-work, but also for the variety with which his nest is, according to circumstances, constructed, furnishing one of the best instances with which we are acquainted, of the adaptation of means to ends. 'About the 20th of March,' says Wilson, 'or earlier, if the season be open, they begin to enter Pennsylvania in numerous, though small parties. These migrating flocks are usually observed from day-break to eight or nine in the morning, passing to the north, chattering to each other as they fly along; and, in spite of all our antipathy, their well-known notes and appearance, after the long and dreary solitude of winter, inspire cheerful and pleasing ideas of returning spring, warmth, and verdure. Selecting their old haunts, every meadow

* Illust. of Brit. Ornith. p. 93. † Brit. Anim.
‡ Brit. Song Birds, Intr. p. 13.

is soon enlivened by their presence. They continue in small parties to frequent the low borders of creeks, swamps, and ponds, till about the middle of April, when they separate in pairs to breed; and about the last week in April, or first in May, begin to construct their nest The place chosen for this is generally within the precincts of a marsh or swamp, meadow, or other like watery situation. The spot usually a thicket of alder bushes, at the height of six or seven feet from the ground; sometimes in a detached bush, in a meadow of high grass; often in a tussock of rushes, or coarse rank grass; and not unfrequently in the ground — in all of which situations I have repeatedly found them. When in a bush, they are generally composed outwardly of wet rushes picked from the swamp, and long tough grass in large quantity, and well lined with very fine bent. The rushes forming the exterior, are generally extended to several of the adjoining twigs, round which they are repeatedly and securely twisted; a precaution absolutely necessary for its preservation, on account of the flexible nature of the bushes in which it is placed. The same caution is observed when a tussock is chosen, by fastening the tops together, and intertwining the materials of which the nest is formed with the stalks of rushes around. When placed in the ground, less care and fewer materials being necessary, the nest is much simpler and slighter than before. The female lays five eggs of a very pale light blue, marked with faint tinges of light purple, and long straggling lines and dashes of black. It is not uncommon to find several nests in the same thicket, within a few feet of each other.'*

Our own missel-thrush (*Turdus viscivorus*) is, perhaps, a still more dexterous basket-maker than the American red-wing, though its ingenuity has

* Wilson, Amer. Ornithol. iv, p. 32.

been little attended to by some systematic ornithologists. It builds, says Willughby, a nest as large as a jug — commonly with rotten twigs, on the outside, and the inside with dead grass, hay, or moss, which he pulls from trees. They construct both the inside and the outside, according to Buffon, with herbage, leaves, and moss, especially the white moss, and their nest resembles more that of the blackbird than of the other thrushes, except its being lined with bedding. It is composed, says Latham, of withered grass, moss, and lichen, intermixed with wool, and lined with fine dry grass. The nest, says Atkinson,

Nest of the Missel-thrush (Turdus viscivorus).

is composed of lichen and coarse grass, and lined with wool! They might as well have described an orange as composed of the rind and the pips; or the missel bird itself as made up of feather and stomach, without taking any notice of its bones and flesh. It is not only a basket-maker, but a mason, and, after it has reared a rough scaffolding of the withered stems of plants, dry grass, and moss, which are placed in great quantity and with little art, it constructs a substantial wall of clay, of which none of the authors just quoted take the least notice. The masonry is not much better finished than the scaffolding, being inferior, perhaps, to that of the blackbird, and decidedly so to that of the song-thrush (*Turdus musicus*); but the rudeness of the scaffolding, and the clay walls built upon it, is amply compensated by the ingenious basket-work by which these are subsequently concealed. The nest, itself, is usually placed in the fork of a tree, such as the pine in wilder districts, or an apple-tree in an orchard; the chief condition being, that it should be plentifully surrounded with the larger leafy lichens (such as *Borrera furfuracea*, *Peltidea scutata*, *Ramalina fraxinea*, *&c*, Acharius). Without detaching these from the trees, the bird artfully interweaves them into the contour of the nest, so as partly to conceal the basket-work of fine hay which is wrought in at the same time, and interwoven with much nicety both around the brim and also over the clay. On the outside of the nest, farthest from the tree, the lichens and other moss have only one of their ends plaited into the basket-work, the outer being left so as to hang down after the manner of the thatch on a hay-stack, or rather the fern-leaves used by gardeners to protect early wall-fruit. We have specimens, however, of several of these nests, which have not a particle of moss or lichen about

them; but are basketed with roots, hay, and pieces of wood shavings from the carpenter's shop, the lining being of dry grass, neatly fixed into the contour of the nest.*

The habits of the missel-thrush appear to vary according to circumstances, for Temminck informs us it prefers black forests situated upon mountains; while, in England, Mr Knapp tells us it keeps generally in open fields and commons, heaths, and unfrequented places, being of a wild and wary nature, and only approaches our plantations and shrubberies in severe weather, and in breeding time. It begins to build, he says, in April, making a large nest, and so openly placed, as would, if built in a copse, infallibly expose it to the plunder of the magpie and the crow, which make prey of all the eggs they can find. In order, as he supposes, to avoid this evil, it resorts to our gardens and orchards, seeking protection from man, near whose haunts those rapacious plunderers are careful of approaching.† But how are we to reconcile this with the preceding statement, which goes to affirm that it prefers breeding in black forests, where we suppose the crow abounds?

A considerable number of the American birds seem to be expert at basket-work; such as the blue linnet or indigo bird (*Fringilla cyanea*, Linn.) This bird builds in a low bush among tall grass or corn, suspending its nest between two twigs, one passing up on each side; and to these it is fastened by strips of flax which encircle it, while at the same time they form the framework of the nest, which is also basketed on the inside with fine dry grass. The summer red bird (*Tanagra æstiva*, Wilson) is not quite so neat in its workmanship, building in the woods upon the horizontal branch of a half-grown tree, often an evergreen, at the height of ten or twelve

* J. R. † Journal of a Naturalist, p. 248, first edit.

feet from the ground, basketing the outside with stalks of dry flax, and lining with fine grass. The polyglot chat (*Icteria viridis*, Bonap.) is rather singular in the choice of its materials. It begins to build about the middle of May, the nest being usually fixed in the upper part of a bramble-bush, in the most impenetrable thicket it can meet with; or, when such is not to be found, in a thick vine or small cedar, — seldom more than five feet from the ground. It is composed outwardly of dry leaves, within these are laid thin strips of the bark of grape vines, the inside being lined with fibrous roots and fine dry grass. The blue-eyed yellow warbler (*Sylvia citrinella*, Wilson) is a very sprightly, unsuspicious, and familiar little bird, often seen hopping about the gardens in North America among the blossoms of fruit-trees and flowering shrubs, and is very conspicuous on account of its colour. It is superior in the execution of basket-work, its nest being constructed with great neatness, generally in the triangular fork of a small shrub, near or among brambles. The outside is composed of a framework of flax or tow, disposed in circular strands, which, in the parts contiguous to the supporting branches, are strongly twisted round them, the branches rising through the materials like the ribs of a basket. The inside is lined with hair, and with the down stripped from the stalks of fern, a similar material, it may be remarked, to the materials stripped by the upholsterer bee (*Anthidium manicatum*, Fabr.) from rose campion and other pubescent plants.* The last of these American examples which we shall mention at present, is the cedar bird (*Bombycilla Carolinensis*, Brisson), which is not quite so careful in the workmanship of its nest as some of the preceding. The exquisitely fine and silky texture, and smooth glossiness of the

* See Insect Architecture, p. 57.

plumage, as well as its rich colours and pretty crest, give the cedar bird a very gay and elegant appearance.

The Cedar Bird (Bombycilla Carolinensis, Brisson.)

They breed very late, seldom pairing before the second week in June, and sometimes fixing on a cedar, but generally choosing an orchard for that purpose. The nest is large for the size of the bird, being fixed in the forked or horizontal branch of an apple-tree, ten or twelve feet from the ground. The foundation is formed of a thick matting of coarse grass, more like one of the ground builders than a bird which nestles on a tree; but the interior is finished with some degree of neatness, fine dry stems of grass being smoothly plaited around the circular walls.

Chapter XI.

Basket-making Birds, continued. — The Raven. Crow. Rook. African Birds. Pensile Grosbeak. Baya. Sociable Grosbeak. Warblers.

Among our European basket-making birds we may enumerate the crow, the rook, the raven, and several others; and though their nests may at first sight appear rude and clumsy, they will be found, when closely examined, to be well adapted to their mode of breeding. The raven (*Corvus corax*) does not build in Gloucestershire, as Mr Knapp tell us, for though a pair did attempt to raise a brood on a wych-elm at Alverston Thornbury, near Bristol, they were soon scared away, and made no second trial, their love of retirement and quiet prevailing over the other temptations held out by the neighbourhood.* White gives an interesting history of a pair of ravens, which bred in a small wood at Selborne, called Losel's hanger. 'In the centre of this grove,' says he, 'there 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 residence for such a series of years, that the oak was distinguished by the title of the Raven Tree. Many were the attempts of the neighbouring youths to get at this eyry; the difficulty whetted their inclinations, and each was ambitious of surmounting the arduous task. But when they arrived at the swelling it jutted out so in their way,

* Journal of a Naturalist, 176, 1st edit.

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 those birds usually sit. The saw was applied to the but, the wedges were inserted into the opening, the woods echoed to the heavy blows of the beetle or mallet, the tree nodded to its fall; but still the dam sat on. At last, when it gave way, the bird was flung from her nest; and though her parental affection deserved a better fate, was whipped down by the twigs, which brought her dead to the ground.'*

According to M. Montbeillard, ravens are particularly attached to the place where they have been bred; and when a pair select a spot for their nest they make it their ordinary residence, and do not readily abandon it. They do not pass the night in the woods like the carrion crow, but choose in their mountains a retreat sheltered from the northern blast under the natural alcoves, secured by the recesses and projections of rocks. Into such places they retire to the number of fifteen or twenty, and sleep perched on the bushes that grow between the rocks, building in the adjacent crevices or in the holes of walls, on the tops of old deserted towers, and sometimes on the high branches of large straggling trees.

The crow (*Corvus corone*), the hooded-crow (*C. cornix*), and the rook (*C. frugilegus*), build very similar basket nests to the raven; the only difference being in the lining materials. The crow forms a thick mattress of wool, rabbit's fur, and similar soft materials in large quantity, laid over a clumsey wall of clay, which is built within the strong basketing of

* Natural Hist. of Selborne, i, 12.

birch twigs and black-thorn branches, with which the whole is bound together and fortified with a sort of chevaux-de-frize. The rook, on the other hand, like the magpie (*Pica caudata*, RAY), does not line with such soft materials, preferring long fibrous roots, which are neatly interwoven into a finer basket-work than the bird might have been supposed capable of executing. This, indeed, might be removed with ease from the nest, and, with little additional work besides what the rook herself had performed, might be made into a fruit-basket, by no means inelegant. M. Montbeillard, we think, must be mistaken in the nest he describes as that of the carrion crow, which was found, he tells us, in an oak eight feet high, in a wood planted on a little hill where other larger oaks grew, and formed on the outside with small branches and thorns rudely interwoven, and plastered with earth and horse-dung, and the inside carefully 'lined with fibrous roots.'* At least all the crows' nests which we have examined have been lined with a bedding of wool, the hair of rabbits, and other soft materials of a similar kind.†

Rooks nestle in large communities, similar to the herons and the ospreys, as described in a preceding page. Ten or twelve nests are sometimes to be seen on the same tree; and there are frequently considerable numbers of trees thus loaded with nests, all contiguous to each other. Schwenckfeldt remarks, that they commonly prefer large trees planted round cemeteries and church-yards; but amongst the numerous rookeries with which we are acquainted not one occurs in such a locality. At Lee in Kent, on the contrary, though there are fine elms close by the church-yard, the neighbouring rooks prefer those around the adjacent mansion-house lately occupied by Lady Dacre, about fifteen or twenty furlongs from

* Oiseaux, art. La Corbine. † J. R.

the church, while, at a similar distance farther, another more numerous rookery is established. Though they usually select tall trees also, they do not do so in every case ; for we observed in 1819 a rookery in a clump of young oaks in the Duke of Buccleugh's park, at Dalkeith near Edinburgh, none of which were above ten or twelve feet high, although they could have found abundance of very lofty trees in the beautiful plantations around this noble mansion.* Mr Jennings mentions another instance, with which also we are acquainted, of a rookery established on trees of inferior height in the garden of the Royal Naval Asylum at Greenwich, although there are many fine lofty elms in the park hard by, upon which not a single rook's nest is to be seen. He thinks it not improbable that they have been influenced in their selection by a love of the noise of the boys in the play-ground of the asylum.† In the middle of the town of Dorchester is a large rookery, which has been established for many years, upon some high trees in a small garden which forms the play-ground for a considerable boys' school. As there are many higher trees in more retired situations in the immediate neighbourhood of the town, it would seem very probable that the birds are in some measure attracted by the bustle and clamour of the school. A correspondent informs us, that having frequently lodged in the adjoining house at the building season, he has been doubtful whether the uproar of the busy contentious rooks or of the boys at play was the loudest. However, the noisy tenants seemed to live in perfect harmony together in their joint and several occupation of the garden. There is also a rookery in the front of a school at Kentish Town, in a play-ground immediately adjoining the

* J. R. † Ornithologia, p. 76.

public road. At Dalkeith, however, we may remark that the rookery on the low oaks was in the most silent and sequestered part of the park. Goldsmith has given an animated account of his own observations on the proceedings of these birds : —

'I have often,' says he, 'amused myself with observing their plan of policy from my window in the Temple, that looks upon a grove where they have made a colony in the midst of the city. At the commencement of spring, the rookery, which, during the continuance of winter, seemed to have been deserted, or only guarded by about five or six, like old soldiers in a garrison, now begins to be once more frequented; and in a short time all the bustle and hurry of business is fairly commenced. Where these numbers resided during the winter is not easy to guess, perhaps in the trees of hedge-rows, to be nearer their food. In spring, however, they cultivate their native trees ; and, in the places where they were themselves hatched, they prepare to propagate a future progeny. They keep together in pairs; and when the offices of courtship are over, they prepare for making their nests and laying. The old inhabitants of the place are all already provided ; the nest which served them for years before, with a little trimming and dressing, will serve very well again, the difficulty of nesting lies only upon the young ones, who have no nest, and must, therefore, get up one as well as they can. But not only are the materials wanting, but also the place in which to fix it. Every part of a tree will not do for this purpose, as some branches may not be sufficiently forked ; others may not be sufficiently strong ; and still others may be too much exposed to the rocking of the wind. The male and female, upon this occasion, are, for some days, seen examining all the trees of the grove very attentively ; and when they have fixed upon a branch that seems fit for their pur-

pose, they continue to sit upon and observe it very sedulously for two or three days longer. The place being thus determined upon, they begin to gather the materials for their nest, such as sticks and fibrous roots, which they regularly dispose in the most substantial manner. But here a new and unexpected obstacle arises. It often happens that the young couple have made choice of a place too near the mansion of an older pair, who do not choose to be incommoded by such troublesome neighbours, — a quarrel, therefore, instantly ensues, in which the old ones are always victorious. The young couple, thus expelled, are obliged again to go through the fatigues of deliberating, examining, and choosing; and having taken care to keep their due distance, the nest begins again, and their industry deserves commendation. But their alacrity is often too great in the beginning; they soon grow weary of bringing the materials of their nest from distant places; and they very easily perceive that sticks may be provided nearer home, with less honesty, indeed, but some degree of address. Away they go, therefore, to pilfer, as fast as they can; and wherever they see a nest unguarded, they take care to rob it of the very choicest sticks of which it is composed. But these thefts never go unpunished; and, probably, upon complaint being made, there is a general punishment inflicted. I have seen eight or ten rooks come upon such occasions, and, setting upon the new nest of the young couple, all at once tear it in pieces in a moment.

'At length, therefore, the young pair find the necessity of going more regularly and honestly to work. While one flies to fetch the materials, the other sits upon the tree to guard it; and thus, in the space of three or four days, with a skirmish now and then between, the pair have fitted up a commodious nest,

composed of sticks without, and of fibrous roots and long grass within. From the instant the female begins to lay, all hostilities are at an end; not one of the whole grove, that a little before treated her so rudely, now venture to molest her, so that she brings forth her brood with patient tranquillity. Such is the severity with which even native rooks are treated by each other; but if a foreign rook should attempt to make himself a denizen of their society he would meet with no favour; the whole grove would at once be up in arms against him, and expel him without mercy.'*

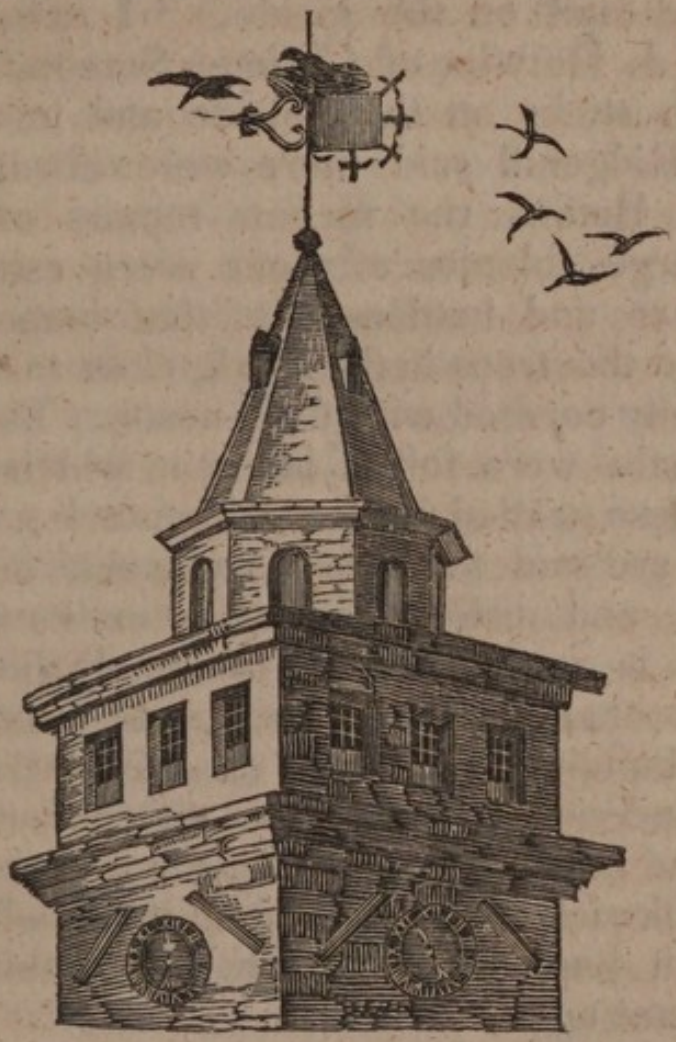
Rooks appear to be fond of the metropolis, for besides the rookery in the Temple gardens, which has been long abandoned, there was an extensive colony in the gardens of Carlton Palace, which, in consequence of the trees having been cut down, removed in the spring of 1827 to the trees behind New Street, Spring Gardens; and there is a colony in the trees near Fife House, at the back of Whitehall. 'There was, also,' says Mr Jennings, 'for many years, a rookery on the trees in the churchyard of St Dunstan's in the East, a short distance from the Tower; the rooks some years past deserted that spot, owing, it is believed, to the fire that occurred at the old Custom-house. But in the spring of 1827 they began to build again on the same trees.'† Mr Hone, in his 'Every-Day Book,' has an anecdote relating to another rookery on some large elm trees in the College garden, behind the Ecclesiastical Court in Doctors' Commons.

At Newcastle a rookery does or did exist at no great distance from the Exchange, and it is recorded that a pair of the rooks, after an unsuccessful at-

* Animated Nature, iii, 340.

† Ornithologia, p. 75.

tempt to establish themselves in the rookery, took refuge on the Exchange spire, and though they continued to be persecuted by individuals from the adjacent colony, they succeeded in building a nest on the top of the vane, undisturbed by the noise of the populace below. They returned and built their nest every year on the same place till 1793, soon after which the spire was taken down.*



Nest of a Rook on the Weathercock of Newcastle Exchange.

A similar circumstance is recorded by Darwin, not of one rook only, but of a whole colony building on the spire of Welborn church, in Lincolnshire, in 1794. The parishioners affirmed that the rooks had

* Bingley's Anim. Biogr., ii, 246, 6th edit; and Brand's Antiq. of Newcastle.

built in the spire from time immemorial. There was a tradition, that formerly a rookery in some high trees adjoined the churchyard, which being cut down, probably in the breeding season, the rooks removed to the church, building their nests on the outside of the spire, on the tops of windows, which, by their projection a little from the spire, made them convenient room, and when they could not find convenience there, they built on the inside. 'I saw,' says the Reverend J. Darwin, of Carleton Scroop, 'two nests made with sticks on the outside and in the spires, and Mr Ridgehill said there were always a great many.'* Before the recent repairs of Windsor Castle, large colonies of rooks were established in every frieze and battlement of that immense building; — and the trees in the Park, close to the Castle, were equally covered with their nests. The old walls of the Castle were full of holes, in which the rooks had doubtless nestled for several centuries.

Rooks are said to have a particular antipathy to the raven, and dislike continuing in its neighbourhood. It is recorded that, at the Bishop of Chichester's rookery, at Broomham, near Hastings, upon a raven's building her nest in one of the trees, all the rooks abandoned the spot, though they returned in autumn and built there again in the succeeding year. Mr Marckwick mentions an instance of a similar kind which happened in 1778; but in this case the rooks did not again return.†

'As soon,' says Mr Knapp, 'as the heat of summer is subdued and the air of autumn felt, the rooks return and visit their forsaken habitations, and some few of them even commence the repair of their shattered nests: but this meeting is very differently conducted from that in the spring; their voices have

* Zoönomia, i, 247, 3rd edit.
† Lingley, ii, 248.

now a mellowness approaching to musical, with little admixture of that harsh and noisy contention so distracting at the former season, and seem more like a grave consultation upon future procedure, and as winter approaches they depart for some other place. The object of this meeting is unknown, nor are we aware that any other bird revisits the nest it has once forsaken. Domestic fowls, indeed, make use again of their old nests, but this is never, or only occasionally, done by birds in a wild state. The daw and the rock pigeon will build in society with their separate kindred, and the former even revisits in autumn the places it had nestled in. But such situations as these birds require — the ruined castle, abbey, or church-tower, ledge in the rock, &c, are not universally found, and are, apparently, occupied from necessity. The rooks appear to associate from preference to society, as trees are common everywhere; but what motive they can have in view in lingering thus for a few autumnal mornings, and counselling with each other around their abandoned and now useless nests, which before the return of spring are generally beaten from the trees, is by no means manifest to us.'*

It may be seen, by referring to a preceding page, that the rook is by no means singular in revisiting its nest in autumn, the same being done by the fish-hawk (*Pandion haliætus*), and several others of those birds which build in communities. With respect to birds in a wild state using the same nest, hundreds of examples could be given; and we have mentioned in several places of this volume a number of instances, such as the blue bird (*Sialia Wilsonii*), the various species of swallows (*Hirundinidæ*), and most of the birds which build in holes.

The birds which build in communities in Southern Africa furnish us with other interesting illustrations,

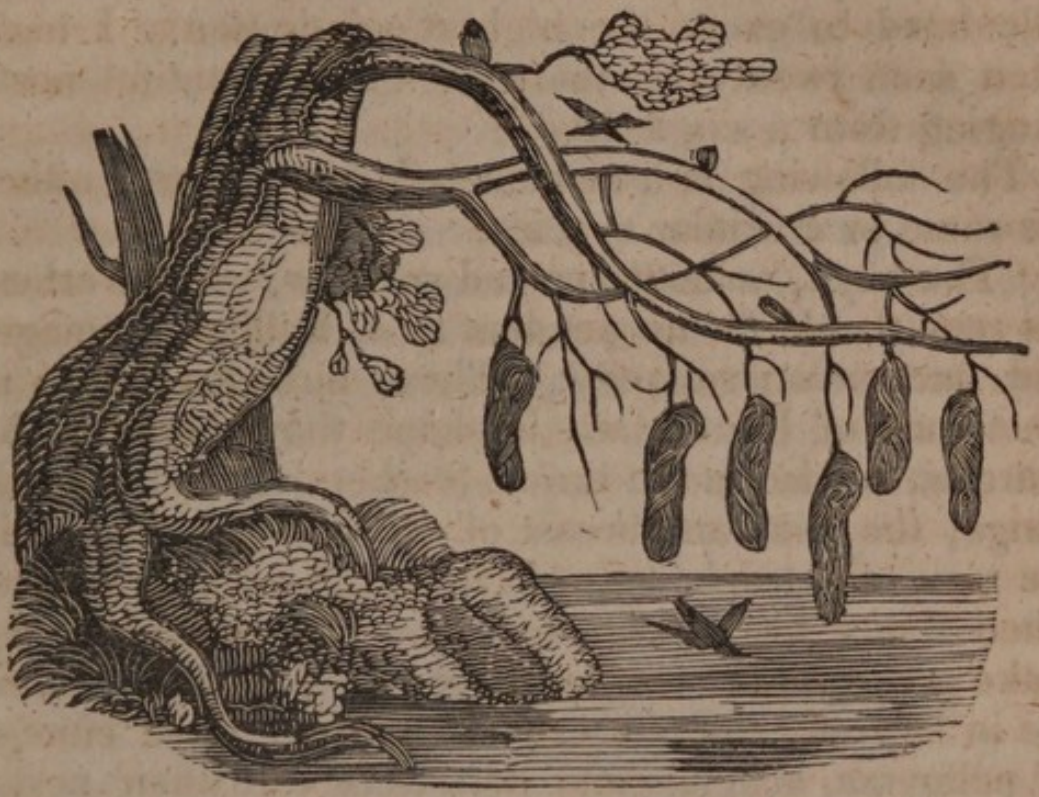
* Journal of a Naturalist, p. 188, 1st edit.

both upon these several points, and the immediate subject of our chapter — basket-work. The locust-eating thrush (*Turdus bicolor*) is one of those species which, according to Barrow, congregate in great numbers. These unite in forming a common fabric for containing individual nests, large enough for a vulture. One of these, which he met with on a clump of low bushes at Sneuwberg, consisted of a number of cells, each of which formed a separate nest, with a tubular gallery leading into it through the side. Of such cells each clump contained from six to twenty, one roof of twigs woven into a sort of basket-work covering the whole. They also build, along the banks of the Orange river, on the tall mimosa trees, which were observed to be loaded with thousands of their nests.* Dr Latham supposed this to be the same bird which is mentioned by Thunberg, as digging a hole for its nest in the bank of a river, or in the hole of a ruined building, or a decayed tree.† But such differences in habit little agree with the distinguishing characteristics of a similar species.

Another of these gregarious African birds is the pensile grosbeak (*Loxia pensilis*), which is about the size of a house-sparrow, and makes a basket-nest of straw and reeds, interwoven into the shape of a bag, with the entrance below, while it is fastened above to the twig of some tree, chiefly such as grow on the borders of streams. On one side of this, within, is the true nest. The bird does not build a distinct nest every year, but fastens a new one to the lower end of the old, and as many as five may thus be seen, one hanging from another. From five to six hundred such nests have been observed, crowded upon one tree.

* Travels in South Africa, 255 — 301.

† Latham, Gen. Hist. v, 228.



Nests of the Pensile Grosbeak (Loxia Pensilis.)

A living author of reputation thus describes these nests; but we must premise that we do not coincide with his opinion of the structure being devised for defence:* 'Several varieties of the finch tribe, in South Africa, suspend their nests from the branches of trees, especially where they happen to impend over a river or precipice. The object of this precaution is obviously to secure their offspring from the assaults of their numerous enemies, particularly the serpent race. To increase the difficulty of access to these "tree-rocked cradles," the entrance is always from below, and frequently through a cylindrical passage of twelve or fifteen inches in length, projecting from the spherical nest, exactly like the tube of a chemist's retort. The whole fabric is most ingeniously and elegantly woven of a species of very tough grass; and the wonderful instinct of foresight (or whatever else we may choose to call it)

* See a succeeding chapter on dome-builders.

displayed by the little architect in its construction, is calculated to excite the highest admiration. I have often seen twenty or more of these beautiful nests hanging from a single tree.'*

The following is a more detailed account of either the same or a similar species.

'The baya, or bottle-nested sparrow,' says Forbes, 'is remarkable for its pendent nest, brilliant plumage, and uncommon sagacity. These birds are found in most parts of Hindostan; in shape they resemble the sparrow, as also in the brown feathers of the back and wings; the head and breast of a bright yellow, and in the rays of a tropical sun have a splendid appearance, when flying by thousands in the same grove; they make a chirping noise, but have no song; they associate in large communities, and cover extensive clumps of palmyras, acacias, and date-trees with their nests. These are formed, in a very ingenious manner, by long grass woven together in the shape of a bottle, and suspended by the other end to the extremity of a flexible branch, the more effectually to secure the eggs and young brood from serpents, monkeys, squirrels, and birds of prey. These nests contain several apartments, appropriated to different purposes: in one the hen performs the office of incubation; another, consisting of a little thatched roof and covering a perch, without a bottom, is occupied by the male, who, with his chirping note, cheers the female during her maternal duties.'

'Dr Fryer gives a very pleasant description of the baya, under the name of the toddy-bird, in his entertaining "Travels." "Nature, in the rainy season at Bombay, affords us a pleasant spectacle, as well as matter for admiration; for here is a bird that is not only exquisitely curious in the artificial composure of

* Pringle's Ephemerides, Notes.

its nest with hay, but furnished with devices and stratagems to secure itself and young ones from its deadly enemy, the squirrel; as likewise from the injury of the weather, which being unable to oppose, it eludes with this artifice: contriving the nest like a steeple-hive, with winding meanders, before which hangs a penthouse for the rain to pass, tying it with so slender a thread to the bough of the tree, that the squirrel dare not venture his body, though his mouth water at the eggs and prey within; yet it is strong enough to bear the hanging habitation of the ingenious contriver, free from

Nest of the Baya.

all the assaults of its antagonists, and all the accidents of gusts and storms. Hundreds of these pendulous nests may be seen on one tree." '*

The sociable grosbeak (*Loxia socia*) seems to excel both the preceding species in the extent, if not in the skill, of its workmanship, though there appears to be no little exaggeration in the original account given by Paterson, which, though since corrected by Vaillant, has been followed by all the systematic naturalists. We shall first give the original account, which appears not a little extraordinary, and may induce sceptical readers to conclude that the whole is a fable.

'The industry of these birds,' says Paterson, 'seems almost equal to that of the bee. Throughout the day they seem to be busily employed in carrying a fine species of grass, which is the principal material they use for the purpose of erecting their extraordinary work, as well as for additions and repairs. Though my short stay in the country was not sufficient to satisfy me, by ocular proof, that they added to their nest as they annually increased in numbers, still, from the many trees which I have seen borne down by the weight, and others which I have observed with their boughs completely covered over, it would appear that this is really the case. When the tree which is the support of this aërial city is obliged to give way to the increase of weight, it is obvious that they are no longer protected, and are under the necessity of building in other trees. One of these deserted nests I had the curiosity to break down, to inform myself of the internal structure of it, and found it equally ingenious with that of the external. There are many entrances, each of which forms a regular street, with nests on both sides, at about two inches distance from each other. The grass with

* Forbes, Oriental Memoirs, i, 119.

which they build is called the Boshman's grass, and I believe the seed of it to be their principal food, though, on examining their nests, I found the wings and legs of different insects. From every appearance, the nest which I dissected had been inhabited for many years, and some parts of it were much more complete than others. This, therefore, I conceive to amount nearly to a proof that the animals added to it at different times, as they found necessary from the increase of the family, or rather of the nation or community.'*

Nests of the Sociable Grosbeak (Loxia socia).

It will be seen, from the following description of the same structures, that the streets of nests are a mere fancy, though enough of the marvellous remains to gratify the curious. 'I observed,' says Vaillant, 'on the way a tree with an enormous nest of those birds

* Travels, p. 156.

to which I have given the appellation of republicans; and, as soon as I arrived at my camp, I despatched a few men, with a wagon, to bring it to me, that I might open the hive, and examine its structure in its minutest parts. When it arrived, I cut it to pieces with a hatchet, and saw that the chief portion of the structure consisted of a mass of Boshman's grass, without any mixture, but so compact and firmly basketed together as to be impenetrable to the rain. This is the commencement of the structure; and each bird builds its particular nest under this canopy. But the nests are formed only beneath the eaves of the canopy, the upper surface remaining void, without, however, being useless; for, as it has a projecting rim, and is a little inclined, it serves to let the rain-water run off, and preserves each little dwelling from the rain. Figure to yourself a huge irregular sloping roof, and all the eaves of which are completely covered with nests, crowded one against another, and you will have a tolerably accurate idea of these singular edifices.

'Each individual nest is three or four inches in diameter, which is sufficient for the bird. But as they are all in contact with one another, around the eaves, they appear to the eye to form but one building, and are distinguishable from each other only by a little external aperture, which serves as an entrance to the nest; and even this is sometimes common to three different nests, one of which is situated at the bottom, and the other two at the sides. According to Paterson, the number of cells increasing in proportion to the increase of inhabitants, the old ones become "streets of communication, formed by line and level." No doubt, as the republic increases, the cells must be multiplied also. But it is easy to imagine that, as the augmentation can take place only at the surface, the new buildings will necessarily cover the old ones, which must therefore be abandoned.

'Should these even, contrary to all probability, be able to subsist, it may be presumed that the depths of their situation, by preventing any circulation and renewal of the air, would render them so extremely hot as to be uninhabitable. But while they thus become useless, they would remain what they were before, real nests, and change neither into streets nor sleeping-rooms.

'The large nest that I examined was one of the most considerable I had anywhere seen in the course of my journey, and contained three hundred and twenty inhabited cells, which, supposing a male and female to each, would form a society of six hundred and forty individuals. Such a calculation, however, would not be exact. I have spoken above of birds among which one male is in common to several females, because the females are much more numerous than the males. The same is the case with many other species, both in the environs of the Cape and in the colony; but it is particularly so among the republicans. Whenever I have fired at a flock of these birds, I have always shot four times as many females as males.'*

After the preceding details of what we may well call the marvellous efforts of birds in basket-making, some of our own little mechanics may not appear to much advantage; though their more slender structures are equally suited to their mode of breeding, and exhibit no small skill in the management of the materials. The nests which we allude to are those of several of our summer warblers (*Sylviadæ*, VIGORS), some of which, though built by different species, are so like in appearance, that it requires some experience to distinguish them. Amongst these we may

* Vaillant. Trav., 2d series, vol. iii.

mention the whitethroat (*Sylvia cinerea*, LATH.), and the babillard (*Sylvia curruca*, LATH.), which are known under an endless multiplicity of provincial names, such as *Peggy*, *Wheetie-why bird*, *Muff*, *Charlie muftie*, *Churr*, *Hay-tit*, *Nettle-creeper*, &c. The nests of these two are not distinguishable in the size, though the birds differ considerably in this respect, each nest being rather more than two inches in diameter within. We should at first deem it impossible to bring the dry, brittle stems of catchweed (*Gallium Aparine*) into a smooth round form, yet this is the usual material of the frame-work employed by these little mechanics, though no sort of dry slender stem comes amiss. These are woven together in the bosom of some low bush of brambles or thorns, as Sepp has accurately figured it,* sometimes so slightly that the light shines through the meshes, while at other times the structure is of considerable thickness. A few long horse-hairs are wound neatly round the interior, with some finer grass. In several nests in our possession, however, the hairs are in quantity sufficient to cover the basket-work of grass from the eye. Whence Mr Bolton derived the notion that the whitethroat uses spiders' webs as a binding material, we cannot imagine; for, out of some hundreds we have examined, and twenty specimens now before us, we can detect nothing of this sort. It is the rough reflexed prickles of the catchweed which binds the exterior, and the hairs (probably glued with saliva) which keep the inside in shape. The chief distinction which we have detected in the nests of these two species is, that the whitethroat for the most part makes use of a few roots in lining, which the babillard never does, while the latter seems fonder than the former of working tufts of willow down

* Nederlandsche Vogelen, ii, Deel.

into the brim of the nest.* According to Montagu, the nest of the Dartford warbler (*Sylvia provincialis*, TEMMINCK) is very similar to that of the whitethroat, but usually contains furze twigs, and is built in the top of a furze bush,† where the former would not be likely to occur. Though this bird is said not to be rare on the heaths in the neighbourhood of London, we have not met with its nest. We observed the bird itself on Blackheath, suspended over the furze, and singing on the wing like a whitethroat or a titlark, as early as the end of February, 1830; whence we concluded that, notwithstanding the severity of the frost, it had wintered here as it is known to do in Devonshire.‡

Another nest of a very similar description, as slight in structure, but superior in the outworks, is built by the reed-warbler (*Curruca arundinacea*, BRISSON), a species first distinguished by Lightfoot in 1785,§ who found it at Uxbridge; but Bolton says he himself discovered it previous to this in Yorkshire, without knowing any name for it. We have now a nest of this species before us, which was built in a field among the branches of lucerne (*Medicago sativa.*) It is very deep, nearly three inches, by the same in diameter, and almost wholly composed of hay, the brim being of thicker stems of dry grass. A very few hairs are wound around the interior, which is very smoothly finished; and in some parts of the structure a few small tufts of willow down and (what seems singular) of elm blossoms are interwoven. It is so different, indeed, from the nest described by Lightfoot, and figured by Bolton, that we should have entertained doubts respecting it had we not known the bird, of which we had a few days

* J. R. † Supplement to Ornith. Dict.
‡ J. R. § Phil. Trans. lxxv, pt. 1.

Nest of the Reed Warbler, drawn from specimen

before seen a living specimen in Mr Sweet's aviary at Chelsea.* It is readily distinguished by its bill appearing rather long, owing, as Latham remarks, to the great projection of the cheeks. Mr Lightfoot's nest was bound round with packthread, and Mr Bolton's with stout double twined woollen yarn, such as the poor people use for making stockings; but though he had seen several of these nests, this was the only one where a twined bandage was used.†

* J. R. † Harmonia Ruralis, ii, 72.

Mr Sweet found one of these nests fastened to the side branches of a poplar tree at Fulham.

Nest of the Reed Warbler (Curruca arundinacea, Brisson,*) from Bolton.*

The preceding bird is frequently confounded with the sedge warbler (*Curruca salicaria*, Brisson), a much more common species ; but, though from the shyness of both this was not to be wondered at, we think it strange that their nests, which are so very different, did not lead sooner to a distinction. The nest of the sedge bird is a much more solid and substantial structure, and an inch less both in depth and diameter, — one of the smallest nests indeed in the interior with which we are acquainted, though, from the quantity of dried grass, leaves, fibrous

roots, wool, and hair, it appears rather large. The whole being very closely woven, is admirably adapted for warmth, so indispensable for so small a bird, when it is considered that it is usually built over water, being supported in an elegant manner between three or four rushes.* The story, which is to be met with in some books, of this and some other nests, built among reeds, being so skilfully attached to the stems as to rise and fall with the water below, is altogether fabulous. The nest of a bird of a different family, the black bonnet (*Emberiza Schœniclus*), inappropriately termed reed-bunting or reed-sparrow, is erroneously said by some authors to exhibit more skill than either of the preceding in constructing its nest. We have remarked an interesting specimen of this kind in the British Museum, suspended between three stems of reeds ; and Mr Bolton describes a similar one which was skilfully bound round with the growing reed leaves, so as to form a slight lattice-work, upon which also the foundation of the nest was laid. The chief material employed in this nest was broken rushes, the stronger placed near the bottom, the finer around the brim ; a few sprigs of moss were mixed here and there, and the whole was artfully wound round with the long flexible reed-leaves. The lining was composed of a thick bed of cow's hair. The nest was placed about a foot above the water of a still pond. Sepp has given a very pretty figure, which represents it as built in the cleft of a willow, and basketed round with straw.† Syme says, the 'nest is placed either amongst rushes, or ingeniously fastened to three or four reeds; and in this floating cradle, though rocked by the tempest, the hen securely sits without fear or dread.‡ Fanciful as this may appear, an accurate naturalist,

* J. R. † Nederlandsche Vogelen, i, Deel.
‡ Brit. Song Birds, p. 146.

Supposed Nest of the Reed-Bunting (Emberiza Schaniclus), drawn from specimen in the British Museum.

Graves, says he has himself more than once seen the hen sitting on the nest, when, at every blast of wind, the reeds to which it was suspended were bent down to the water.*

There cannot be a doubt, however, that these authors have mistaken some other nest for that of the black-headed or reed-bunting, probably that of the sedge warbler (*Curruca salicaria*, Brisson). The nest of the former, Selby remarks, 'differs both in

* Brit. Ornithology.

fabric and situation, being generally built in a low bush or tuft of grass, and not suspended between the stems of reeds just above the surface of the water,'* as is the case with the latter. 'The nest of the black-headed bunting,' says Syme, 'is generally placed among clumps or bunches of long grass, willow roots, tufts of rushes, reeds, &c. It is a flimsy structure, composed of bent and withered grass, and slightly lined with a few horse-hairs.†

Among some hundreds of these nests which we have seen in Scotland (we have not met with the bird in England nor on the Continent), not one was built according to either of these descriptions; but uniformly in the side of a low bank, so that a bit of turf or a stone might project over it. The structure was very much like that of the wagtail or the yellow-hammer, but with much fewer materials than either.‡

* Illustr. i, p. 243. † Brit. Song Birds, p. 229. ‡ J. R.

Chapter XII.

Weaver Birds. — Weaver Oriole. Small British Weaver Birds. American Weaver Birds. Baltimore Starling. Bengal Sparrow. Tchitrec. Yellow Hammer.

The name of weaver oriole has been given by way of distinction to a bird supposed to be a native of Senegal, because it amused itself with interweaving whatever flexible materials it could procure, into the wires of its cage. But though this was certainly a singular habit, as it seemed unconnected with nest-building, it is by no means uncommon to find nests with the materials interwoven more or less neatly, as we shall exemplify, after we have mentioned the few particulars which are known of the weaver oriole (*Ploceus textor*, Cuvier).

The captain of a ship, who had collected about forty birds from Madagascar, Senegal, and other parts of the African coast, brought to France two of the weaver orioles, which he called Senegal chaffinches, and which are the only individuals we believe hitherto described by naturalists. They appeared to be of different ages, the elder having a kind of crown, which appeared in sun-light of a glossy golden brown colour; but at the autumnal moult this disappeared, leaving the head of a yellow colour, though its golden brown was always renewed in the spring of every successive year. The principal colour of the body was yellowish orange, but the wings and tail had a blackish ground. The younger

bird had not the golden brown on the head till the end of the second year, which occasioned the excusable mistake of supposing it to be a female, as it is one of the characteristics of female birds to preserve for a long time the marks of youth. The two birds were kept in the same cage, and lived at first upon the best terms with one another, the younger generally sitting on the highest bar, holding its bill close to the other, which it answered by clapping its wings, and with a submissive air.

Having been observed in the spring to interweave chickweed into the wire-work of their cage, it was imagined to be an indication of their desire to nestle; and accordingly, upon being supplied with fine rushes, they built a nest so capacious as to conceal one of them entirely. They renewed their labour on the following year; but the younger, which had now acquired its full plumage, was driven off by the other from the nest first begun. Determined, however, not to be idle, it commenced one for itself in the opposite corner of the cage. The elder, however, did not relish this, and continuing his persecution, they were separated. They went on working at their several buildings; but what was built one day was generally destroyed the next. Latham tells us, that one of them, 'having by chance got a bit of sewing silk, wove it among the wires, which being observed, more was put into the cage, when the bird interlaced the whole, but very confusedly, so as to hinder the greater part of one side of the cage from being seen through: it was found to prefer green and yellow to any other colour.'* A pair of these, or similar weaver birds, are, or lately were, at Newstead Abbey.

It seems difficult to conceive in what manner a

* Gen. Hist. of Birds, iii, p. 117.

bird could ever be able to interweave materials in the manner just described, with no other instrument than its bill; for it does not appear that the feet are brought into use in the work. In every species of weaving practised by our mechanics, the cross thread or weft is passed between the warp or straight threads, by means of a shuttle which goes completely through; but it is very obvious that a bird could not use its bill in this manner, much less its entire body, which, in all known instances of weaver birds, is much too bulky for this purpose. We may therefore, we think, add this to some of the examples already mentioned, to show that the inventions of men are not derived from an imitation of the ingenuity of the inferior animals. We cannot trace the art of weaving to its origin, as it appears to have been known in the most remote ages.

But, however ancient the art of weaving may be among men, it was no doubt practised by weaver birds from the period of their first existence; unless we were to admit the very objectionable theory that the mechanical ingenuity employed by the inferior animals was elicited, like human arts, by necessity or accident. We need not go to Senegal for specimens of the art of weaving among birds. There are few of those who build their nests with any degree of neatness, that do not in some part of the structure exhibit more or less of this peculiar skill. Even those which make very slender nests are sometimes most solicitous to interweave their materials.

Take any of the nests of the common small birds, which line the interior with hair, and remove the outer basketing of hay or roots, or the felt-work of moss and wool, and there will remain a circular piece of hair-cloth of various workmanship, according to the ingenuity of the bird and the materials which it has

been able to procure. In the instance of the hedge-sparrow (*Accentor modularis*, BECHSTEIN), which usually makes a rather loose nest of green moss (*Hypna*, &c,) upon a foundation of a few dry twigs or roots, the hair-work within is sometimes of considerable thickness, though most usually so thin as not to cover the moss; but in both cases the hairs are collected and interwoven into the structure singly, and always bent carefully so as to lie smooth in the circular cup of the nest. It may be remarked, also, that none of the ends are left projecting, but uniformly pushed in amongst the moss of the exterior. Whether the birds use any salivary gluten as a cement to retain the hairs in their proper places, we have not succeeded in distinctly ascertaining. We think it highly probable, that if this is not done, the hairs are moistened to make them bend, since otherwise we could not account for the neatness of the work. The hedge-sparrow, however, is perhaps the least distinguished in the skill of weaving for its nest a lining of hair-cloth. The pied wagtail (*Motacilla alba*, LINN.), which builds on the ground, in the hole of a bank, or the shelf of a low rock, forms a texture of hair more than half an inch thick. Although this is evidently not all worked together hair by hair, as several flattened tufts of the same hair are placed in various parts of the walls, yet these are usually bound down by single hairs laid obliquely over them, so that the interior may present a smooth uniform surface. The same method of working is pursued by the redbreast (*Sylvia rubecula*,) the redstart (*S. phœnicura*), and the yellow-hammer (*Emberiza citrinella*), with more or less skill. But these are far exceeded in neatness of execution by some of the finches, particularly the chaffinch (*Fringilla cœlebs*). The chaffinch does not always, indeed, line with hair-

cloth of its own weaving, as it often uses down, feathers, or cotton, with a few long hairs to bind these materials together; but amongst the numerous specimens of these nests now on our table, more than two-thirds are lined chiefly with hair, of various colours, and from various animals, though that of the cow and the horse seems to be preferred. We have one chaffinch's nest which appears more beautiful than usual, from being lined with a smooth thick texture of cow's hair, all of an orange-brown colour, which forms a fine contrast to the white wool intermixed with gray lichens and green moss around the brim. In some specimens, again, the hairs are nearly all white, and in others nearly all black; though seldom in a mass, and almost wholly worked in hair by hair. If a tuft of hair is procured, therefore, from a tree or a gate-post, where cattle have been rubbing themselves, the chaffinch seems to pull it minutely to pieces before interweaving it, while the wagtail and some other birds merely flatten it to make it lie smooth.*

The above by no means accords with what is stated by Syme, who says, it 'has struck us as singular, with regard to the materials birds use in forming their nests, that the feathers and hair, which they make choice of for lining them, are always white or gray, never black. Whether the white colours of the feathers, &c, have anything to do in concentrating the heat, or that black might conduct the heat through the nest by radiation, and thus allow it to escape, we cannot say; but we can vouch for the fact.'† We, on the other hand, have as frequently found black hair in nests, as hair of other colours.‡ The white-throat (*Sylvia cinerea*), indeed, seems to prefer black hair.

* J. R. † Brit. Song Birds, p. 11. ‡ J. R.

The linnet (*Linaria Linota*, CUVIER) is not quite so neat as the chaffinch in the interior workmanship of its nest. The greenbird (*Fringilla chloris*), also, is not so dexterous a mechanic, as it forms a rather rough basket-work of roots, sometimes interwoven with moss, very loosely put together on the outside, but increasing in compactness as the structure advances; and when a layer of finer roots has been worked as a middle wall, the bird then begins a thick texture of hair similar to that of the wagtail above described, but more neatly rounded and compact, and not so deep as the chaffinch's.

Nest of the Greenfinch (Fringilla chloris).

M. Montbeillard, on the authority of M. Guys, gives the following most apocryphal account of the greenfinch's nest: 'In spring,' says he, 'it makes its nest in trees or bushes. It is larger, and almost as neatly formed as that of the chaffinch, consisting of dry herbs and moss lined with hair, wool, and feathers; sometimes it places it in the chinks of the branches, which it even *widens with its bill:* it also constructs near the spot a little magazine for provisions.'* Sepp's figure represents the nest as built in a thick cleft, with roots and feathers on the brim.†

Besides so many of our own birds which may appropriately be said to weave the materials of their nests, at least on the inside, more foreign birds do so than it would be interesting to enumerate. Amongst the more remarkable of these, is that singular bird the mountain ant-catcher (*Myiothera obsoleta*, Bonaparte), which weaves a hemispherical structure of dry grass, the blades of which it winds round the adjacent branches of a tree. The American king-bird (*Tyrannus intrepidus*, Vieill.) first forms a sort of basket frame-work of slender twigs, and the withered flower tops of the rose yarrow (*Achillea asplenifolia*, Pers.) and other plants, which are afterwards woven together with wool and tow, and lined with interweavings of hair and dry fibrous grass. A bird of the same family, the white-eyed fly-catcher (*M. cantatrix*, Bartram), constructs a neat conical hanging nest, 'suspended,' says Wilson, 'by the upper edge of the two sides, on the circular bend of a prickly vine, a species of smilax that generally grows in low thickets. Outwardly it is constructed of various light materials, bits of rotten wood, fibres of dry stalks of weeds, pieces of paper, commonly newspapers, an article almost

* Oiseau, Art. Le Verdier. † Nederlandsche Vogelen, i, deel.

always found about its nest, so that some of my friends have given it the name of the politician; all these substances are interwoven with the silk of caterpillars, and the inside is lined with fine dry grass and hair.' The hooded fly-catcher (*M. cucullata*, Wilson), instead of spiders' web for a binding material, uses flax and fibres of hemp to interweave with moss. The pine-creeper (*Sylvia Pinus*) uses both coarser and finer materials than this, suspending its nest, according to Abbot, from the horizontal fork of a branch, and forming it of slips of vine-bark and rotten wood, interwoven with caterpillars' webs and bits of hornets' nests, the interior being lined with pine-leaves and roots. A still prettier nest of the same materials, but more delicate from its very small size, as it weighs scarcely a quarter of an ounce, is made by the prairie warbler (*Sylvia minuta*, Wilson.*)

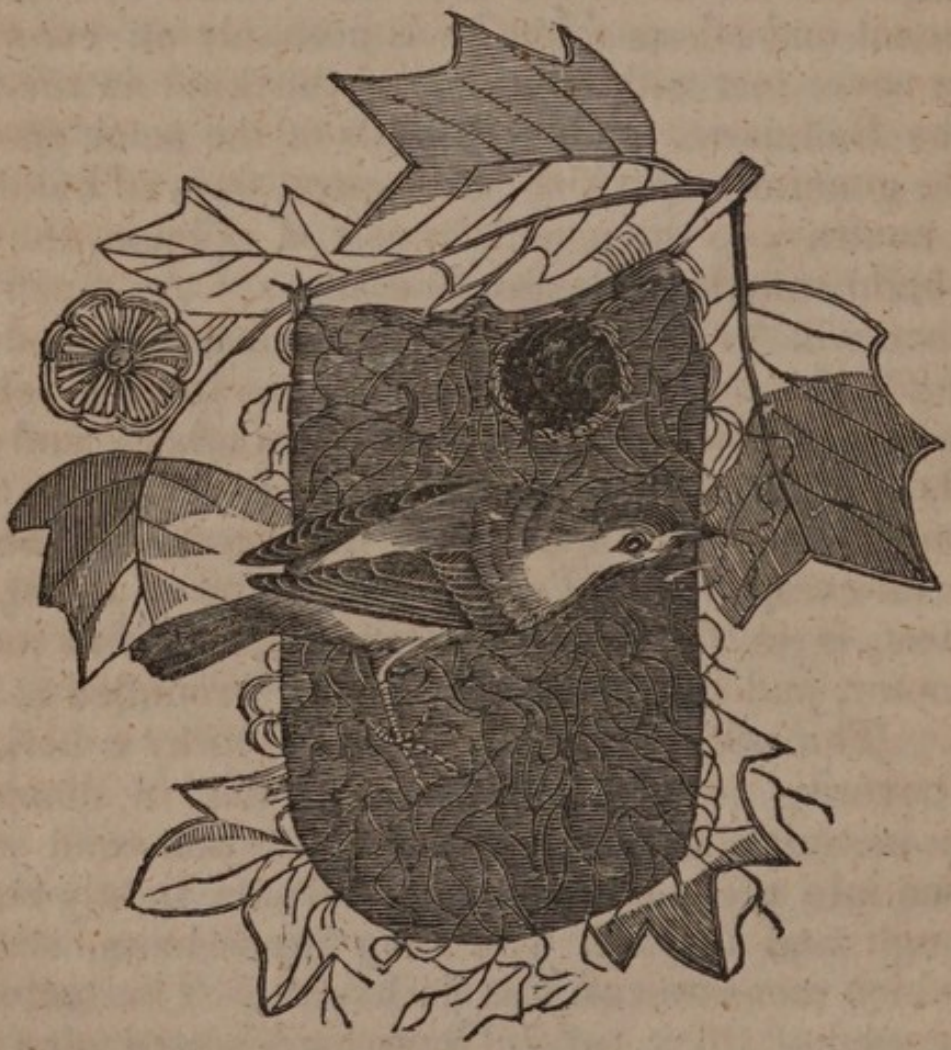
But by far the most celebrated nest of this kind is that of the Baltimore starling (*Icterus Baltimore*). Latham, differing materially from the admirable description of Wilson, says that 'the nest is loosely constructed of some downy matter in threads, formed not unlike a purse, fastened to the extreme forks of the tulip, plane, or hiccory tree.'† M. Montbeillard is still more brief in his notice of this interesting structure. We shall give Wilson's account entire.

'Almost the whole genus of orioles,' says he, 'belong to America, and, with a few exceptions, build pensile nests. Few of them, however, equal the Baltimore in the construction of these receptacles for their young, and in giving them, in such a superior degree, convenience, warmth, and security. For these purposes he generally fixes on the high bending extremities of the branches, fastening strong strings

* Amer. Ornith. vol. iii. † Gen. Hist. of Birds, iii, 116.

of hemp or flax round two forked twigs corresponding to the intended width of the nest; with the same materials, mixed with quantities of loose tow, he interweaves or fabricates a strong, firm kind of cloth, not unlike the substance of a hat in its raw state, forming it into a pouch of six or seven inches in depth, lining it substantially with various soft substances, well interwoven with the outward netting, and, lastly, finishes with a layer of horse-hair, the whole being shaded from the sun and rain by a natural penthouse, or canopy of leaves. As to a hole being left in the side for the young to be fed and void their excrements through, as Pennant and others relate, it is certainly an error: I have never met with anything of the kind in the nest of the Baltimore. Though birds of the same species have, generally speaking, a common form of building, yet, contrary to the usually received opinion, they do not build exactly in the same manner. As much difference will be found in the style, neatness, and finishing of the nests of the Baltimores as in their voices. Some appear far superior workmen to others, and probably age may improve them in this as it does in their colours. I have a number of their nests now before me, all completed and with eggs. One of these, the neatest, is in the form of a cylinder, of five inches diameter, and seven inches in depth, rounded at bottom. The opening at top is narrowed by a horizontal covering to two inches and a half in diameter. The materials are flax, hemp, tow, hair, and wool, woven into a complete cloth, the whole tightly sewed through and through with long horse-hairs, several of which measure two feet in length. The bottom is composed of thick tufts of cow-hair, sewed also with strong horse hair. This nest was hung on the extremity of the horizontal branch of an apple-tree, front-

ing the south-east, was visible one hundred yards off, though shaded by the sun, and was the work of a very beautiful and perfect bird. The eggs are five, white, slightly tinged with flesh colour, marked on the greater end with purple dots, and on the other parts with long hair-like lines, intersecting each other in a variety of directions. I am thus minute in these particulars from a wish to point out the specific difference between the true and bastard Baltimore, which Dr Latham and some others suspect to be only the same bird in different stages of colour.



Baltimore Starling (Icterus Baltimore) and Nest

'So solicitous is the Baltimore to procure proper materials for his nest, that, in the season of building,

the women in the country are under the necessity of narrowly watching their thread that may chance to be bleaching, and the farmer to secure his young grafts, as the Baltimore, finding the former, and the strings which tie the latter, so well adapted for his purpose, frequently carries off both; or should the one be too heavy, and the other too firmly tied, he will tug at them a considerable time before he gives up the attempt. Skeins of silk and hanks of thread have been often found, after the leaves were fallen, hanging round the Baltimore's nest, but so woven up and entangled as to be entirely irreclaimable. Before the introduction of Europeans no such material could have been obtained here; but with the sagacity of a good architect he has improved this circumstance to his advantage, and the strongest and best materials are uniformly found in those parts by which the whole is supported.'*

There is a bird (the species of which has not been well ascertained) celebrated in India for lighting up her nest during the night with glow-worms or fire-flies. It is further added to this wonderful circumstance, that, after collecting the luminous insects, she fastens them to the inside of her nest by means of a peculiar kind of clay of a glutinous nature.† 'What an elegant illumination!' exclaims Mrs Wakefield, 'could our minds be divested of the sufferings of the poor glow-worms, whose brilliancy subjects them to a painful death: they form an apt emblem of beauty that so often misleads its possessor into error and folly.'‡ This story of the bird lighting up its nest with glow-worms has been considered, however, as unreal as the poetical fancy that the light of the glow-worm itself is intended as a nuptial torch,

* Wilson, Amer. Ornith., i, 26.
† Asiatic Annual Register for 1802
‡ Instinct Displayed, p. 119.

to guide the darkling flight of the male to his home; which popular belief, adopted even by the best naturalists, must give way to the fact, first ascertained by De Geer, that the larva of the glow-worm (which cannot propagate) exhibits the same light. The nest of the Indian sparrow (*Loxia Bengalensis*?) is thus described, and its illumination explained, by Sir William Jones: —

'This bird is exceedingly common in Hindoostan; he is astonishingly sensible, faithful, and docile, never voluntarily deserting the place where his young are hatched, but not averse, like most other birds, to the society of mankind, and easily taught to perch on the hand of his master. In a state of nature he generally builds his nest on the highest tree he can find, especially on the Palmyra, or on the Indian fig-tree, and he prefers that which happens to overhang a well or a rivulet: he makes it of grass, which he weaves like cloth, and shapes like a bottle, suspending it firmly on the branches, but so as to rock with the wind, and placing it with its entrance downward to secure it from the birds of prey. His nest usually consists of two or three chambers, and it is popularly believed that he lights them with fire-flies, which he is said to catch alive at night, and confine with moist clay, or with cow-dung. That such flies are often found in his nest, where pieces of cow-dung are also stuck, is indubitable; but, as their light could be of little use to him, it seems probable that he only feeds on them. He may be taught with ease to fetch a piece of paper, or any small matter, that his master points out to him. It is an attested fact, that if a ring be dropped into a deep well, and a signal be given to him, he will fly down with amazing celerity, catch the ring before it touches the water, and bring it up to his master with apparent exultation: and it is confidently asserted, that if a house, or any other place, be shown to him

once or twice, he will carry a note thither immediately, on a proper signal being made. The young Hindoo women at Benares, and in other places, wear very thin plates of gold, called *ticas*, slightly fixed, by way of ornament, between their eyebrows, and when they pass through the streets it is not uncommon for the youthful libertines, who amuse themselves with training these birds, to give them a signal which they understand, and send them to pluck the pieces of gold from the foreheads of their mistresses, which they bring in triumph to their lovers.'

It is not improbable, however, that some of these feats have received a colouring from oriental imagination. The separate chambers of the nest, also, may possibly be accounted for, as Vaillant has most satisfactorily done respecting the perch of the pinc-pinc.* We have, however, received the following account from a gentleman, long resident in India, whose testimony in favour of the popular opinion that the loxia uses glow-worms to light up its nest, and makes separate chambers in its dwelling, is so strong, that we cannot refuse to place it before our readers:

'Desiring to ascertain the truth of the current belief that the bird employs the glow-worm for the purpose of illuminating its nest, I adopted the following method. Taking advantage of the absence of the birds, about four o'clock in the afternoon, I directed a servant to prevent their return, while I examined their nest; which I cut open, and found in it a full sized glow-worm, fastened to the inside with what is in India called *morum*, a peculiarly binding sort of clay. Having sewn up the division, I replaced the nest; which, on the following evening I again examined, and found another smaller sized glow-worm, with fresh clay, a little on one side of the former spot. I subsequently tried the experiment

* See our chapter on Felt-making birds.

on three other nests, in two of which the same results were elicited, and in the third the fresh clay was fixed, but no glow-worm. That the insect is placed in the nest as food, is, I think, rendered extremely doubtful, by the fact of its being fixed in the clay, a useless labour for that purpose; and from the little likelihood there is that a bird, which, as I believe, never quits its nest after roosting, which delights in sunshine, and which is never known to take any food during the night-time, should be of such a greedy disposition as to be unable to retire to rest without providing food for a future occasion. As to the separate chambers, also, it may be observed that the fact of their existence is indisputable, and I think it is equally certain that they are not occasioned by adding new nests to old ones, as such additions would be at once discernible, from the difference occasioned in the colour and texture, by exposure to the inclemencies of the seasons.'

One of the prettiest of the woven nests is figured and described by Vaillant in his splendid work on African birds; though he is doubtful what species of bird was the mechanic. The following is his account of this beautiful nest.

'It is, I believe,' says he, 'the nest of the tchitrec (*Muscicapa cristata*, LATHAM); for though I have never captured the bird of this species on the nest, and am not therefore certain of the fact, my good Klaas, a faithful if not a profound observer, assured me that it was. In one of our journeys through a wood of mimosas, in the country of the Caffres, he discovered and brought me this nest, having seen, he said, and particularly observed a male and female tchitrec occupied in constructing it. It is remarkable for its peculiar form, bearing a strong resemblance to a small horn, suspended, with the point downwards, between two branches. Its great-

Nest of the Tchitrec? (*Muscicapa cristata*, Latham).

est diameter was two inches and a half, and gradually diminishing towards the base. It would be difficult to explain the principle upon which such a nest had been built, particularly as three-fourths of it appeared to be entirely useless and idly made; for the part which was to contain the eggs, and which was alone indispensable, was not more than three inches from the surface. All the rest of this edifice, which was a tissue closely and laboriously woven of slender threads taken from the bark of certain shrubs, seemed to be totally useless. The interior of the nest was not fur-

nished with any sort of soft material, such as down, wool, or hair, but as the female had not laid her eggs when Klaas brought it to me, it is probable that the nest was not quite finished; a fact indeed proved by the birds being still at work at the time.'*

We possess a specimen of the nest of a yellow-hammer (*Emberiza citrinella*) which was built in the slope of a bank, and though not so finely woven as the African one just figured, is constructed in the same way, of a long closely worked basis in the form of an inverted cone, quite solid for about two inches, while the cavity of the nest, therefore, which is about two inches deep, only extends to half the perpendicular dimensions.†

The nest of the yellow hammer, however, belongs rather to the preceding division of basket-work in the exterior, though the lining is frequently woven with considerable art. Grahame gives a pretty description of it:

> 'Up from the ford, a little bank there was,
> With alder-copse and willow overgrown,
> Now worn away by mining winter floods;
> There, at a bramble root, sunk in the grass,
> The hidden prize, of withered field straws formed,
> Well lined with many a coil of hair and moss,
> And in it laid five red-veined eggs, I found.'‡

The figure which Sepp has given of this nest is very good,§ but the streaks on the eggs are lighter than we ever observed them in some thousands of specimens which we have examined. 'It makes choice,' says Syme, 'of a low bush or hedge, though we have seen a nest in a moist mossy bank above a streamlet, canopied by a plant of avens, the decayed leaves of which laid the foundation of the nest, while the green foliage and bending flowerets concealed

* Oiseaux d'Afrique, iii, 129. † J. R. ‡ Birds of Scotland, p. 28.
§ Nozeman and Sepp, Nederlandsche Vogelen, ii, deel.

Nest of the Yellow-hammer (Emberiza citrinella), drawn from specimen.

the artless dwelling. But the yellow-hammer rarely builds on the ground, preferring a low bush or among reeds in moist places.'* This is contrary, however, to our observation, as we have rarely found the nest except on the ground.

* Brit. Song Birds, p. 223.

Chapter XIII.

Tailor Birds. — Orchard Starling. Bonana Starling. Tailor Bird.

It seems no less difficult to conceive in what manner a bird could make its bill perform the office of a needle, than that of a weaver's shuttle; yet that this is actually done, we have unquestionable evidence, both in the workmanship of the nests of more than one species, and in the ocular testimony of observers who have watched the little mechanics at work. We are, however, more deficient in details upon the process of forming nests by sewing, than in the case of most of the other mechanical operations of birds described in this volume, and therefore our notices must be brief. The most perfect of these descriptions is given by Wilson, respecting the nest of the orchard starling (*Icterus mutatus*), a bird which has created no small confusion among systematic writers, in consequence of the male not arriving at its mature plumage till the third summer, which circumstance has caused it to be mistaken by Buffon and Latham for the female of the Baltimore (*Icterus Baltimore*). Wilson has cleared up these mistakes in a luminous and satisfactory manner, by coloured figures of the female as well as of the male in its three different gradations of plumage; while the nest is so very different in structure, that we have deemed it proper to place them in separate chapters.

'These birds' (the orchard starlings), says Wilson, 'construct their nests very differently from the Baltimores. They are so particularly fond of frequenting orchards, that scarcely one orchard in summer is without them. They usually suspend their nest from

the twigs of the apple-tree; and often from the extremities of the outward branches. It is formed exteriorly of a particular species of long, tough, and flexible grass, knit or sewed through and through in a thousand directions, as if actually done with a needle. An old lady of my acquaintance, to whom I was one day showing this curious fabrication, after admiring its texture for some time, asked me in a tone between joke and earnest, whether I did not think it possible to learn these birds to darn stockings? This nest is hemispherical, three inches deep by four in breadth; the concavity scarcely two inches deep by two in diameter. I had the curiosity to detach one of the fibres, or stalks, of dried grass from the nest, and found it to measure thirteen inches in length, and in that distance was thirty-four times hooked through and returned, winding round and round the nest! The inside is usually composed of wool, or the light downy appendages attached to the seeds of the platanus occidentalis, or buttonwood, which form a very soft and commodious bed. Here and there the outward work is extended to an adjoining twig, round which it is strongly twisted, to give more stability to the whole, and prevent it from being overset by the wind.

'When they choose the long pending branches of the weeping-willow to build in, as they frequently do, the nest, though formed of the same materials, is made much deeper, and of slighter texture. The circumference is marked out by a number of these pensile twigs that descend on each side like ribs, supporting the whole; their thick foliage, at the same time, completely concealing the nest from view. The depth in this case is increased to four or five inches, and the whole is made much slighter. These long pendent branches, being sometimes twelve and even fifteen feet in length, have a large sweep in the wind,

and render the first of these precautions necessary, to prevent the eggs or young from being thrown out; and the close shelter afforded by the remarkable thickness of the foliage is no doubt the cause of the latter. Two of these nests, such as I have here described, are now lying before me, and exhibit not only art in the construction, but judgment in adapting their fabrication so judiciously to their particular situations. If the actions of birds proceeded, as some would have us believe, from the mere impulses of that thing called instinct, individuals of the same species would uniformly build their nest in the same manner, wherever they might happen to fix it; but it is evident from these just mentioned, and a thousand such circumstances, that they reason, *à priori*, from cause to consequences, providently managing with a constant eye to future necessity and convenience.'*

According to Buffon and Latham, the bonana starling (*Icterus bonana*) is another of the tailors. It inhabits Martinico, Jamaica, and other West India islands, and builds a nest of a very curious construction, if it can justly be called building. The materials which it uses are fibres and leaves, which it shapes into the fourth part of a globe, and sews the whole, with great art, to the under part of a bonana-leaf, so that the leaf makes one side of the nest.†

But the most celebrated bird of this division is the one which in the East is, *par excellence*, named the tailor-bird (*Sylvia sutoria*, Lath.), the description of whose performances we would be apt to suspect for an Oriental fiction, if we had not a number of the actual specimens to prove their rigid authenticity. We do suspect, however, that these very specimens have

* Wilson, Amer. Ornith., i, 72.
† Latham, Gen. Hist. of Birds, iii, 118.

misled European naturalists a step beyond the truth in their accounts of its proceedings. 'The tailor-bird,' says Darwin, 'will not trust its nest to the extremity of a tender twig, but makes one more advance to safety by fixing it to the leaf itself. It *picks up a dead leaf, and sews it to the side of a living one*, its slender bill being its needle, and its thread some fine fibres; the lining consists of feathers, gossamer, and down; its eggs are white; the colour of the bird light yellow; its length three inches; its weight three-sixteenths of an ounce; so that the

Nest of the Tailor-Bird (Sylvia sutoria, Lath.), *from Pennant's figure.*

materials of the nest, and the weight of the bird, are not likely to draw down a habitation so slightly suspended. A nest of this bird is preserved in the British Museum.'*

There are now three such nests in the Museum, all of which certainly give some colour to the story of a dead leaf having been sewed to a living one; yet we have the authentic narrative of an eye-witness of its operations, which mentions nothing of this kind; but, on the contrary, serves to confirm our doubts. It will consequently be desirable to give this narrative in the language of the original observer, whose splendiid figure we shall likewise take the liberty of copying. Comparing it with the baya, which we have already described, he says, 'Equally curious in the structure of its nest, and far superior in the variety and elegance of its plumage, is the tailor-bird of Hindostan; so called from its instinctive ingenuity in forming its nest: it first selects a plant with large leaves, and then gathers cotton from the shrub, spins it to a thread by means of its long bill and slender feet, and then, as with a needle, sews the leaves neatly together to conceal its nest. The tailor-bird (*Motacilla sutoria*, LINN.) resembles some of the humming-birds at the Brazils, in shape and colour; the hen is clothed in brown; but the plumage of the cock displays the varied tints of azure, purple, green, and gold, so common in those American beauties. Often have I watched the progress of an industrious pair of tailor-birds, in my garden, from their first choice of a plant, until the completion of the nest and the enlargement of the young. How applicable are the following lines, in the "Musæ Seatonianæ," to the nidification of the tailor-birds, and the pensile nests of the baya: —

'Behold a bird's nest!
Mark it well, within, without!

* Zoonomia, s. xvi, 13. 3.

No tool had he that wrought; no knife to cut,
No nail to fix, no bodkin to insert,
No glue to join: his little beak was all:
And yet how neatly finish'd! What nice hand,
With every implement and means of art,
Could compass such another?'*

Female Tailor-bird and Nest.

* Forbes, Oriental Memoirs, i, 55.

Chapter XIV.

Felt-making Birds. — Chaffinch. Goldfinch. Canary. Pinc-pinc. Humming Birds. Capocier.

The resemblance of the texture of some of the more elegant nests of small birds to that of a hat or a piece of double-milled woollen cloth, may not have struck many of our readers, because the most compact of the nests alluded to feel loose when compared with a hat or a piece of thick cloth. But when closely examined, the materials will be found arranged in a very similar manner, being, as it were, carded into one another, and not interwoven thread by thread or hair by hair, as we have described to be the case with the nests of basket-making and weaver-birds. The nest of the chaffinch (*Fringilla cœlebs*, Linn.), one of those so commonly found as to be familiarly known to every boy, furnishes a good example of what we mean. The exterior frame-work of this pretty nest is composed of materials which vary considerably, according to the opportunities the birds have of procuring them: for, among twelve specimens in our collection, no two are exactly alike, and most of them differ very considerably. Some are formed with the finer sorts of green moss from trees (*Hypnum tenellum*, *Leskea sericea*, *L. polyantha*, &c,) but more commonly small gray or yellow lichens (*Parmelia stellaris*, *P. perlata*, *Lecanora virella*, &c,) are at least stuck over the outside; and in one instance, which seems unique, the thin bark-scales of the American plane-tree (*Platanus occidentalis*).

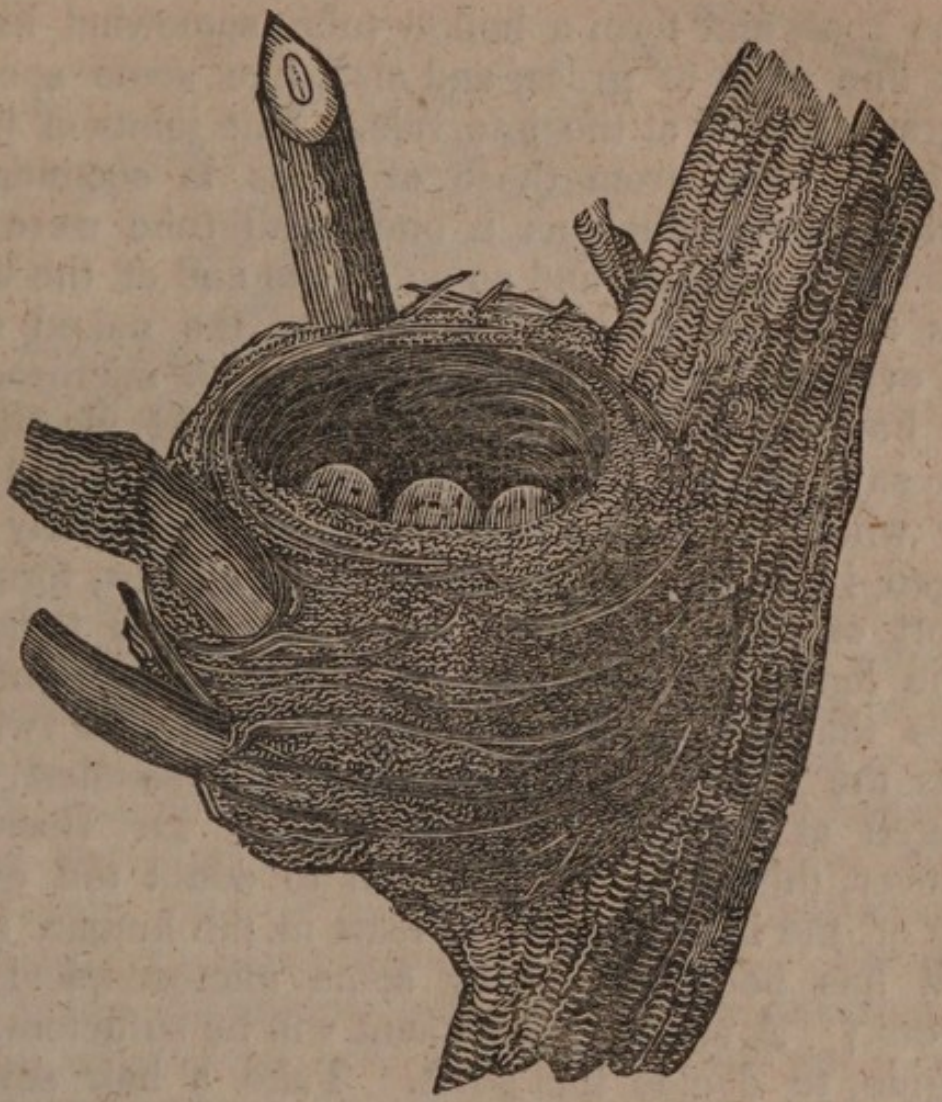
Sometimes we have found the nest-webs of spiders bundled up into little tufts, and stuck in similarly to lichens; and in the vicinity of the cotton factories, at Catrine, in Ayrshire, we have seen many chaffinches' nests stuck over in the same manner with small tufts of cotton wool.

But the indispensable substance in all these nests, how different soever they may be in the outward materials, is fine wool, with which the moss, lichen, spiders' nests, tufts of cotton, or bark-scales, are carefully and neatly felted into a texture of wonderful uniformity. The nature of the workmanship of these little birds will be seen to extraordinary advantage when compared with the moss-baskets for holding eggs or fruit, which we meet with in some of the shops in the metropolis. The moss (usually *Hypna*) upon the fruit and egg-baskets is stuck on in a very rough way, bits of the branches projecting all over, as if the maker possessed not the skill to render it smooth; but the bird's nest, when newly finished, and before it has been battered by storms or exposed to the wear and tear incident to the rearing of a brood of nestlings, is almost as smooth on the outside (more so interiorly) as if it had been felted together by a hat-maker. The wool, of course, is the material by which this is effected, no other substance which the bird could select being capable of matting so nicely together both its own fibres and the coarser materials which are intermixed with it and stuck over the whole. In many of these nests, though not in all (following the principle of the hat-maker in binding the rim of a hat), greater strength is given to the fabric by binding the whole round with dry grass-stems, or more rarely with slender roots, which are partly covered by the staple felt-work of moss and wool. A circumstance also never neglected, is to bind the nest

firmly into the forks of the bush where it is placed, by twining bands of moss, felted with wool, round all the contiguous branches, both below and at the sides. The parts of the nest which touch the larger branches, also, are always considerably less massive than the open unsupported parts, — a thin wall, moulded to the rounding of the branch, being all that is thought necessary for security, warmth, and softness, which are further procured by a neat lining of hair, smoothly woven, and a few feathers. The trees and bushes most commonly selected by the chaffinch for her nest, are the elm, oak, crab-tree, hawthorn, silver-fir, elder, &c. Mr Jennings justly remarks, that 'it prefers gardens and apple-trees,' and 'will build against a wall on a grape-vine;' though perhaps he is wrong in adding, 'rarely or ever in hedges.'* We have noticed it very often building in hedges, particularly in those composed of hawthorn and crab-tree; and we have found one in a closely-clipped privet-hedge, and another in a thick hedge of holly, though we consider the latter two instances rather unusual.†

A still more unusual situation for such a nest is quoted by Cowper as the origin of his pretty verses entitled 'A Tale.' 'Glasgow, May 23d. In a block, or pulley, near the head of the mast of a gabert now lying at the Broomielaw, there is a chaffinch's nest and four eggs. The nest was built while the vessel lay at Greenock, and was followed hither by both birds. Though the block is occasionally lowered for the inspection of the curious, the birds have not forsaken the nest. The cock, however, visits the nest but seldom, while the hen never leaves it but when she descends to the hulk for food.'‡

* Ornithologia, p. 19, note. † J. R.
‡ Buckinghamshire Herald, June 1, 1793.

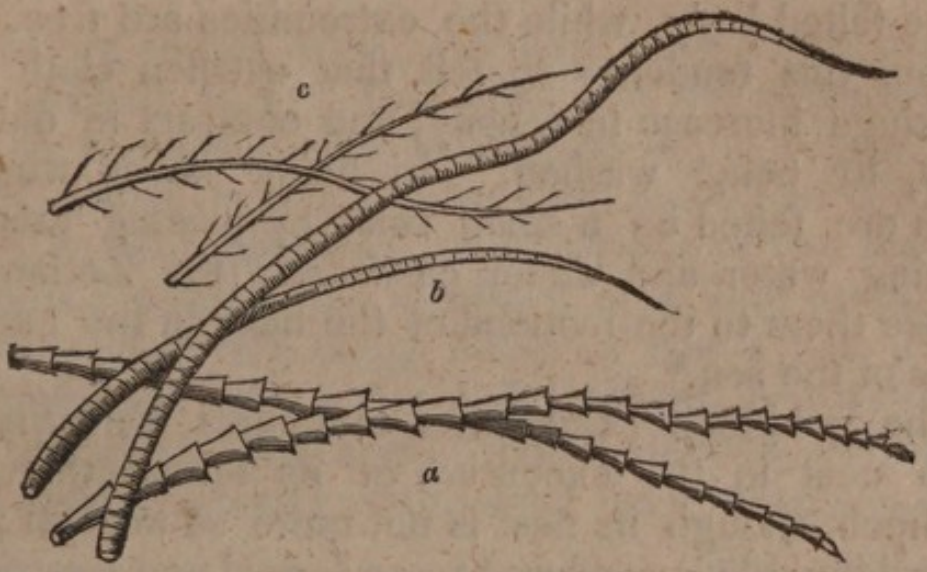


Chaffinch's Nest on an Elder tree.

The process of felting, in the case of nest-building, as well as in the fabrication of hats, depends on the structure of the wool or fur, which requires for that purpose to be very flexible. All fur, wool, and hair, besides, though it may appear smooth both to the eye and the touch, is full of inequalities, which disposes the fibres to hook and adhere among each other, working more closely together as they are pressed or moved, and retaining the hold they thus gain, unless dissevered by considerable force. We shall make this more obvious by briefly considering the structure of hair. Each hair, then, appears to be composed of ten or twelve smaller hairs, which unite

at the root, and form a hollow tube, somewhat like a very fine stalk of grass, and also, like some species of grass, jointed at the intervals. The joints of hair, however, differ from those of grass, in seeming to overlap one another, as if one small tube were inserted into another, and so on to the end of the hair. This structure, though invisible to the naked eye, and even, in some sorts of hair, to the microscope, may be made manifest to the touch. M. de Blainville says the particles of the more tender and soft part which arises from the pulp, are generally arranged in a thread-like or fibrous manner, forming a sort of filament, which, being cemented together in the length by glutinous matter, produce a sort of cones that are joined into one another, of which joints the oldest formed is always the smallest, and situated at the point of the hair.* Dr Bostock, however, thinks there is reason to doubt the existence of the imbrications, at least in the human hair, as it has been denied by some microscopical observers.† A simple experiment will be sufficient, we imagine, to decide this point. Take a hair several inches long, and work it between the thumb and the finger, and it will be found that it will always work towards the top end, and never (let it be turned how it may) towards the root end; that is, the hair will exhibit a progressive motion in the direction of the root, proving that the rough over-lappings are all directed towards the top, and that this imbricated surface prevents all motion in the opposite direction. In the hairs of some animals this structure is clearly demonstrable by the microscope, as in the fur of the mole, and still more in the fur of the bat. In rabbits' fur, which the hatters call their best stuff, this is, probably, no less remarkable.

* Anatomie Comparat., vol. i. † Physiology, vol. i.



Hairs of (a) the Bat, (b) the Mole, and (c) the Hamster Mouse.

It is in consequence of this imbricated structure that the individual fibres of a quantity of fur or wool, when spread upon a table, covered with a linen cloth, and pressed down in different directions, will each begin to move in the direction of its root, in the same manner as the hair rubbed between the fingers in the experiment just mentioned. The several fibres being thus moved in every direction, become interwoven with each other, and unite into a continuous mass. Curled hairs, again, such as the fibres of wool, entwine themselves less closely than those which are straight, though flexible, as they do not, like these, recede from the point of pressure in a straight line; but the expansion of the imbricated structure by heat and moisture greatly facilitates the felting process, and hence hatters use hot water to expand the short fur of rabbits and hares, which they employ. The tendency of straight hairs to proceed in a straight line in the direction of the root, is a property of great advantage to the hatter; for he spreads over his coarser hat body a quantity of fine straight fur, and, by pressure, these fine hairs move inwards in the direction of their roots, and thus form a coating or nap, the base of the hairs being inserted

in the felted body, while the extremities are free. It is from this tendency to felt that woollen cloth and stockings increase in density, and contract in dimensions, by being washed. In many places woollen stuffs are felted on a small scale by placing them in running water and under cascades: the Zetlanders expose them to the motions of the tides in the narrow inlets of the sea.*

The goldfinch (*Carduelis communis*, CUVIER) is more neat in the execution of its felting than the chaffinch, though its nest is not quite so tasteful; for the goldfinch's is rendered more formal and less richly varied in its colouring, by the anxiety which the bird displays not to leave a single leaf of moss or lichen projecting, all being smoothly felted with wool, which in some measure conceals the moss; whereas, in the chaffinch's nest, the lichens usually conceal the wool. In other respects the two nests are much the same, as well as the eggs; those of the goldfinch having their white ground more commonly tinged with blue, and having fewer and rather brighter spots, which are dark in the centre, and shade off into a thinly-spread purple colour. Bolton describes the goldfinch's nest as bound with blades of dried grass and a few small roots; a circumstance which has not fallen under our observation, though this may be sometimes resorted to, for it may be seen in the nests of some chaffinches and not in others. Bolton found his nest in the bough of a plane tree (*Acer Pseudo-platanus*); but we have usually met with them in orchards, on elms, and more rarely in hawthorn hedges. The lining of thistle-down, ascribed to the nest of the goldfinch in most books of natural history, must be a mistake, at least with respect to the nests built in May and early in June; for none of our native thistles flower

* Fleming, Philos. of Zoology, i, 89.

before the end of June, and none have down, we believe, before July. The bottom of the nest now before us is bedded with small tufts of fine wool, not much spread, and the sides with the down of coltsfoot (*Tusilago farfara*), and only one or two hairs or feathers; whereas the chaffinch uses little down, and seems partial to a lining either of cow's hair alone, or intermixed with a few soft feathers, neatly woven into the cup of the nest. The goldfinch frequently uses nothing besides cotton-wool for a lining.

Nest of the Goldfinch (Carduelis communis).

The truth is, that birds will in general take the materials for building which they can most easily procure. 'On the 10th of May, 1792,' says Bolton, 'I observed a pair of goldfinches beginning

to make their nest in my garden; they had formed the ground-work with moss, grass, &c, as usual, but on my scattering small parcels of wool in different parts of the garden, they in a great measure left off the use of their own stuff, and employed the wool. Afterwards I gave them cotton, on which they rejected the wooland proceeded with the cotton; the third day I supplied them with fine down, on which they forsook both the other, and finished their work with this last article. The nest, when completed, was somewhat larger than is usually made by this bird, but retained the pretty roundness of figure and neatness of workmanship which is proper to the goldfinch. The nest was completed in the space of three days and remained unoccupied for the space of four days, the first egg not being laid till the seventh day from beginning the work.'*

Grahame is correct in saying it uses the down of willows and cannach (*Eriophorum polystachion*). His sketch is worth quoting: —

'The goldfinch weaves with willow down inlaid,
And cannach tufts, his wonderful abode.
Sometimes, suspended at the limber end
Of plane-tree spray, among the broad-leaved shoots,
The tiny hammock swings to every gale;
Sometimes in closest thickets 'tis concealed;
Sometimes in hedge luxuriant, where the briar,
The bramble, and the plumtree branch,
Warp through the thorn, surmounted by the flowers
Of climbing vetch and honeysuckle wild.'†

The nest of the canary (*Fringilla Canaria*) is very similar to the preceding, and is built, in its native regions, in the fork of an orange-tree. When kept in a green-house in this country, it will make a similar choice, seeming to be pleased with the perfume of the orange flowers, as well as of myrtle. It has been re-

* Harmonia Ruralis, i, pref. vi.
† Birds of Scotland, p. 49.

marked, that the hen canary continues adding to the brim of the nest after she begins to lay, till the time of beginning to hatch,* as do the humming birds† (*Trochilidæ*, VIGORS), and several others. Canaries are fond of lining their nests with the hair of deer or rabbits, which, like the chaffinch, they seem to prefer to down.

Nest of the Canary (Fringilla Canaria).

Vaillant has given more than one narrative, of no little interest, respecting the proceedings of several species of birds, which construct nests of felt-work in Southern Africa. The pinc-pinc (*Parus* ——), which is one of these, may appear, from a portion of his account, to rank among our weaver-birds. It may be remarked, however, that the cloth which it

* Harmonia Ruralis, i, 36. † Zool. Journal, No. 18.

fabricates is not woven, but felted. Before coming to Vaillant's account, it may be as well to quote the previous statements of Thunberg and Sonnerat, which refer, Latham thinks, rather to an allied species than to the pinc-pinc. Thunberg says, that a bird called the kapock 'forms its nest (which is as curious as it is beautiful, and is of the thickness of a coarse worsted stocking) from the down of the rosemary tree.' Sonnerat says, the Cape-tit (*Parus Capensis*, LATHAM) places its nest in the thickest bushes, and makes it with a kind of cotton, which is not known in the country.* It very much resembles the figure of a bottle; it has a narrow neck; on the outside of it is a pocket, which serves as a place of lodging for the male. When the female has left the

Nest of the Cape-Tit (Parus Capensis, Latham*), from Sonnerat.*

* There must surely be some mistake in this.

nest, the male, if he desire to follow her, beats violently with his wings against the sides of the nest, and the edges, coming in contact with each other, unite, and entirely close up the entrance. By the means of such a singular contrivance, these small birds protect their young from voracious insects and animals which are capable of doing them injury.*

'The nest of the pinc-pinc,' says Vaillant, 'is usually placed among prickly shrubs, particularly the mimosas, but sometimes on the extreme branches of trees. It is commonly very large, though some are larger than others; but the difference is only in the external appearance; in the interior they are almost of the same dimensions, namely from three to four inches in diameter, whilst the circumference of the exterior is often more than a foot. As the nest is wholly composed of the down of plants, it is either of a snowy whiteness, or of a brownish colour, according to the quality of the down which is produced by the neighbouring shrubs. On the outside it appears to be constructed in an irregular and clumsy manner, according to the situation of the branches upon which it is built, and to which it is so firmly attached, part of them passing through its texture, that it is impossible to remove it without leaving one half behind. If, however, the nest have the appearance, on the outside, of being badly made, we shall be the more surprised, on looking into the interior, that so small a creature, without other instrument than its bill, its wings, and tail, could have wrought vegetable down in such a manner as to render it as united and of as fine a texture as cloth — even of good quality. The nest in question is entirely of a round form, has a narrow neck made in its upper part, by which means the bird glides into the interior.

* Sonnerat, Voyage aux Indes orientales, vol. ii, p. 206.

At the base of this corridor there is a niche that has the appearance of a small nest resting against the large one; and at the Cape it is generally supposed that this niche was made expressly for the male to sit upon, in order to keep watch whilst the female is hatching her eggs, and that he may apprise her of danger when she is at the bottom of the nest and unable to observe an enemy on the outside. This idea, I must confess, is rather ingenious; but I have ascertained that this sort of niche is not contrived for any such purpose. The male, indeed, sits on the eggs as well as the female, and when either of them is thus occupied, the other never remains as a sentinel at the nest. I am quite confident of this, from having found at least a hundred of these nests, and having watched and observed the birds for whole mornings together. This little recess appears to be nothing more than a perch, by means of which the pinc-pinc may pass more easily into its nest, which, without such a contrivance, it might find some difficulty of accomplishing, as it could not move through so small an opening on the wing; and as the outside of the nest is slightly formed, it would injure it were the bird constantly to rest upon it — whilst this little space is as strongly built as the interior of the nest. To give it the requisite solidity, the bird has no other means than beating with its wings, and turning its body in different directions, as I have, elsewhere, related of the capocier. In consequence of this method of working, the work must necessarily be rounded, and have the appearance of a very small nest; a circumstance which has led to the belief that it was made solely for the accommodation of the male. This, however, is so far from being the fact, that when a branch is so situated as to render the entrance into the nest easy, the little cell is not found;

and, besides, I found several of these nests with two or three perches; and others in which the perch had little of the form of a small nest.

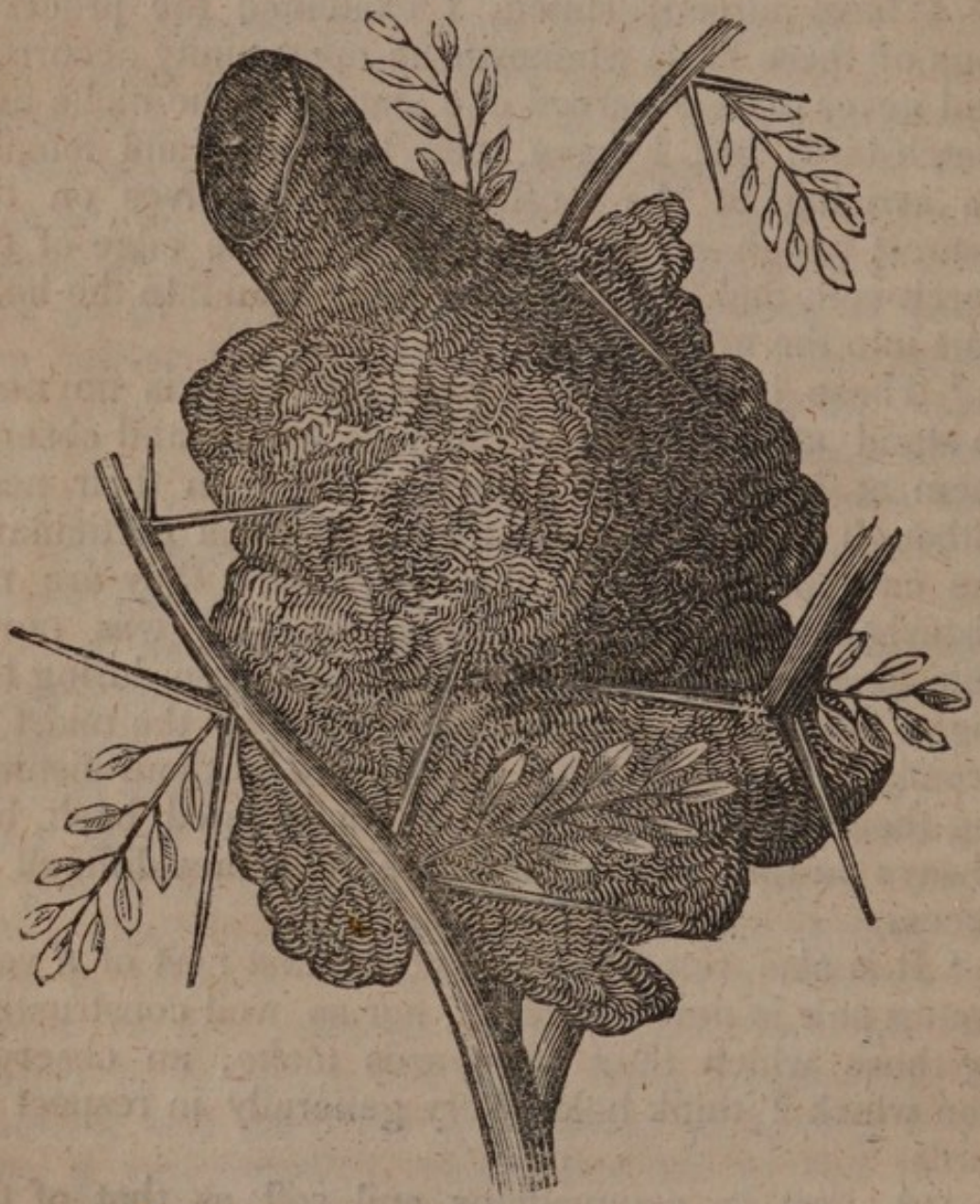
'In general, these perch-cells are so narrow, that the bird, small as it is, could not well rest upon them; and it would be much more difficult for the bird to which Sonnerat attributes this nest. Besides, as I have already stated, I examined the proceedings of these birds whenever an opportunity occurred, and never once observed one placed in the niche as a watch-bird; but I have seen the male and female, on arriving at the nest, perch themselves on the nearest bough — hop from this upon the edge of the perch-cell, and then thrusting their head into the hole, dart into the nest.

'These birds are so tame, that there is no need to stand at a distance in order to watch and observe them at leisure, since they will enter in their nest, although any one be near them. This is particularly the case in the wildest districts, where they are not disturbed by children. Nevertheless, I was never able to surprise them in the nest, not even during the night, because it is invariably placed in the midst of brambles, and cannot be approached without disturbing them; it is never built in an isolated bush, but always in the midst of a clump of bushes difficult of access.

'It is also remarkable, that the first nest of a very young pair is never so large, nor so well constructed, as those which they afterwards make, an observation which I think holds very generally in respect of birds.

'A nest so commodious and soft as that of the pinc-pinc is envied by many birds which are unhappily superior to it in strength, and which, after having broken its eggs, and compelled it to flight, despoil its habitation. Thus it frequently happens, that when

a pair of pinc-pincs have finished the workmanship of their little nest, and even sometimes after having made several of these, they have not had the pleasure of possessing an asylum for their young. A sad example of what is seen in the affairs of men, among whom the most powerful have exercised absolute dominion and obliged the weaker to obey.'*

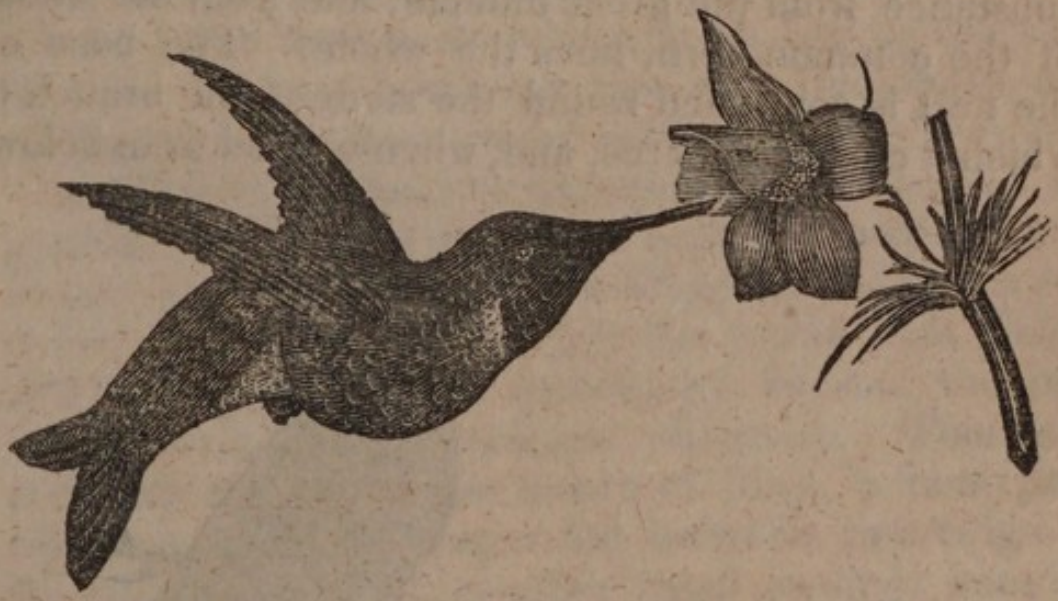


The Nest of the Pinc-Pinc (Parus ———).

We may with great propriety place here the smallest and prettiest nests with which we are ac-

* Oiseaux d'Afrique, vol. iii, p. 91.

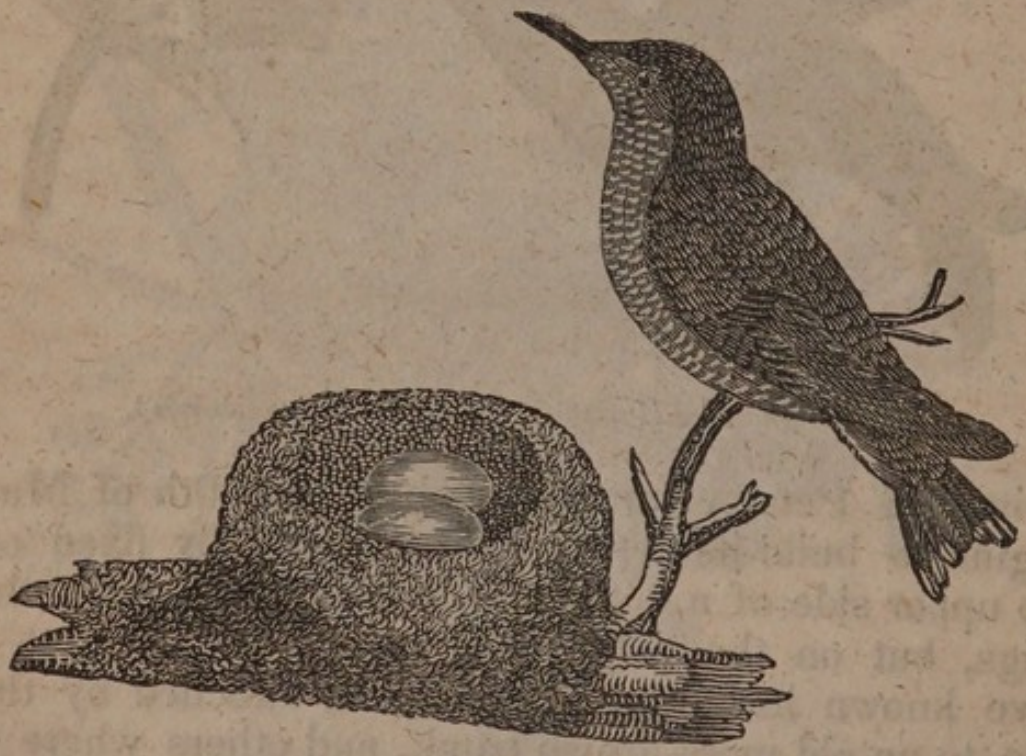
quainted, those of the humming-birds (*Trochilidæ*, VIGORS), with whose appearance many of our readers may be familiar, as they are by no means uncommon in museums—their extreme neatness of execution, and their minute size, causing them to be highly prized. By far the best description of these which we have met with, is that by Wilson of the red-throated humming-bird (*Trochilus colubris*). 'About the 25th of April,' he says, 'the humming-bird usually



The Red throated Humming Bird (Trochilus colubris).

arrives in Pennsylvania, and about the 10th of May begins to build its nest. This is generally fixed on the upper side of a horizontal branch, not among the twigs, but on the body of the branch itself. Yet I have known instances where it was attached by the side to an old moss-grown trunk, and others where it was fastened on a strong rank stalk or weed in the garden; but these cases are rare. In the woods it very often chooses a white oak sapling to build on, and in the orchard or garden selects a pear-tree for that purpose. The branch is seldom more than ten feet from the ground. The nest is about an inch in

diameter, and as much in depth. A very complete one is now lying before me, and the materials of which it is composed are as follows:—The outward coat is formed of small pieces of a species of bluish-gray lichen that vegetates on old trees and fences, thickly glued on with the saliva of the bird, giving firmness and consistency to the whole, as well as keeping out moisture. Within this are thick matted layers of the fine wings of certain flying seeds closely laid together: and, lastly, the downy substance from the great mullein, and from the stalks of the common fern, lines the whole. The base of the nest is continued round the stem of the branch to which it closely adheres, and, when viewed from below,



Nest of the Humming-Bird.

appears a mere mossy knot or accidental protuberance. The eggs are two, pure white, and of equal thickness at both ends. On a person's approaching their nest the

little proprietors dart around with a humming sound, passing frequently within a few inches of his head, and should the young be newly hatched, the female will resume her place upon the nest, even while you stand within a yard or two of the spot. The precise period of incubation I am unable to give, but the young are in the habit, a short time before they leave the nest, of thrusting their bills into the mouths of their parents, and sucking what they have brought them. I never could perceive that they carried them any animal food, though, I think it highly probable they do. As I have found their nests with eggs so late as the 12th of July, I do not doubt but that they frequently, and perhaps usually, raise two broods in the same season.'*

A more varied nest as to materials, and no less ingenious in the construction, is built by a small American bird, well known in the West Indies for its singular cry, fancied to be like the words *Tom Kelly! Whip Tom Kelly!* and named, by Wilson, the red-eyed fly-catcher (*Muscicapa olivacea*). This little architect builds, in the month of May, a neat pensile nest, generally suspended between two twigs of the young dogwood, or other small sapling, hanging it by the two upper edges, seldom at a greater height than four or five feet from the ground. The materials are pieces of hornets' nests, some flax, fragments of withered leaves, slips of vine bark, bits of paper, all nicely felted together, and partly, as Wilson thinks, glued with the saliva of the bird and caterpillars' silk, so as to be very compact. 'These nests,' he adds, 'are so durable, that I have often known them resist the action of the weather for a year, and in one instance I found the nest of the yellow-bird (*Carduelis tristis*) built in the cavity of one of these of the preceding year. The mice also very often

* Wilson, Amer. Ornith., ii, 18.

take possession of them after they are abandoned by the owners.'*

The yellow-bird (*Carduelis tristis*) just mentioned, itself sometimes called the American goldfinch, likewise makes a felt nest, prettily formed, like that of our chaffinch, of pieces of tree lichens on the outside, partly glued on with saliva, the inside being lined with whatever soft downy substance can be procured, and the whole fastened to the twigs of an apple-tree, or to the strong branching stems of hemp. The American redstart (*Setophaga ruticilla*, SWAINS.), again, fixes its nest still more accurately in the fork of a small sapling, or the drooping branches of the elm, by flax well wound together, into which are felted and glued with saliva, pieces of lichen, with a very soft lining of down. But as there would be no end to our enumeration of every individual finch or humming-bird which exhibit skill in felting together the materials of their nests, we think it will be more interesting to our readers to conclude this chapter with the lively narrative which Vaillant has given of the proceedings of a pair of small African birds.

This romantic though accurate naturalist had contrived by tempting tit-bits to render the species alluded to, which he calls the Capocier (*Sylvia macroura*, LATHAM), so familiar, that a pair of these birds regularly entered his tent several times a day, and even seemed to recognise him in the adjacent thickets as he passed along. 'The breeding season,' he goes on, 'had no sooner arrived, than I perceived the visits of my two little guests to become less frequent, though, whether they sought solitude the better to mature their plans, or whether, as the rains had ceased and insects became so abundant that my tit-bits were less relished, I cannot tell, but they seldom made their appearance for four or five successive

* Wilson, Amer. Ornith., ii, 56.

days, after which they unexpectedly returned, and it was not long before I discovered the motives that had brought them back. During their former visits they had not failed to observe the cotton, moss, and flax which I used to stuff my birds with, and which were always lying upon my table. Finding it, no doubt, much more convenient to come and furnish themselves with these articles there than to go and pick the down from the branches of plants, I saw them carry away in their beaks parcels of these, much larger in bulk than themselves.

'Having followed and watched them, I found the place which they had selected for constructing the cradle which should contain their infant progeny. In a corner of a retired and neglected garden belonging to the good Slaber there grew, by the side of a small spring beneath the shelter of the only tree which ornamented that retreat, a high plant, called by the colonists of the Cape *Capoc-bosche*. In this shrub they had already laid a part of the foundation with moss, the fork of the branches chosen for the reception of the nest being already bedded therewith. The first materials were laid on the 11th of October. The second day's labour presented a rude mass, about four inches in thickness, and from five to six inches in diameter. This was the foundation of the nest, which was composed of moss and flax, interwoven with grass and tufts of cotton.

'I passed the whole of the second day by the side of the nest, which the female never quitted from the moment my windows were opened in the morning till nearly ten o'clock, and from five o'clock in the evening till seven On the morning of the 12th, the male made twenty-nine journies to my room, and in the evening only seventeen. He gave great assistance to the female in trampling down and press

ing the cotton with his body, in order to make it into a sort of felt-work.

'When the male arrived with parcels of moss and cotton, he deposited his load either on the edge of the nest or upon branches within the reach of the female. He made four or five trips of this kind without interruption, and then set about helping his mate in the execution of her work.

'This agreeable occupation was often interrupted by innocent and playful gambols, though the female appeared to be so actively and anxiously employed about her building, as to have less relish for trifling than the male; and she even punished him for his frolics by pecking him well with her beak. He on the other hand fought in his turn, pecked, pulled down the work which they had done, prevented the female from continuing her labours, and, in a word, seemed to tell her, 'You refuse to be my playmate on account of this work, therefore you shall not do it!' It will scarcely be credited, that, entirely from what I saw and knew respecting these little altercations, I was both surprised and angry at the female. In order, however, to save the fabric from spoliation, she left off working, and fled from bush to bush, for the express purpose of teasing him. Soon afterwards, having made matters up again, the female returned to her labour, and the male sung during several minutes in the most animated strains. After his song was concluded he began again to occupy himself with the work, and with fresh ardour carried such materials as his companion required, till the spirit of frolic again became buoyant, and a scene similar to that which I have just described recurred. I have witnessed eight interruptions of this kind in one morning. How happy birds are! They are certainly the privileged creatures of nature, thus to work and sport alternately as fancy prompts them.

'On the third day the birds began to rear the side walls of the nest, after having rendered the bottom compact by repeatedly pressing the materials with their breasts, and turning themselves round upon them in all directions. They first formed a plain border, which they afterwards trimmed, and upon this they piled up tufts of cotton, which was felted into the structure by beating and pressing with their breasts and the shoulders of their wings, taking care to arrange any projecting corner with their beaks so as to interlace it into the tissue, and render it more firm. The contiguous branches of the bush were enveloped as the work proceeded in the side walls, but without deranging the circular cavity of the interior. This part of the nest required many materials, so that I was quite astonished at the quantity which they used.

'On the seventh day their task was finished; and anxious to examine the interior, I determined to introduce my finger, when I felt an egg that had probably been laid that morning, for on the previous evening I could see there was no egg in it, as it was not quite covered in. This beautiful edifice, which was as white as snow, was nine inches in height on the outside, whilst in the inside it was not more than five. Its external form was very irregular on account of the branches which it had been found necessary to enclose; but the inside exactly resembled a pullet's egg placed with the small end upwards. Its greatest diameter was five inches and the smallest four. The entrance was two-thirds or more of the whole height, as seen on the outside; but within it almost reached the arch of the ceiling above.

'The interior of this nest was so neatly worked and felted together, that it might have been taken for a piece of fine cloth, a little worn, the tissue being so compact and close, that it would have been impos-

sible to detach a particle of the materials without tearing the texture to pieces; yet was this only effected by the process which I have already described; and it must be confessed that it was a work truly admirable, considering the instruments of the little mechanics.'*

Nest of the Capocier (Sylvia macroura, Latham), *from Vaillant's figure.*

* Oiseaux d'Afrique, iii, 77, &c.

Chapter XV.

Cementers. — American Chimney-Swallow. Esculent-Swallow.

One of the old classifications of birds ranged them in three divisions, the first comprehending those which muddled in the dust; the second, those which washed in the water; and the third, those which did both. A division, something upon the same principle, with regard to the building of nests, would comprehend, in the first class, birds which used no salivary cement; in the second, those which did; and in the third, those which used it only in a portion, not the whole of their structures. In no circumstance of nest-building has there been more error promulgated in books of natural history than with respect to this cement, few naturalists seeming to be even aware of its existence; but finding nests so neatly compacted, and their parts adhering firmly to one another as well as to walls and boughs of trees, authors think it requisite to name some adhesive material by which this is accomplished, and when there is no clay in the edifice, spider's web is the substance generally fixed upon. We do not indeed deny that both the webs of spiders and of the social caterpillars are partly employed by some birds; but this is by no means an occurrence common to all the small neatly built nests of our song-birds and some others, as we are taught in books to believe. As this very point involves one of the most curious discussions connected with the subject of nests, we shall begin

with one about which there can be the least dispute. We are furnished with an instance well adapted for this purpose in the American chimney-swallow (*Cypselus pelasgius*, LATHAM). This bird, with respect to appearance, may be readily distinguished from its congeners by its rounded tail, the shafts of which, extending beyond the vanes, are sharp pointed, strong, and elastic, and are employed as a point of support for the body when the bird rests, as it exclusively does, upon the side of a tree or a perpendicular wall. It is also easily distinguished in the air by its long wings and short body, and its wide unexpected diving rapidity of flight, shooting in various directions without any apparent motion of the wings, and uttering the sounds *tsip*, *tsip*, *tsip*, *tsee*, *tsee*, in a hurried manner. It is always most gay and active in wet and gloomy weather, and is the earliest abroad in the morning and latest out in the evening, of all its brethren.

Wilson has given the following very interesting history of their mode of nestling. 'They arrive,' he says, 'in Pennsylvania late in April or early in May, dispersing themselves over the whole country, wherever there are vacant chimneys in summer sufficiently high and convenient for their accommodation. In no other situation with us are they observed at present to build. This circumstance naturally suggests the query, Where did these birds construct their nests before the arrival of Europeans in this country, when there were no such places for their accommodation? I would answer, probably in the same situations in which they still continue to build in the remote regions of our western forests, where European improvements of this kind are scarcely to be found; namely, in the hollow of a tree, which in some cases has the nearest resemblance to their present choice, of

any other. One of the first settlers in the state of Kentucky informed me that he cut down a large hollow beech-tree, which contained forty or fifty nests of the chimney-swallow, most of which, by the fall of the tree, or by the weather, were lying at the bottom of the hollow, but sufficient fragments remained adhering to the sides of the tree to enable him to number them. They appeared, he said, to be of many years' standing. The present site which they have chosen must, however, hold out many more advantages than the former, since we see that in the whole thickly settled parts of the United States these birds have uniformly adopted this new convenience; not a single pair being observed to prefer the woods.

'Security from birds of prey and other animals, from storms that frequently overthrow the timber, and the numerous ready conveniences which these new situations afford, are doubtless some of the advantages. The choice they have made certainly bespeaks something more than mere unreasoning instinct, and does honour to their discernment.'

To the following passage, we request particular attention.

'The nest of this bird is of singular construction, being formed of very small twigs, fastened together with a strong adhesive glue or gum, which is secreted by two glands, one on each side of the hind head, and mixes with the saliva. With this glue, which becomes hard as the twigs themselves, the whole nest is thickly besmeared. The nest itself is small and shallow, and attached by one side or edge to the wall, and is totally destitute of the soft lining with which the others are so plentifully supplied. The eggs are generally four, and white. They generally have two birds in the season. The young are fed at intervals during the greater part of the night, — a fact which I have had frequent op-

portunities of remarking, both here and in the Mississippi territory. The noise which the old ones make in passing up and down the funnel has some resemblance to distant thunder. When heavy and long continued rains occur, the nest, losing its hold, is precipitated to the bottom. This disaster frequently happens. The eggs are destroyed; but the young, though blind (which they are for a considerable time), sometimes scramble up along the vent, to which they cling like squirrels, the muscularity of their feet and the sharpness of their claws at this tender age being remarkable. In this situation they continue to be fed for perhaps a week or more. Nay, it is not uncommon for them voluntarily to leave the nest long before they are able to fly, and to fix themselves on the wall, where they are fed until able to hunt for themselves.'*

Since Wilson seems to be certain that the glutinous substance employed by the American chimney-swallow to cement the materials of its nest, is derived from glands distinguished both in function and situation from the common salivary glands, we may perhaps be authorised to infer that similar glands exist in the head of the swallow called salangane, and by naturalists the esculent swallow (*Hirundo esculenta?* LATH.)† As this singular nest has for many centuries been an object of curiosity among naturalists, it is scarcely credible that it should still up to the present time remain involved in mystery; and, to use the words of Dr Fleming, 'it is much to be regretted that the recent historians of those regions have added so little to its history.'‡

The earliest modern account of these edible nests

* Wilson, Amer. Ornith. v, 50.

† This epithet is not very appropriate, as it is not the bird which is eaten, but its nest.

‡ Philosophy of Zoology, ii, 238.

which we have met is given by Bontius, a Dutch physician, who resided in Java, and published some excellent works on the natural history and diseases of the East. 'On the sea-coast,' says he, 'of the kingdom of China, a sort of small parti-coloured birds, of the shape of swallows, at a certain season of the year, namely, their breeding time, come out of the midland country to the rocks; and from the foam or froth of the sea-water dashing and breaking against the bottom of the rocks, gather a certain clammy, glutinous matter, perchance the sperm of whales or other fishes, of which they build their nests wherein they lay their eggs and hatch their young. These nests the Chinese pluck from the rocks and bring them in great numbers into the East Indies to sell; which are esteemed by gluttons great delicacies, who dissolving them in chicken or mutton broth are very fond of them, preferring them far before oysters, mushrooms, or other dainty and liquorish morsels.'* About the same period they were tolerably described by Olaus Wormius,† and John de Laet,‡ who justly remarks that their substance resembles isinglass. But, long before this, these nests were known to Hierax, the Cappadocian, to Andromachus, the physician to the Emperor Nero, and, as we learn from Galen, to Asclepiades, who lived in the time of Pompey. All these ancients, however, employed them only as a medicine; and the celebrated Redi says, 'I do not remember to have ever read or heard that they were used as food, and I therefore am of opinion that we owe this ingenious invention solely to the epicurism of the later ages, which, always hungering after novelty, sets an adventitious value upon what is

* Bontius, India Orientalis, p. 66.
† Musæum Wormianum, iii, 21.
‡ Epist. ad. Worm.

brought from a distance and difficult to be procured.'* Redi has subjoined two tolerable figures of the nests, and likewise mentions their resemblance to isinglass; but he has no faith in their medical virtues.

Kircher, Du Halde, and others candidly confess that the substance composing the nests is unknown; while others deal in theoretical conjectures. Some seem to suppose they are made of shells, describing them as marked like these with ridges and rugosities, and consisting of numerous cells as if a number of shells had been conglutinated together.† Others say they are composed of sea foam or of the juice of a tree called *calambouc*. Kæmpfer again tells us he was assured by the Chinese fishers that the nests are an artificial production, at least those usually sold being nothing but a preparation of marine polypi,‡ as isinglass is the dried swim-bladder of the sturgeon (*Accipenser Huso*, and *A. Ruthenus*).

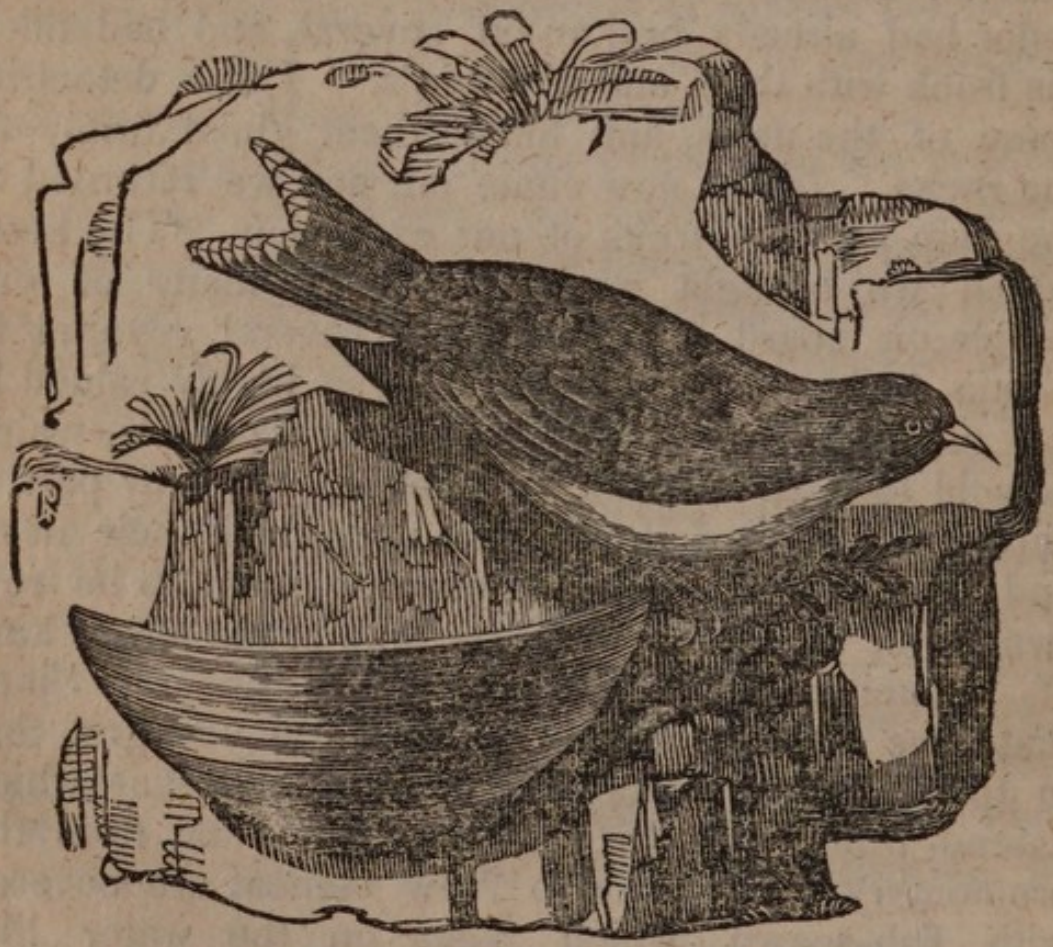
M. Montbeillard, anxious to clear up the mystery, applied to M. Poivre, an intelligent philosophical traveller who had visited the places where these nests are built. The following is his account of the matter 'In 1741,' says M. Poivre, 'I embarked in the ship Mars, bound for China, and in the month of July, the same year, we reached the Straits of Sunda, very near Java, and between two small islets called the Great and Little Tocque. We were there becalmed, and went ashore on Little Tocque to hunt green pigeons. While the rest of the party were clambering among the precipices, I walked along the beach to gather shells and jointed corals, which are found here in great abundance. After having made almost an entire circuit of the islet, it was growing late,

* Redi, Experimenta circa Res. Nat. p. 132, ed. Amstel. 1685; and Coll. Acad. iv, p. 567.

† Marin, Hist. de la Chine, p. 42. ‡ Hist. de Japan, i, 110.

when a sailor who accompanied me, discovering a deep cavern in the rocks on the brink of the sea, went into it, and scarcely advanced two or three steps when he called aloud to me. I hastened to the mouth of the cavern, and found it darkened by an immense cloud of small birds, which poured out like swarms. I entered it, and knocked down with my cane many of these poor little birds, with which I was then unacquainted; as I penetrated farther I perceived the roof of the cavern to be covered entirely with small nests shaped like holy-water pots. Each of these nests contained two or three eggs or young ones, which lay softly on feathers, like those which the parents had on their breast. As these nests soften in water, they could not withstand rain, or bear an exposure near the surface of the sea. The sailor had already broken off several, and had filled his frock with them and with birds. I also detached some of the nests, and found them glued firmly to the rocks. Night now came on, and we returned to the ship with the fruits of our excursion. The nests which we brought were known by many of our people on board, who had made several voyages to China, to be the same with those so highly valued in that country. The sailor kept several pounds, which he sold to good account at Canton. For my part, I delineated and coloured these birds, with their nests and their young; and I discovered them to be real swallows; they were about the size of the larger kind of humming-birds (*Trochilidæ*, VIGORS). Since that time I have observed, in several voyages, that in the months of March and April the seas which extend from Java to Cochin-China, and from the promontory of Sumatra to New Genoa, are covered with fish-spawn, which floats on the water like strong glue half melted. I have learnt from the Malays, the Cochin-Chinese, and from the natives of

the Philippines and Moluccas, that this is the substance of which the salangane constructs its nest. It gathers the spawn either by skimming the surface of the sea, or by alighting on the rocks on which it is cast coagulated. Sometimes threads of this viscous substance are seen hanging at the bills of these birds, and which have been supposed, but without foundation, to be extracted from their stomach in the breeding season. They all agree in this account. On passing the Moluccas in April, and the Straits of Sunda in March, I fished up some of this spawn with a bucket, and, after having drained off the water and dried it, I found it resembled exactly the substance of those nests. About the end of July and the beginning of August it is customary with the people of



The Salangane and Nest, from M. Poivre's figure.

Cochin China to rove the islets which skirt their coasts, to the distance of twenty leagues, in search of the nests of these little swallows. . . . The salanganes are seldom ever found but in that immense archipelago which encircles the eastern extremity of Asia. . . . . All that archipelago, where the islets may be said almost to touch each other, is extremely favourable to the breeding of fish; their spawn is very abundant; the water is there warmer than in the ocean.'

Sir G. Staunton has given a rather different description of the esculent swallow and its nest in his account of the Embassy to China. 'In the Cass,' says he, 'a small island near Sumatra, we found two caverns running horizontally into the side of the rock, and in these were a number of those birds' nests so much prized by the Chinese epicures. They seemed to be composed of fine filaments, cemented together by a transparent viscous matter, not unlike what is left by the foam of the sea upon stones alternately covered by the tide, or those gelatinous animal substances found floating on every coast. The nests adhere to each other and to the sides of the cavern, mostly in horizontal rows, without any break or interruption, and at different depths from fifty to five hundred feet. The birds that build these nests are small gray swallows, with bellies of a dirty white. They were flying about in considerable numbers, but were so small, and their flight was so quick, that they escaped the shot fired at them. The same sort of nests are said to be also found in deep caverns at the foot of the highest mountains in the middle of Java, at a distance from the sea; from which source it is thought that the birds derive no materials, either for their food, or the construction of their nests, as it does not appear probable they should fly in search of either over the intermediate mountains, which are very high, or against the boisterous winds prevailing

thereabouts. They feed on insects, which they find hovering over stagnated pools between the mountains, and for the catching of which their wide opening beaks are particularly adapted. They prepare their nests from the best remnants of their food. Their greatest enemy is the kite, who often intercepts them in their passage to and from the caverns, which are generally surrounded with rocks of gray limestone or white marble. The colour and value of the nests depend on the quantity and quality of the insects caught, and perhaps also on the situation where they are built. Their value is chiefly ascertained by the uniform fineness and delicacy of their texture, those that are white and transparent being most esteemed, and fetching often in China their weight in silver.

'These nests are a considerable object of traffic among the Javanese, many of whom are employed in it from their infancy. The birds, after having spent nearly two months in preparing their nests, lay each two eggs, which are hatched in about fifteen days. When the young birds become fledged it is thought the proper time to seize upon their nests, which is done regularly three times a-year, and is effected by means of ladders of bamboo and reeds, by which the people descend into the caverns; but when these are very deep, rope-ladders are preferred. This operation is attended with much danger, and several perish in the attempt. The inhabitants of the mountains generally employed in this business begin always by sacrificing a buffalo, which custom is observed by the Javanese on the eve of every extraordinary enterprise. They also pronounce some prayers, anoint themselves with sweet-scented oil, and smoke the entrance of the cavern with gum-benjamin. Near some of the caverns a tutelar goddess is worshipped, whose priest burns incense, and

lays his protecting hands on every person preparing to descend. A flambeau is carefully prepared at the same time, with a gum which exudes from a tree growing in the vicinity, and which is not easily extinguished by fixed air or subterraneous vapours.'*

It seems impossible to come to any satisfactory decision upon statements varying in so many important circumstances. Were we to determine the substance employed from the concurring testimony of numbers, we should certainly fix upon what is indefinitely called sea-foam. Marsden, indeed, expressly affirms, that 'the birds, during their building-time, are seen in large flocks on the beach collecting in their bills the foam which is thrown up by the surf. Of this there is little doubt, but they construct their nests after it has undergone, perhaps, a preparation from a commixture with the saliva or other secretion with which nature may have provided them for that purpose.'†

But in opposition to this it is urged that the caves where the nests are found are not always by the sea-side. Mr Crawfurd, the late British resident at the Court of the Sultan of Java, who superintended for several years the collecting of these nests at Karang-Bolang, tells us that 'very productive caves are found in the interior of the country, and at least fifty miles from the sea. It appears probable that they are most abundant on the sea-side, only because caverns are there most frequent and least liable to disturbance. This seems to prove that sea-foam, or other marine production, has no share in the formation of the nest, and the most probable hypothesis is, that the nest is a material elaborated from the food of the bird, a conjecture which would be proved, if, on a skilful dissection, it were discov-

* Macartney's Embassy to China.
† Marsden's Sumatra, i, 260.

ered that the bird has any peculiar organs destined to perform such a process.'*

The same writer has likewise made the important remark, that 'the nests of all the swallow-tribe in these countries are more or less formed of the same singular substance. The common house martin, as I have a thousand times seen, constructs its nest partly of this substance and partly of the ordinary materials of birds' nests, hair, straws, feathers, &c.' But as he does not seem to have made much, if any, distinction of species — apparently agreeing with the natives of the country, and (as he mistakenly believes) with 'naturalists,' that there is 'no distinction between the variety of swallow which affords the esculent nest and any other,' we think it is probable his house-martin may be allied to the American chimney-swallow (*Cypselus pelasgius*) mentioned in a preceding page. What he says of the nest, indeed, clearly indicates that he does not refer to that of our window-swallow (*Hirundo urbica*), which is not made of the ordinary materials of birds' nests, but of clay. The dissection proposed by Mr Crawfurd has been subsequently performed; and the results are given in a paper in the Philosophical Transactions, by Sir Everard Home, of which the following are the most important passages.

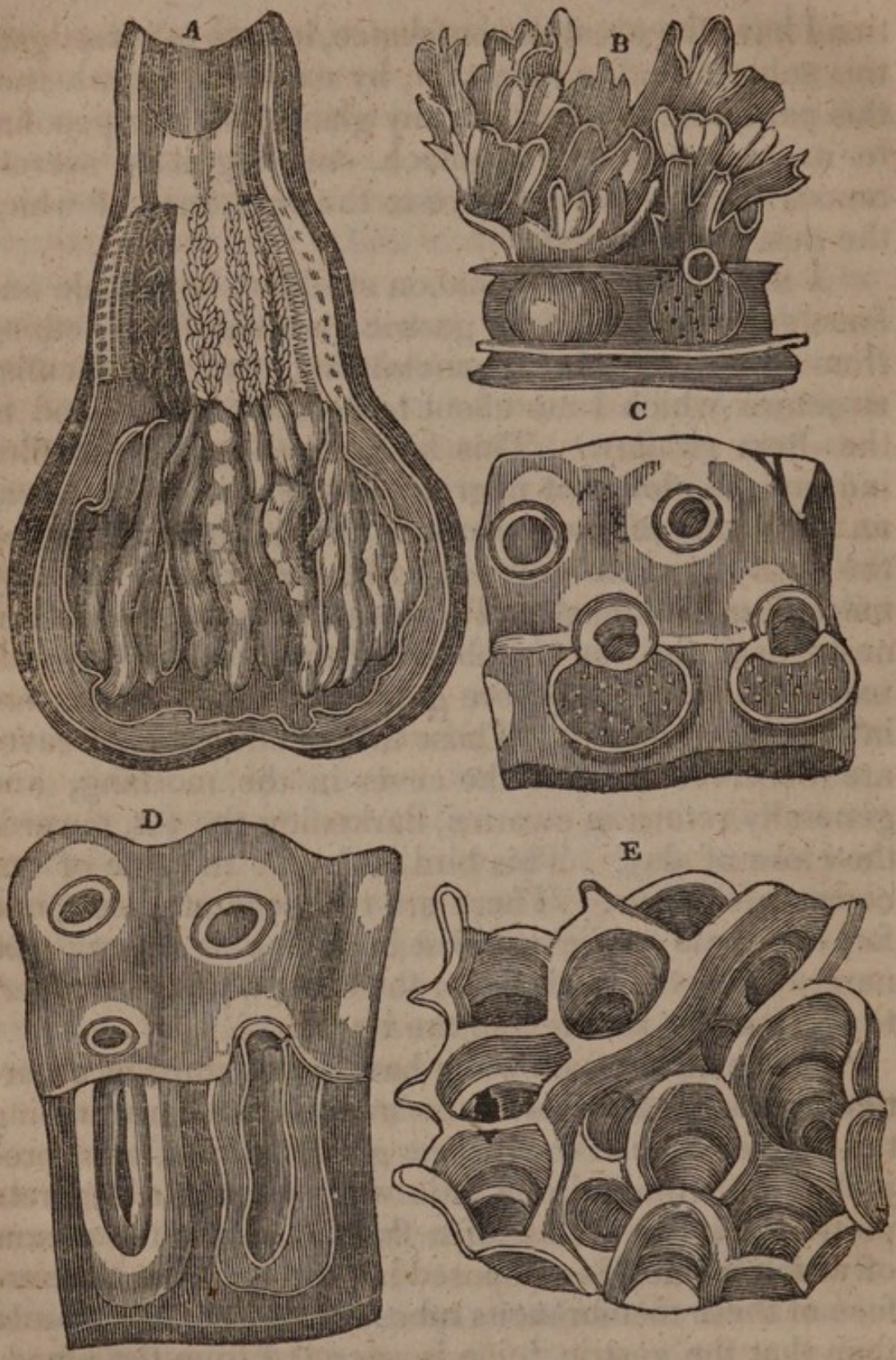
'Sir Stamford Raffles, who has just returned from Java, has brought over a number of these nests, and has been kind enough,' says Sir Everard, 'to offer me some of them for the purpose of investigating the materials of which they are composed. He gives it decidedly as his own opinion, that, whatever it is, it is brought up from the stomach, and requires at times so great an effort as to bring up blood, the stain of which is seen on the nest. This account of Sir Stamford Raffles, in the correctness of whose observa-

* History of the Indian Archipelago, vol. iii, p. 432.

tion I have the greatest confidence, led me to investigate this subject, and to ascertain, by examination, whether this particular swallow has any glands that are peculiar to its œsophagus or stomach, enabling it to secrete mucus similar in its nature to the substance of which the nest is composed.

'I find that in the common swallow, both male and female, the orifices of the gastric glands differ in nothing from those of birds in general, but that the peculiar structure which I am about to describe is confined to the Java swallow. This bird, Sir Stamford Raffles informs me, does not migrate, but remains all the year an inhabitant of the caverns in that island. Some of the most extensive caves in which they reside are forty miles from either sea. Those swallows that build their nests near the sea are observed to fly inland towards extensive swamps, where gnats and other insects are in great abundance. Those that build in inland caves are observed to quit the caves in the morning, and generally return in swarms, darkening the air, towards the close of day. This bird is double the size of our common swallow. There are two separate nests, one for the male to lie and rest in, which is oblong and narrow, adapted to his form; the other wide and deeper, to receive the female and the eggs.

'In the Java swallow we have a structure of a particular nature: there is a membranous tube surrounding the duct of each of the gastric glands, which, after projecting into the gullet a little way, splits into separate portions like the petals of a flower. That the mucus of which the nest is composed is secreted from the surface of these membranous tubes, there is no more doubt than that the gastric juice is secreted from the glands whose ducts these tubes surround. For what purpose so extraordinary an apparatus could be provided would probably have puzzled the weak intellects of human



Glands of the Stomach.

A. Lower gullet and gizzard of the Java Swallow laid open.
B. Gastric glands of the lower gullet, magnified 225 times.
C. Same glands in the Common Swallow.
D. Same glands in the Blackbird.
E. Similar glands in the pylorus of the human stomach, magnified 900 times.

beings, and given rise to many wild theories, had not the animal matter of which the bird's nest is composed, and the accurate observation of Sir Stamford Raffles, led to the discovery of its use. The swallows of Java that reside upon the coast never exhaust their secretions in forming their nests, when they find other materials fitted for that purpose.'*

Notwithstanding this apparently conclusive investigation, however, we cannot avoid giving the opinion of Dr Fleming, who says that, 'though the use of these lobes may puzzle, we cannot admit that there is a shadow of proof, even from analogy, to conclude that these secrete the materials of the nest.'† This distinguished anatomist, who dissected the Java swallow, seems to have overlooked the indispensable preliminary of ascertaining the species of swallow which he dissected; for his description of it as 'double the size of our common swallow,' proves that his bird was not the species described by Poivre, as 'about the size of the larger kind of humming-birds,' and by M. Montbeillard as rather smaller than the wren, its total length being two inches, three lines;'‡ and by Linnæus as 'two inches and a quarter long;'§ which, so far from being double, is not half the size of our common swallow (*H. rustica*), which measures six inches.

It may give some solution to this discrepancy to mention that M. Lamouroux says positively there are three species, of which the smallest makes the most valuable nest. He says this is distinguished by the feet not being covered with down, and it is never found inland like the other two, but always on the sea-

* Sir E. Home in Phil. Trans. for 1817, p. 347.
† Philosophy of Zoology, ii, 238.
‡ Oiseaux.
§ Turton, i, 628.

coast.* 'Among the natives,' says Marsden, 'I have heard some assert that these (nests, which are dark-coloured,) are the work of a different species of bird.'† M. Lamouroux is farther decidedly of opinion that the white nests of the smallest species are chiefly composed of sea-plants belonging to his *Gelidia*, the second division of his *Thalassiophytes*, which, by boiling or maceration, can be almostwholly reduced to a gelatinous substance. The larger inland species, distinguished by the want of down upon the legs, on the other hand, make use of opaque materials, and never of marine plants.‡

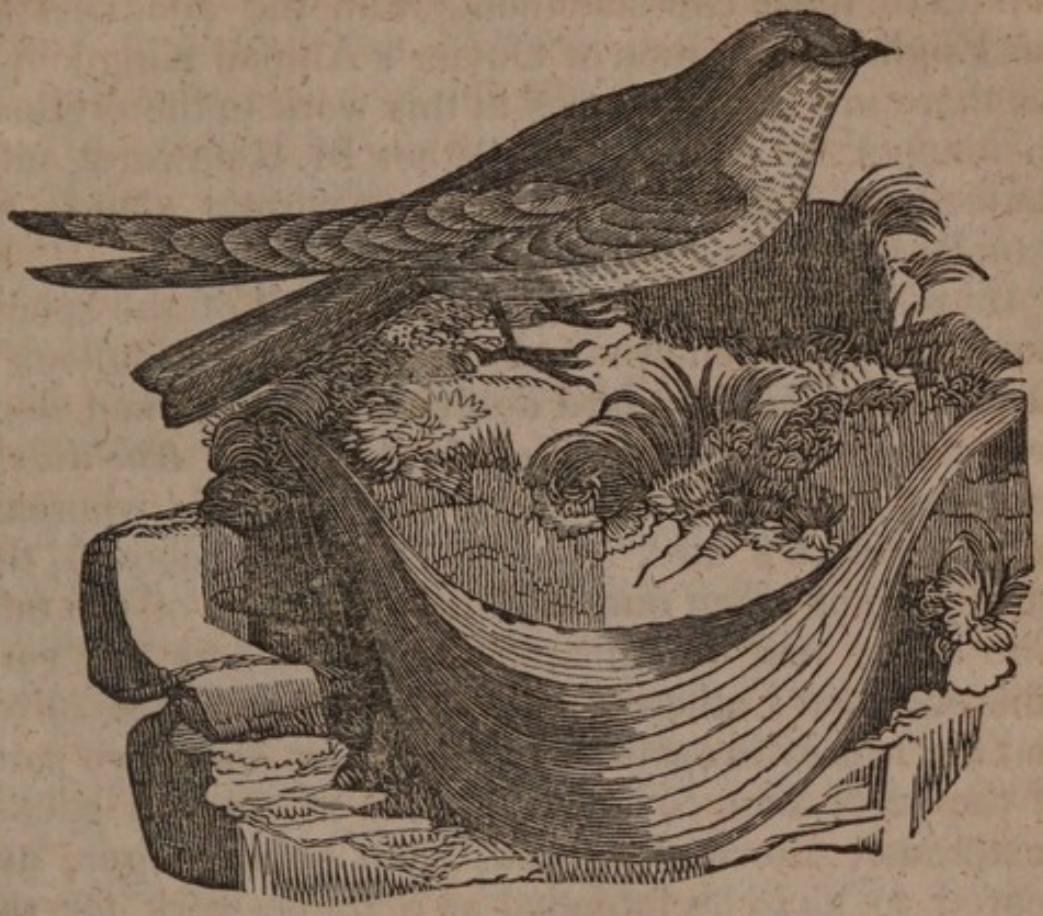
Latham is inclined to think there are more than one species which construct the edible nests; the one from Sumatra, presented to him by Sir Joseph Banks, being the size of the bank swallow, that is, four inches and a half long, of dusky, glossy black on the upper, and of a pale ash-colour on the under parts, and the legs bare of feathers. De Vrie says specifically, that it is as large as a swallow, and black. A drawing of the nest and bird, by Mr Dent, makes the latter three inches and a half long, greenish black above, sprinkled with white, beneath inclining to blue, with a mixture of white.

It would be presumptuous, amidst so many conflicting opinions, for us to pronounce at all upon the materials of these nests; yet we think it probable that M. Lamouroux's account comes nearest the truth. If the nests, however, are formed of *Gelidia*, they are most assuredly cemented with salivary gluten into the uniform consistency which they ultimately assume.

* Essai sur les Thalassiophytes, 4to, Paris, 1813, p. 41, note.

† Sumatra, i, 260.

‡ Nouv. Dict. d'Hist. Nat. art. Hirondelle.



Esculent Swallow and Nest, from Latham's figure.

M. Valenciennes thinks he has at length settled the question of the composition of these nests, agreeing with Lamouroux that they are made of the branches of a fucus common in the eastern seas, having satisfied himself of the identity of this with the nests by comparing specimens of both deposited in the King's Cabinet at Paris. The same comparison, with a similar result, was made by M. Desfontaines, who is understood to be an excellent botanist. M. Reinwardt, a celebrated professor, who resided a considerable time in Java, and made some careful researches upon the subject, came to the conclusion that the bird consolidates, if it does not wholly form, its nest with a viscous and glutinous fluid, secreted by its very large parotid glands.

We take these two statements from the additions to the English translation of Cuvier's Animal Kingdom.* As there are no references in this work to the original documents, we cannot tell whether M. Reinwardt only conjectured that the bird had large parotid glands, or actually discovered these by dissection.

In the notes which we took in 1814 of the specimens of the swallows and their nests in Bullock's Museum,we find the bird described as small and slender, not greater than the hay-bird (*Sylvia trochilus*), with the wings greatly longer than the tail; whereas, in M. Poivre's bird, (figured in p. 292, above), the wings do not reach one-third of the length of the tail. The upper part of Bullock's bird, which is not very different from Latham's description, was blackish olive, and the breast brownish gray. There were two sorts of the nests, one composed wholly of chips of sticks, dexterously interwoven; and, from being larger, appeared to us to be intended as a frame-work for the smaller nest, which was of a semicircular form, seemingly composed of a fine paste, the interior exhibiting a sort of irregular net-work, interwoven without order, as if some glutinous substance had been drawn out into threads from one side to another of the nest. It was of a yellowish white colour, and very thin. Another nest, which was thicker and blackish, was not so finely netted; but there was also a black one of a thin texture. In the specimens of these nests now in the British Museum, there are several of the white ones, of what is reckoned the first quality in commerce; besides one which differs from all we have met with, either in descriptions or in cabinets. The one we allude to is lined with a number of dark lead-coloured feathers, placed rather loosely, while

* Vol. vi, p. 135.

the exterior frame-work is similar to the white nests, which have no lining whatever. We have no means of explaining this singular anomaly.*

The white nests appear to consist chemically of a substance intermediate between gelatine and albumen. Neither the analytical experiments of Dobereiner or Brande indicate it to be of animal origin, but to be more allied to the vegetable gums, as it is incinerated with difficulty, and contains only a small portion of ammonia.

The commercial history of these singular nests is much better understood than their composition, in consequence of their reputed virtue as a restorative. The best account of them which we have met with is given by Mr Crawfurd. 'The best nests,' he says, 'are those obtained in deep, damp caves, and such as are taken before the birds have laid their eggs. The coarsest are those obtained after the young have been fledged. The finest nests are the whitest; that is, those taken before the nest has been rendered impure by the food and fæces of the young birds. The best are white, and the inferior dark-coloured, streaked with blood, or intermixed with feathers. It may be remarked, however, that some of the natives describe the purer nests as the dwelling of the cock-bird, and always so designate them in commerce. Birds' nests are collected twice a-year; and, if regularly collected, and no unusual injury be offered to the caverns, will produce very equally, the quantity being very little, if at all, improved by the caves being left altogether unmolested for a year or two. Some of the caverns are extremely difficult of access, and the nests can only be collected by persons accustomed from their youth to the office. The most remarkable and productive

* J. R.

caves in Java, of which I superintended a moiety of the collection for several years, are those of Karangbolang, in the province of Baglen, on the south coast of the island. There the caves are only to be approached by a perpendicular descent of many hundred feet, by ladders of bamboo and rattan, over a sea rolling violently against the rocks. When the mouth of the cavern is attained, the perilous office of taking the nests must often be performed with torch-light, by penetrating into recesses of the rock, when the slightest trip would be instantly fatal to the adventurers, who see nothing below them but the turbulent surf making its way into the chasms of the rock. The only preparation which the birds' nests undergo is that of simple drying, without direct exposure to the sun, after which they are packed in small boxes, usually of a picul.* They are assorted for the Chinese market into three kinds, according to their qualities, distinguished into first or best, second, and third qualities. Caverns that are regularly managed will afford, in 100 parts, $53\frac{3}{10}$ parts of those of the first quality, 35 parts of those of the second, $11\frac{7}{10}$ parts of those of the third. The common prices for birds' nests at Canton are, for the first sort, 3,500 Spanish dollars the picul, or *5l.* 18*s.* 1½*d.* per pound; for the second, 2,800 Spanish dollars per picul; and, for the third, no more than 1,600 Spanish dollars. In the Chinese markets a still nicer classification of the edible nests is often made than in the island. The whole are frequently divided into three great classes, under the commercial appellation of Paskat, Chi-kat, and Tung-tung, each of which, according to quality, is subdivided into three inferior orders, and we have, consequently, prices varying from 1,200 Spanish dollars per picul to 4,200. These last, therefore,

* The picul is about 135 pounds.

are more valuable than their weight in silver. Of the quantity of birds' nests exported from the Indian islands, although we cannot state the exact amount, we have data for hazarding some probable conjectures respecting it. From Java there are exported about 200 piculs, or 27,000 lbs, the greater part of which is of the first quality. The greatest quantity is from the Suluk Archipelagos, and consists of 530 piculs. From Macassar there are sent about 30 piculs of the fine kind. These data will enable us to offer some conjectures respecting the whole quantity ; for the edible swallows' nests being universally and almost equally diffused from Junk, Ceylon, to New Guinea, and the whole produce going to one market, and only by one conveyance, the junks, it is probable that the average quantity taken by each vessel is not less than the sum taken from the ports just mentioned. Taking the quantity sent from Batavia as the estimate, we know that this is conveyed by 5,300 tons of shipping, and, therefore, the whole quantity will be 1,818 piculs, or 242,400 lbs, as the whole quantity of Chinese shipping is 30,000 tons. In the Archipelago, at the prices already quoted, this property is worth 1,263,519 Spanish dollars, or 284,290*l*. The value of this immense property to the country which produces it, rests upon the capricious wants of single people. From its nature, it necessarily follows that it is claimed as the exclusive property of the sovereign, and everywhere forms a valuable branch of his income, or of the revenue of the state. This value, however, is, of course, not equal; and depends upon the situation and the circumstances connected with the caverns in which the nests are found. Being often in remote and sequestered situations, in a country so lawless, a property so valuable and exposed is subject to the perpetual depredations of freebooters; and it not unfrequently happens that an attack upon them is the principal object of the

warfare committed by one petty state against another. In such situations, the expense of affording them protection is so heavy, that they are necessarily of little value. In situations where the caverns are difficult of access to strangers, and where there reigns enough of order and tranquillity to secure them from internal depredation, and to admit of the nests being obtained without other expense than the simple labour of collecting them, the value of the property is very great. The caverns of Karang-bolang, in Java, are of this description. These annually afford 6,810 lbs of nests, which are worth, at the Batavia prices of 3,200, 2,500, and 1,200 Spanish dollars the picul, for the respective kinds, nearly 139,000 Spanish dollars; and the whole expense of collecting, curing, and packing, amounts to no more than 11 per cent on this amount. The price of birds' nests is of course a monopoly price, the quantity produced being by nature limited and incapable of being augmented. The value of the labour expended in bringing birds' nests to market is but a trifling portion of their price, which consists of the highest price which the luxurious Chinese will afford to pay for them, and which is a tax paid by that nation to the inhabitants of the Indian islands. There is, perhaps, no production upon which human industry is exerted, of which the cost of production bears so small a proportion to the market price.'*

* Crawfurd's Indian Archipelago, vol. iii.

Chapter XVI.

Dome builders.—The common Wren. American marsh and house Wren. Other English Wrens. House-Sparrow. Towhe Bunting. Dipper. Magpie. Bottle-Tit.

Prince Maximilian, of Wied-Neuwied, remarks, that in Brazil there are far more birds which build closed nests than among us; 'probably,' he adds, 'because there are more enemies to the young brood;'* but more probably, as we think, on account of the vertical sun. Though warmth is indispensable to hatching their eggs and rearing their young, too much of it must be equally injurious with too much cold. It is usually asserted, indeed, in books of natural history, that the tropical birds build their nests with narrow openings, for the purpose of protecting their eggs and young from snakes; but those who draw this inference surely forget that narrow entrances are precisely those which would be likely to entice the smaller snakes into the nests, as they usually pry into every hole they can find in pursuit of their natural prey.

Amongst our native dome-builders, the common wren (*Troglodytes Europœus*) is perhaps the most familiarly known; for there are few individuals, we believe, who have not seen and admired its snug little edifice. Although it is usually placed in what appears to be an inscrutable concealment, it is oftener found than nests that seem less carefully

* Travels in Brazil, p. 105.

hidden, by those at least who are acquainted with the haunts and habits of the bird. The name of *Troglodyta*, applied to it by the older naturalists, and still continued, (*Sylvia Troglodytes*, Lath.; *Troglodytes Europæus*, Cuvier), is derived from an ancient race of people inhabiting Ethiopia, who lived in caves.* It is very usual for the wren to build under the brow of a river's bank, where the turf overhangs from being undermined by the stream. But the bird seems equally partial to the shelter afforded by ivy on trees or walls, though it will often build under the fork of a bare overhanging bough; and we have now before us a specimen built in the small upper spray of a hawthorn. It will be found, perhaps, more commonly still, sheltered under the projecting side of a haystack, or the overhanging thatch of a cottage-eave.†

The usual staple material of this nest is green moss (*Hypnum velutinum*, &c), which the wren collects in great quantity; and, apparently to save itself the trouble of frequent journeys for materials, it sometimes carries a tuft of moss nearly as bulky as itself. We have picked out several such tufts from the nest in the hawthorn spray just mentioned, which are evidently not felted nor cemented together by saliva, but as they have naturally grown on the tree. We have often seen a house-sparrow flying with a piece of packthread, or bass, more than a yard long, and consequently about six times its own length; but it must be a much more curious sight to see a wren carrying a piece of moss almost as large as its own body. When the wren attaches its nest to the bare clay, under an overhanging piece of turf, as well as when it selects the moss-grown trunk of a tree, it first sketches an oval outline of the structure, by

* Pliny, Hist. Nat. v, 8. † J. R.

gluing with saliva bits of moss all round, so as to be narrower at top than bottom.

Sometimes, instead of attaching the back of the nest to the clay, it fixes only the arch of the top to that support, the under part of the nest being built downwards and suspended therefrom. This foundation of moss is increased by inserting fresh pieces, apparently glued with saliva, as the foundation is glued to the clay, till a large hemisphere is constructed, about twenty times the bulk of the little architect, with a small oval hole in the side for an entrance. Sometimes moss is almost the only material used in the whole structure, a smooth bed of the finer sort being employed for a lining. But most commonly there are a few straws, sticks, or dead leaves on the outside, by way of binding to the moss; while the interior is lined with hair, wool, shavings of wood, cotton, worsted, feathers, down, and similar materials, according as they can be had, or rather according to the experience of the birds and their different notions of comfort; for we have found the nests thus varying even in the same locality.*

It is not a little remarkable that the same bird, though so partial to moss as a building material, in other instances, scarcely uses any. We have now two of these nests before us of this sort. One, which was built in a haystack, is chiefly composed of withered grass of the softer kinds (*Holcus lanatus*, &c), and of some of the finer twigs of birch, bent into a circular form, the convex part being downwards, and the concavity encompassing the oval entrance of the nest. There is in this a few bits of moss on the back of the structure, as well as in the interior. Another, built in an adjoining haystack, was chiefly of moss, which shows that the locality does not always influence the choice of materials.

* J. R.

A second nest which we possess has no woody twigs, and scarcely any moss in the walls, which are composed of straw and dried grass (*Lolium*, *Agrostis*, *Poa*, &c), several with the seed-panicles; while within it is lined with dog's-hair, and apparently the scrapings from the barrels of writing-quills, procured, no doubt, from the sweepings of a neighbouring school-room.* There is a similar specimen in the British Museum.

Nest of the Wren (Troglodytes Europæus), drawn from specimen built in a hawthorn.

* J. R.

The statement of Colonel Montagu, copied by Atkinson, that the wren's nest is 'invariably lined with feathers,' is no less incorrect than maintaining it to be always adapted to the selected locality. We have seen a nest of moss in a haystack, and others of the same material under the thatch of cottages and barns; which agrees also with the observations of Mr Jennings.*

An anonymous correspondent of Mr Loudon's Magazine says, 'Many wren's nests may be found which have no feathers — but did you ever find either eggs or young ones in them? As far as my observation goes, the fact is that the nest in which the wren lays its eggs is profusely lined with feathers: but, during the period of incubation, the male, apparently from a desire to be doing something, constructs as many as half a dozen nests in the vicinity of the first, none of which are lined; and, whilst the first nest is so artfully concealed as to be seldom found, the latter are very frequently seen. The wren does not appear to be very careful in the selection of a site for the *cock-nests*, as they are called by the schoolboys in Yorkshire. I have frequently seen them in the twigs of a thick thorn-hedge, under banks, in hay-stacks, in ivy-bushes, in old stumps, in the loop-holes of buildings, and in one instance in an old bonnet placed amomg some peas to frighten away the black-caps.'† We apprehend that these supposed cock-nests are nothing more than the unfinished structures of paired birds.

The wren sometimes lays as many as eighteen eggs, but more commonly six or eight, whence Willughby remarks that 'it is strange, to admiration, that so small a bodied bird should feed such a company of young, and not miss one bird,

* Ornithologia, p. 243. † Mag. of Nat. Hist. iii, 568.

and that in the dark also.'* But as Bolton justly says, 'any one who compares the dimensions of the window with the dimensions of the house within, will instantly perceive that a wren's nest is more strongly lighted than any palace in the kingdom.'†

The marsh-wren (*Troglodytes palustris*, Bonap.) of North America, seems to surpass our little native in skilful workmanship, though it falls far short of it in musical talent. 'If deficient,' says Wilson, 'and contemptible in singing, it excels in the art of design, and constructs a nest, which, in durability, warmth, and convenience, is scarcely inferior to one, and far superior to many of its musical brethren. This is formed outwardly of wet rushes mixed with mud, well intertwisted, and fashioned into the form of a cocoa-nut. A small hole is left two-thirds up, for entrance, the upper edge of which projects like a pent-house over the lower, to prevent the admission of rain. The inside is lined with fine soft grass, and sometimes feathers; and the outside, when hardened by the sun, resists every kind of weather. This nest is generally suspended among reeds, above the reach of the highest tides, and is tied so fast in every part to the surrounding reeds, as to bid defiance to the winds and waves.'‡

The American house-wren (*Troglodytes ædon*, Vieill.) is no less interesting in its architectural proceedings. 'This well-known and familiar bird,' says Wilson, 'arrives in Pennsylvania about the middle of April; and about the 8th of May begins to build its nest, sometimes in the wooden cornice under the eaves, or in a hollow cherry-tree; but most commonly in small boxes, fixed on the top of a pole, in or near the garden, to which he is extremely partial, for

* Ornithology, by Ray, p. 229.
† Harmonia Ruralis, p. 68. ‡ Amer. Ornith. ii, 59.

the great number of caterpillars and other larvæ with which it constantly supplies him. If all these conveniences are wanting, he will even put up with an old hat, nailed on the weather-boards, with a small hole for entrance ; and if even this be denied him, he will find some hole, corner, or crevice about the house, barn, or stable, rather than abandon the dwellings of man. In the month of June, a mower hung up his coat, under a shed near a barn ; two or three days elapsed before he had occasion to put it on again ; thrusting his arm up the sleeve he found it completely filled with some rubbish, as he expressed it, and, on extracting the whole mass, found it to be the nest of a wren completely finished, and lined with a large quantity of feathers. In his retreat, he was followed by the little forlorn proprietors, who scolded him with great vehemence for thus ruining the whole economy of their household affairs. The twigs, with which the outward parts of the nest are constructed, are short and crooked, that they may the better hook in with one another, and the hole, or entrance, is so much shut up to prevent the intrusion of snakes or cats, that it appears almost impossible the body of the bird could be admitted ; within this is a layer of fine dried stalks of grass, and lastly, feathers.'* The parasite habits of this little bird we shall advert to in a subsequent page.

We have four native birds of this genus, besides the common wren, which build domed nests — of which the chip-chop, or chiff-chaff (*Sylvia Hippolais*), seems to be the least careful in the workmanship. Though the bird is not uncommon around London, and may be heard early in spring repeating its monotonous *chip*, *chip*, *chop*, in every wood, we have not hitherto met with the nest, which is described by Bolton to consist of dried grass, the upper

* Wilson, Amer. Ornith., i, 130.

part being constructed, apparently, more as a storm-breaker than a finished dome. Montagu, however, describes it as oval and domed, composed of dried grass, and lined with feathers like that of the hay-bird (*Sylvia trochilus*). With the latter we are well acquainted, and have now half a dozen specimens before us, two of which are rather peculiar. The usual materials of the nest (which like that of the chiff-chaff is built in a sloping bank, or at the root of a tree or bush) are a frame-work of dried grass stems, intermixed with a few bits of green moss (*Hypnum prælongum*, &c), and sometimes a few leaves or thin flexible slips of birch-bark, with a warm lining of soft feathers within, laid more loosely than is usual in such nests. The entrance, which is in front, immediately under the arched dome, is considerably wider than that of the common wren, though the bird itself is no thicker, but a trifle longer in the body. This fact accords ill with the common doctrine of these domed nests being contrived to prevent the entrance of snakes, — which, indeed, frequent the same localities. We saw a snake (*Coluber natrix*) close by one of these very nests, but having just swallowed a frog twice as thick as its own body, it probably had no relish for the tiny eggs of the wren. Of the two anomalous nests above alluded to, one has a frame-work chiefly composed of small fibrous roots, instead of the dried grass, which has obtained this wren the provincial name of *hay-bird*, in the same way as the white-throats are called *hay-tits*. The same wren is also called the *bee-bird*, not from its preying upon bees, which are too bulky for its slender bill, but because it builds a similar nest, of moss or dried grass, to the carder-bee (*Bombus muscorum*, LATREILLE).* This root-nest is lined with soft feathers as usual. Another of these

* See Insect Architecture, pp. 65-6.

nests is a much more compact structure than the hay-bird commonly makes, being formed of long thin slips of bass, wound over dry leaves of the horn-beam and poplar, so firmly plaited together that the nest may be rolled along like a ball without injury; whereas the grass nests of the same bird are usually so loose as not to bear much handling.*

Nest of the Hay-Bird (Sylvia trochilus), built with bass, drawn from specimen.

The wood-wren *Sylvia sibilatrix*, TEMMINCK) is another of those birds whose nest we have not seen; but, according to the description of Colonel Montagu, it is similar to the preceding in every particular, except that, instead of feathers, it is invariably built with fine grass and a few long hairs. Montagu also says it is built on the ground; but Mr Sweet (a high authority on such subjects) informs us that he has usually found it built on the trunk of a tree. We infer, therefore, that, like the redbreast (*S. rubecula*),

* J. R.

and some others, it occasionally makes choice of both localities.

A nest precisely similar is built by the Maryland yellow-throat (*Sylvia Marylandica*), in the midst of a thicket of briars, the dome being made of dead leaves, bound together with dry grass and lined with hair.* We shall afterwards see that this nest is often selected by the parasite cow-bird for depositing her eggs. A more singular domed nest is built by another American warbler (*Sylvia solitaria*), which haunts thickets and shrubberies, is fond of visiting gardens, orchards, and willow-trees, and is also found in very sequestered woods, where it generally builds its nest. 'This,' says Wilson, 'is fixed in a thick bunch or tussock of long grass, sometimes sheltered by a briar bush. It is built in the form of an inverted cone or funnel, the bottom thickly bedded with dry beech leaves, the sides formed of the dry bark of strong weeds, and lined within with fine dry grass. These materials are not placed in the usual manner, circularly, but shelving downwards on all sides from the top; the mouth being wide, the bottom very narrow, filled with leaves, and the eggs or young occupying the middle.'†

The only other British warbler, besides those we have just noticed, which builds a domed nest, is that beautiful little bird the gold-crested wren (*Regulus cristatus*, Ray); but it does not build uniformly in this manner, a circumstance which has led to some confusion among our most accurate naturalists. Colonel Montagu, for example, denies that it builds a covered nest, upon the fact of one, of which he has given a most interesting history in his introduction, not being covered at top; while Albin, on the authority of Derham, describes it as having a side entrance. The truth is, that this bird, like many other species,

* Wilson, Amer. Ornith. i, 89. † Ib. ii, 109.

seems to know how to accommodate its nest to the locality chosen. When it selects a spot where there is a natural canopy, it does not take the trouble to build one; but when this is wanting, it forms as neat a dome, with a small side entrance, as any of those already described. It is the only British species, we believe, which ever suspends its nest like so many of the tropical birds; for though it is said not unfrequently to build against the trunk of a tree covered with ivy, we have always found it hanging under the broad bough of a spruce-fir, a cedar, or a yew-tree, the thick flat disposition of the leaves forming a sort of umbrella over the opening. The materials of the nest are the same as those of the goldfinch and

Nest of the Golden-crested Wren (Regulus cristatus, Ray*), from Bolton's figure.*

chaffinch, namely, green moss (*Hypnum tenellum*, &c,) or lichens felted together very neatly with wool, and lined with the down of willows and other plants, or very soft feathers.*

'The golden-crested wren,' says Mr Knapp, 'a minute creature, perfectly unmindful of any severity in our winter, and which hatches its young in June, the warmer portion of our year, yet builds its most beautiful nest with the utmost attention to warmth; and interweaving small branches of moss with the web of the spider, forms a closely compacted texture, nearly an inch in thickness, lining it with such a profusion of feathers, that, sinking deep into this downy accumulation, it seems almost lost itself when sitting, and the young, when hatched, appear stifled with the warmth of their bedding and the heat of their apartment.'†

This accommodation of the structure of the nest to the locality where it is built is, in no instance with which we are acquainted, more conspicuous than in the proceedings of the house-sparrow (*Passer domesticus*, Ray). Dr Darwin mentions, seemingly as an extraordinary circumstance, that 'in the trees before Mr Levet's house, in Lichfield, there are annually nests built by sparrows, a bird which usually builds under tiles of houses or the thatch of barns;'‡ but if he had been acquainted with the statement of Bonnet, he would have learned that in Switzerland, at least, the sparrow 'most usually (*pour l'ordinaire*) builds near the tops of trees,' while its nestling under tiles is an accidental exception.§ In the vicinity of London, also, we venture to say that three pair of sparrows build on trees to one pair that nestles in holes; and so commonly is this noticed, that the tree-sparrow is

* J. R. † Journal of a Naturalist, p. 172.
‡ Zoonomia, § xvi, 13, 2.
§ Contemp. de la Nature, part xii, note 6.

popularly supposed to be a different species from the house-sparrow. The tree-sparrow (*Passer montanus*) of Yorkshire, is indeed a different species, which lays pale-brown eggs without spots ; but the London ones, which build indifferently on trees or in holes, have not a shade of difference in their eggs.

The circumstance which renders these nests most interesting, is their very different conformation, when built in a tree or under the shelter of a roof-tile. When a hole is selected it is first bedded with coarse straw, hay, and sometimes moss or similar materials, over which is laid feathers, wool, cotton, pieces of riband, tangled thread, or whatever the birds can find to suit their purpose. There is opposite our window, a faggot of sticks bound with a piece of old rope, which the sparrows have been employed half the summer in making into oakum, as a seaman would say ; every fibre of loose ends having been carded out by their beaks, and carried off piecemeal. Last summer, a pair of these birds, unfortunately for themselves, carried off from the garden a long piece of bass ; but when this had been successfully stowed in the nest under the tiles, it appeared that they had not sufficient skill to work it into the fabric, and in their endeavours to manage it, both the birds entangled their feet so inextricably in the folds, that they were held close prisoners, one only having line enough to flutter about a foot beyond the entrance. How long they had remained thus entangled we know not, as our attention was called to their situation by the more than ordinary cackling of their neighbour sparrows, who had assembled, it appeared, more to scold the unfortunate pair for their carelessness, than to assist them in getting rid of the bass, for not one attempted to aid them. We there-

fore had them taken down, but they were so exhausted with their struggles that they did not long survive; and a pair of their scolding neighbours took possession of their premises a few days afterwards.*

It is worthy of notice, that sparrows always proportion the quantity of materials to the size of the nest-hole, which is generally packed close, leaving only a sufficient cavity for hatching the eggs and rearing the young. We have one of these nests, for example, which could almost be hid in the hollow of the hand, and another built about a yard from it, which would fill a hat. When the nest is built on a tree, however, it is always nearly of the same dimensions, — about a foot in diameter each way. From the bird nestling occasionally in holes, it might be imagined that its choice of a tree would be determined on account of thus obtaining a canopy of thick boughs, to form a roof. But, on the contrary, sparrows, for the most part, select a high exposed branch, as if they were more anxious to be out of the reach of cats than of cold winds. We know one of these nests at present built at the very summit of a pear-tree, on a slender bough which bends to every breeze. But, wherever the nest is placed, a roofing seems to be an indispensable requisite; and, in such a nest as that on the pear-tree, a dome of straw is piled together in the loose, lumbering, inartificial style of the rest of the structure, an entrance being formed under this, in the side, sufficient to admit the birds, but not neatly rounded, as is the case in the nests of the wrens above described. When sparrows build in the ivied wall of a house, as they often do, they do not consider the thick clustering of the leaves above the nest as a sufficiently warm coping; and in such

* J. R.

cases, usually, if not always, they construct a dome of straw, though much more slight than in nests built on the exposed branches of trees.*

Nest of the House-Sparrow (Passer domesticus, Ray) *on a poplar bough.*

An American bird of a different family, the towhe bunting (*Pipilo erythropthalmus*), is also influenced by circumstances in forming a dome for its nest, only *sometimes* half covering it in with dry grass. Wilson does not, however, say whether this is carried, or if it be the natural grass around the nest, which is placed on the ground, and formed on the outside

* J. R.

of leaves bound together with slips of vine bark, the inside being lined with fine stalks and dry grass. Our doubts have been suggested by the same author's description of the nest of the meadow-lark (*Sturnella Ludoviciana*), which, he says, 'is built generally in, or below, a thick tuft or tussock of grass. It is composed of dry grass and fine bent laid at bottom, and wound all around, leaving an arched entrance level with the ground. The inside is lined with fine stalks of the same material disposed with great regularity.'* It is rather singular, however, to find one of the partridges (*Ortyx Virginianus*) building a covered nest, with a side entrance of a precisely similar construction.

That nests of this kind are covered for the purpose of concealment, as is usually maintained in books, is disproved, at least in part, by what Wilson tells us of the clapper rail (*Rallus crepitans*). 'About the twentieth of May,' he says, 'these birds generally commence laying and building at the same time; the first egg being usually dropped in a slight cavity, lined with a little dry grass, pulled for the purpose, which, as the number of the eggs increases to their usual complement, *ten*, is gradually added to, until it rises to the height of twelve inches or more, doubtless to secure it from the rising of the tides. Over this the long salt grass is artfully arched and knit at top, to conceal it from the view above' (to defend it, we should say, from the weather); 'but this very circumstance enables the experienced egg-hunter to distinguish the spot at the distance of thirty or forty yards, though imperceptible to a common eye. The eggs are of a pale clay colour, sprinkled with small spots of dark red, and measure somewhat more than an inch and a half in length, by one inch in breadth, being rather obtuse at the small end. These

* Wilson, Amer. Ornith., iii, 21.

eggs are exquisite eating, far surpassing those of the domestic hen. The heighth of the laying is about the 1st of June, when the people of the neighbourhood go off to the marshes *an egging*, as it is called. So abundant are the nests of this species, and so dexterous some persons at finding them, that one hundred dozen of eggs have been collected by one man in a day At this time the crows, the foxes, and the minxes come in for their share ; but not content with the eggs, these last often seize and devour the parents also. The bones, feathers, wings, &c, of the poor mud-hen lie in heaps near the hole of the minx ; by which circumstance, however, he himself is often detected and destroyed.'*

It seems no less singular for a thrush to build a domed nest, than for the rail, the lark, and the partridge, which we have just mentioned ; but the American golden-crowned thrush (*Seïurus aurocapillus*, SWAINS.) seems to have few of the usual habits of the genus ; for though a denizen of the woods, it runs along the ground like a lark, and even on the horizontal branches, frequently moving its tail in the manner of the wag tails, (*sub.-fam. Motacillina*, VIGORS). This bird builds a snug and somewhat sigular nest on the ground in the woods, generally on a declivity facing the south. The frame-work is composed of leaves and dry grass, and the lining of hair. Though sunk below the surface, it is arched over, and only a small hole left for entrance.

A British bird of an allied genus, the dipper, or water crow, (*Cinclus aquaticus*, BECHSTEIN), makes a similar domed nest, only known, however, to the inhabitants of the more mountainous and wooded districts of the country, the romantic rivulets and streams of which are its chosen haunts.

* Wilson, Amer. Ornith., vii, 118.

In the southern counties in England we have never seen the bird ; but in Derbyshire, Yorkshire, Cumberland, and particularly in Scotland, we know few brooks where a pair of dippers may not be seen flitting from stone to stone, and occasionally hopping under water, at the bottom of which they can walk as easily as on dry ground. We have only once met with the nest, at Sorn Cleugh, Ayrshire, a romantic spot, where thickly wooded rocks of variegated sandstone rise for several hundred feet on each side of a small brook, approaching in some points so near that the sun-beams cannot reach the channel below. By the side of a large block of sandstone, which had fallen into the stream from the overhanging cliff, in one of those darkened corners a pair of dippers had built their nest. The block in its fall had dragged down with it an old moss-grown hazel, whose roots were plentifully clothed with lady-fern (*Polypodium vulgare*), sweet woodroof (*Asperula odorata*), and a profusion of green moss (*Hypna*). These convenient materials were employed by the dippers for the frame-work of their fabric, which was neatly arched over with a withered fern-leaf, and over this was laid a warm coating of green moss, with a few chips of the woodroof. The lining was of similar materials, but of finer quality and more smoothly arranged. It was so near the edge of the stream, also, that it must have been overflowed, had a flood occurred, as is not unusual from its vicinity to the Clomfort range of hills. It is said the dipper will sometimes nestle behind a waterfall, when it overshoots a steep rock, and thus leaves a vacuum:* and we are convinced of the fact from having watched a pair of these birds flitting stealthily out and in from such a locality, at a small linn in the

* Bewick's Birds, ii, 120.

moors above Wemyss Bay, Renfrewshire; but the force of the falling stream precluded our getting sufficiently near to discover the nest.*

Colonel Montagu found one of these nests under a small wooden bridge in Caermarthenshire, built with hay, fibres, and moss, and lined with dry oak leaves. Though this nest was taken, another was built in the same place within a fortnight, and in a month after a third nest was taken under the same bridge. In another instance he found one in a steep mossy bank projecting over a rivulet; and, from the convenience of procuring moss, the nest was so like a portion of the bank that it could not have been discovered, but for the parent birds carrying in fish to their young.†

Amongst our larger birds, the magpie (*Pica caudata*, Ray) excels all her congeners in architectural skill. Several of the older naturalists were inclined to attribute to her more ingenuity than facts will corroborate. Albertus Magnus, for example, says she not only constructs two passages for her nest, one for entering and another for going out, but frequently makes two nests on contiguous trees, with the design of misleading plunderers, who may as readily choose the empty nest as the one containing the eggs, on the same principle that Dionysius the tyrant had thirty sleeping-rooms.‡ Others maintain that the opening opposite the passage is for the tail of the mother-magpie when hatching. Before speculating upon the use of this, it would have been well to ascertain its existence; for among the numerous magpies' nests which we have seen (two very perfect ones are now before us) the alleged second opening is by no means apparent, though in some instances the twigs may appear more loosely woven than in others,

* J. R.
† Ornithological Dict.
‡ Apud Aldrovand, i, 329.

but seldom so much so, we think, as to permit a passage to the bird.*

There is considerable discrepancy in the accounts given by naturalists of the haunts of the magpie. 'The tall tangled hedge-row,' says Mr Knapp, 'the fir grove, or the old well-wooded enclosure constitutes its delight, as there alone its large dark nest has any chance of escaping observation.'† 'It always,' says Jennings, 'builds a solitary nest either in a thornbush or on some lofty elm, and sometimes on an apple-tree: it does not often build very near dwelling-houses, but a remarkable exception to this has lately occurred in Somersetshire, at Huntspill, a magpie not only having built its nest on a tree a very short distance from a dwelling-house, but it occupied the same nest two years successively.'‡

Wilson, on the other hand, speaking, we apprehend, of its habits in Scotland as well as in America, says it 'generally selects a tall tree adjoining the farm-house for its nest, which is placed amongst the highest branches.'§ Another writer says it nestles 'in the tall hedge, or in a thick tree near the cottage:' 'it is no bird of the wilderness.'‖ This agrees with our own observations; for we have remarked the magpie to be no less partial to human neighbourhood than its congener the rook, and, so far from sequestering itself, though it is certainly a shy and wary bird, we have seldom met with it except near farm-houses. In the north, almost every farm has its denizen pair of magpies, which incubate in their hereditary nest on the old ash tree year after year, precisely like an hereditary colony of rooks. In the more closely-wooded districts of the south, indeed, it does

* J. R.

† Journ. of a Naturalist, p. 188.

‡ Ornithologia, p. 20, note. See also Bloomfield's Remains, ii, 129, &c.

§ Wilson, Amer. Ornith., iv, 76.

‖ British Naturalist, ii, 214.

not so frequently build on the trees in the farm-yard; yet we observed, in 1830, a magpie's nest in such a locality on the borders of Epping Forest, near Chigwell, and another in a clump of elms about a hundred yards from Sion House, the seat of the Duke of Northumberland.* The following is a more singular instance, from the very low situation of the nest.

'On the road,' says the Reverend John Hall, 'between Huntley and Portsoy, I observed two magpies hopping round a gooseberry bush, in a small garden near a poor-looking house, in a peculiar manner, and flying out and into the bush. I stepped aside to see what they were doing, and found, from the poor man and his wife, that these magpies, several succeeding years, had built their nest and brought up their young in this bush, and that foxes, cats, hawks, &c, might not interrupt them, they had barricadoed not only their nest, but had encircled the bush with briars and thorns, in a formidable manner, nay, so completely, that it would have cost even a fox, cunning as he is, some days' labour to get into the nest.

'The materials in the inside of the nest were soft, warm, and comfortable, but all on the outside so rough, so strong, and firmly entwined with the bush, that without a hedge-knife, hatch-bill, or something of the kind, even a man could not, without much pain and trouble, get at their young, for from the outside to the inside of the nest extended as long as my arm.

'They fed the young brood with frogs, mice, worms, or anything living, within their power to subdue. It once happened that one of the magpies having seized a rat, which it was not able to kill, one of the young ones came out of the nest to its mother and the rat,

* J. R.

while they were fighting on the outside of the bush, and assisted her to kill it, which they were not able to accomplish, till the father, arriving with a dead mouse, also lent his aid.

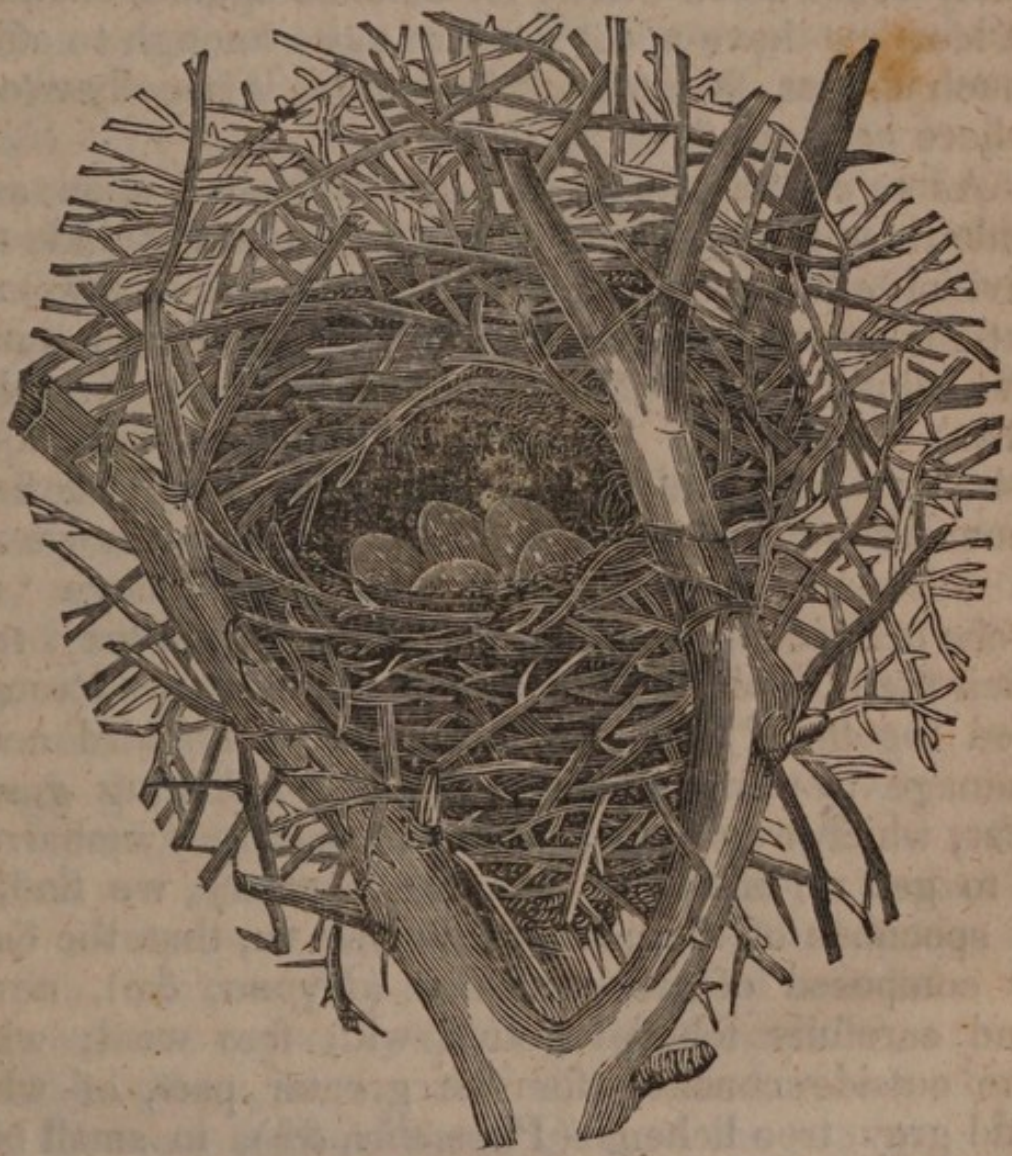
'These magpies had been faithful to one another for several summers, and drove off their young as well as every one else that attempted to take possession of their nest. This they carefully repaired and fortified in the spring, with strong rough prickly sticks that they sometimes brought to it by uniting their force, one at each end, pulling it along when they were not able to lift it from the ground.'*

Goldsmith, who is unusually copious in his history of the magpie, gives it credit for similar intelligence in the general selection of a site for its nest. 'The nest,' he says, 'is usually placed conspicuous enough, either in the middle of some hawthorn bush, or on the top of some high tree. The place, however, is always found difficult of access, for the tree pitched upon usually grows in some thick hedge-row, fenced by brambles at the root, or sometimes one of the higher bushes is fixed upon for the purpose.'†

From the contradictory descriptions of the structure of the magpie's nest, it would be impossible for a person to identify it, though it be so very conspicuous and distinct. Bonnet tells us that the birds 'fortify all the exterior of the edifice with bushes and mortar, composed of moist earth, similar to that employed by the swallow.'‡ 'The body of the nest,' says Goldsmith, 'is composed of hawthorn branches, the thorns sticking outward, but well united together by their mutual insertions. Within it is lined with fibrous roots, wool, and long grass, and *then* nicely plastered all round with mud and clay.'§ 'The

* Travels in Scotland.
† Animated Nature, iii, 170.
‡ Contempl. de la Nature, pt xii, note 6.
§ Animated Nature, iii, 171.

interior of the nest,' says a recent writer, 'is made of soft grass, and wool, hair, or feathers.'* Two fine specimens now before us have no plastering on the outside; but upon the foundation, layers of sticks, pieces of turf and clay are piled up, intermixed with sticks, chiefly thorns, and on the top of the mound thus formed a circular hollow cup of well-wrought clay is built, of considerable thickness, and about a foot deep. This is lined with a mass of pliable roots both of trees and herbs, very neatly interwoven into



Nest of the Magpie (*Pica caudata*, Ray), *drawn from specimen.*

* Brit. Nat. ii, 219,

a compact basket-work. There is not a particle of grass, wool, hair, or feathers, in these nests, nor in any others which we have examined; but it is possible that this mode of construction, though certainly not usual, may occur.

The dome which, from some of the preceding statements, we might infer to be plastered on the outside with clay, is a loose irregular fabric of blackthorn twigs laid crosswise in all directions, and raised pretty high above the body of the nest. This dome is probably constructed wholly for defence against enemies; at least we have never seen it close enough to afford much shelter from rain, to which it is usually everywhere pervious.*

As a contrast to what may be looked upon as a rude though substantial fabric, we shall conclude this division of our subject with an account of the most artfully-constructed nest of any of our British birds. We allude to that of the bottle-tit (*Parus caudatus*, Ray), provincially known by the names of Jack-in-a-bottle, and bottle-Tom, the nest being formed much after the shape of a bottle. Derham, however, is mistaken in saying that this bird employs 'the webs of spiders, cast out from them when they take their flight, with which the other materials are strongly tied together,'† for it is evident that no bird could manage to work with the threads of floating gossamer, which would cling to its bill, and only embarrass it to get rid of them. On the contrary, we find, in a specimen of the nest now before us, that the basis is composed of green mosses (*Hypna*, *&c*), newly and carefully felted together with fine wool; while the outside consists, for the greater part, of white and gray tree lichens (*Parmeliæ*, *&c*), in small bits, intermixed with the egg nests of spiders,‡ from the

* J. R. † Physico-Theology, ii, 24, note; 11th edit.
‡ See Insect Transformations, pp. 93, 94.

size of a pea and upwards, part of which are drawn out to assist in felting; so that when the texture of the nest is stretched, portions of fine gossamer-like threads appear among the fibres of the wool, — the circumstance, no doubt, which misled Derham. His description, however, is otherwise good. 'Having,' he says, 'neatly built and covered her nest with these materials without, she thatcheth it on the top with branchy tree moss (*Hypnum proliferum?*), or such like broad whitish moss, to keep out rain and to dodge the spectator's eye, and within she lineth it with a great number of soft feathers, so many, that I confess I could not but admire how so small a room could hold them, especially that they could be laid so close and handsomely together, to afford sufficient room for a bird with so long a tail, and so numerous an issue as this bird commonly hath.' A still more minute and correct description is given by Aldrovand. 'It was,' says he, 'of an oblong figure, like a pine-apple, of two palms length, and one broad, round, built of sundry materials, namely, both tree and earth moss, caterpillars' webs, and other woolly-like matter, and feathers, with that order and art, that the chief and middle strength of the work, or texture of the walls, was of that yellowish-green moss, the common hairy moss, that silk-like substance, and tough threads *resembling* those filaments suspended in the air, and flying up and down like spiders' webs, which are accounted signs of fair weather, connected and interwoven, or rather entangled so firmly together that they can hardly be plucked asunder. Of the interior capacity, all the sides, it seemed, as well as the bottom, were covered and lined with feathers, for the more soft and warm lying of the young. The outmost superficies round about was fenced and strengthened with fragments of that leafy moss which everywhere grows on trees, firmly bound together.

In the fore-part, respecting the sun-rise, and that above (where an arched roof of the same uniform matter and texture as the sides and bottom covered the nest), was seen a little hole, scarce big enough, one would think, to admit the old one.'*

Nest of the Bottle-Tit (Parus caudatus), drawn from specimen.

* Aldrovandi Ornithologia, xvii.

Chapter XVII.

Parasite Birds. — House Sparrow. Swift. Crow-Blackbird. Purple Martin. Blue Bird. House-Wren. Sparrow-Hawk, &c.

Amongst our native birds, the house-sparrow (*Passer domesticus*, Ray) is the most audacious and the most commonly observed of those invaders who boldly seize upon the nests of others by open assault, and fight courageously in defence of the habitation of which they have taken forcible and felonious possession. This robbery is not prompted because it is either unable or unwilling to build a nest of its own, (for we have already recorded it as a most industrious nest-builder) ; but, from its anxiety to procure shelter, it seizes upon any convenience it can find best adapted to its purpose, whether that be accidental or have been prepared by some other bird. One very cogent reason for this appears to be its looking forward prospectively to the winter ; for sparrows occupy their nests at night throughout the year, and though they are hardy birds, they require a warm shelter during severe frosts. From their evident preference of houses, we have been surprised at finding them in one or two situations not a little singular, when compared with their ordinary abodes. We have, in a preceding page, defended the bank-swallow (*Hirundo riparia*) against the unjust charge of robbing the kingfisher, and the bee-eater (*Merops apiaster*) ; but we must charge the sparrow with often, unceremoniously, appropriating the holes which the swallow has been at the trouble of bur-

rowing into a bank. White says, this most usually happens when the swallows breed near hedges and enclosures; but though sparrows delight to frequent such places, they rarely nestle in their vicinity unless houses be near, and not even then in any number. In the colony of bank-swallows, for instance, near Charlton in Kent, consisting of more than a hundred pairs, — not more than two or three pairs of sparrows have settled. We say 'settled,' because they appear to live on terms of good neighbourhood with the original colonists, as we have watched them for hours passing and repassing without the least indication of hostility; which, amongst birds, soon shows itself in tones of insult and defiance, and by incessant skirmishing and bickerings. How differently these same bank-swallows treated a poor cuckoo, we had an opportunity of witnessing, while observing their good fellowship with the sparrows. The cuckoo was flying quietly along, certainly meditating no harm against the swallows, and not even poaching on their domain by hawking for flies, inasmuch as he prefers a breakfast of caterpillars, which the swallows never touch; nevertheless, the instant he appeared, the tocsin was sounded, and every swallow in the colony darted out of the holes to pounce upon the intruder, whom they beat most unmercifully with bill and wing till they drove him from their boundaries. The sparrows, meanwhile, sat at the mouths of their holes with the utmost indifference as spectators, altogether unconcerned in the affray.*

We have mentioned this harmonious sociality of the bank-swallows and the sparrows, the rather because we read of anecdotes of obstinate contests for possession between sparrows and other species of swallows. Avicenna, and afterwards Albertus Magnus, tell us, that when a sparrow takes forcible

* J. R.

possession of the nest of a window-swallow (*Hirundo urbica*), there ensues a determined battle between the proprietors and the invaders, in which the latter usually come off in the first instance victorious, from their cunningly remaining in the nest. The swallows, however, take care to be revenged; for, summoning their companions to assist them, they bring a quantity of the mortar which they use in building their nests, and closing up the entrance entomb the sparrows alive. The same story is given by Rzaczynski; and Batgowski, the Jesuit, affirms that he was an eye-witness of the circumstance; while Linnæus, who was somewhat too credulous of such matters, states it as a fact ascertained.* M. Montbeillard, on the contrary, says, that the instances which he has witnessed of contests of this kind give no countenance to the story. He observed the swallows, indeed, return frequently in the course of the summer to quarrel with the sparrows, and often wheeling about for a day or two; but they never attempted to enter the nests or to shut them up with mortar.† The whole account, indeed, we should say is a fanciful legend; for the sparrows, with their strong bills, would instantly demolish the thickest wall which the swallows could build, instead of quietly permitting themselves to be imprisoned.

As the sparrow is thus on the watch to invade the homes of the swallows, so is one species of the latter, the swift (*Cypselus murarius*, Temminck), said to appropriate the nest of the sparrow; and when, after a short absence, they find the property reclaimed, they make little ceremony of expelling the owners. They are further accused of stealing from other nests the materials with which they build. 'I have,' says M. Montbeillard, 'at different times, and in different places, opened ten or twelve swifts' nests, and in all

* Fauna Suecica. † Oiseaux, art. La Hirondelle.

of them I found the same materials, consisting of a great variety of substances ; stalks of corn, dry grass, moss, hemp, bits of cord, threads of silk and linen, the tip of an ermine's tail, small shreds of gauze, of muslin, and other light stuffs, the feathers of domestic birds, those of the partridge and of the parrot, charcoal, — in short, whatever they can find in the sweepings of towns. But how can birds which never alight on the ground gather these materials? A celebrated observer supposes that they raise them by glancing along the surface of the ground, as they drink by skimming close on the water. Frisch imagines that they catch the substances in the air as they are carried up by the wind. But it is evident that little could be collected in the latter way ; and, if the former were true, it would not fail to have been observed in towns. I am inclined to think the account more probable which several plain people have told me, — that they have often seen the swifts coming out of swallows' or sparrows' nests, and carrying materials in their claws. This observation is corroborated by several circumstances : first, the swifts' nests consist of nearly the same substances with those of sparrows ; secondly, we know that the swifts enter sometimes into the nests of small birds, which we may suppose they do for the sake of pillaging the materials. With regard to the moss which they employ, it is in very small quantity, and they may gather it with their little claws, which are very strong, from trees, on which they can clamber, in the hollows of which they even sometimes breed. Of seven nests found under the head of a church-porch, fifteen feet from the ground, there were only three which had a regular cup-shape, and of which the materials were more or less interwoven, and with greater order than usual in sparrows' nests ; they had also more moss and fewer

feathers, and were in general less bulky. The best formed of all weighed two ounces and one drachm and a half; the seven together, thirteen ounces and a half; and the largest, five or six times more than the smallest.'*

We are not indeed prepared to deny that the swift may occasionally filch a straw or a feather from the nest of the house-sparrow, as rooks may occasionally be seen to steal sticks from the nests of their brethren; but we think it improbable that either this, or their finding feathers floating about on the wind, can be the only modes of procuring materials for building. All birds which employ soft substances, however, will as readily collect them when floating on the air as from the ground; and we have frequently seen the house-sparrow, the goldfinch, and the chaffinch, though never the swift, collect in this way small feathers, tufts of cotton, wool, and the down of willows.†

But to return to the house-sparrow, whose habits of nestling seem to be as various as its food, we may mention that another of its chosen stations is a rookery, where no one who had previously observed it burrowing in a sand-pit, among bank-swallows, or creeping, like a garret-mouse, under the tiles or thatch of a house, could have expected to find it associating with rooks, upon the loftiest elms, around a manor-house. Yet in such situations sparrows are very often seen, rearing their offspring contiguous to their more powerful neighbours, the rooks, who seem to take no offence at the sparrows. One thing we believe is certain — that a sparrow never ventures (at least during the breeding season) to nestle in the interior of any rook's nest which has not been abandoned, and is contented with build-

* Montbeillard, Oiseaux, viii, 218. † J. R.

ing under shelter of the larger structure, either immediately below or to leeward. In winter, however, when the rooks do not come to the rookery, the sparrows, as we have remarked, are not so ceremonious in keeping their distance, thinking themselves at liberty to roost in the warmest nests they can select. In the rookery at Lee we have observed them, throughout the winter, assembling every night at sunset, squabbling together for nearly an hour, as if to settle their individual claims to particular nests belonging to the absent rooks.*

A sociality of a similar kind is mentioned by Wilson, as sometimes occurring among the purple-grakles and the fish-hawks of America. The nest of the fish-hawk (*Pandion haliætus*, SAVIGNY) is very large, being from three to four feet in breadth, and from four to five feet high, and composed externally, as we have already described, of large sticks or faggots. Among the interstices of this structure, sometimes three or four pairs of the crow-blackbirds (*Quiscalus versicolor*, VIEILLOT) will construct their nests, while the hawk is sitting or hatching above; and during incubation they seem to live in the greatest harmony, mutually watching and protecting each other's property from depredators.† 'This,' says Wilson, 'I have had many opportunities of witnessing. The grakles, or crow-blackbirds, are permitted by the fish-hawk to build their nests among the interstices of the sticks of which his own is constructed, several pairs of grakles taking up their abode there, like humble vassals around the castle of their chief, laying, hatching their young, and living together in mutual harmony. I have found no less than four of these nests clustered around the sides of the former, and a fifth fixed on the nearest branch of the adjoin-

* J. R. † Wilson, Amer. Ornith., iii, 48.

ing tree, as if the proprietor of this last, unable to find an unoccupied corner on the premises, had been anxious to share, as much as possible, the company and protection of this generous bird.'*

The crow-blackbird (*Quiscalus versicolor*) furnishes a proof, among many others of the same kind, that its parasite habits are not original, but acquired ; for, like our sparrows in a rookery, it is only occasionally that it nestles in the eyries of the fish-hawks. Its habits, indeed, seem to be very analogous to those of the rook, being equally omnivorous, at one time making prey of grubs, worms, and caterpillars, and at another proving destructive to corn and pulse. They are also very social, and when the business of feeding is over for the day, they assemble towards evening at the nearest group of cedar and pine-trees to roost, making a continual chattering as they fly along. 'On the tallest of these trees,' says Wilson, 'they *generally* build their nests in company, about the beginning or middle of April, sometimes ten or fifteen nests being on the same tree. One of these nests, taken from a high pine-tree, is now before me. It measures full five inches in diameter within, and four in depth ; is composed outwardly of mud, mixed with fine bent and horsehair. The trees where these birds build are often at no great distance from the farm-house, and overlook the plantations. From this they issue in all directions, and with as much confidence, to make their daily depredations among the surrounding fields, as if the whole were intended for their use alone.'†

Those who are fond of harbouring birds near their habitations, take advantage of these parasite propensities of some species, by fixing conveniences for them to nestle in, about houses and gardens. Belon‡

* Wilson, Amer. Ornith., v, 22. † Ibid, iii, 45.
‡ Oiseaux, p. 326.

tells us, that in certain provinces of France, it is customary, in this way, to hang pots in the tops of trees which are haunted by thrushes; and these birds, finding convenient sheltered nests, seldom fail to lay their eggs in them, to hatch and rear their young. This plan, which, Aldrovand says, is unknown in Germany (nor is it, we believe, practised in Britain), contributes doubly to the multiplication of the species, for it both preserves the brood, and, by saving part of the time spent in building nests, it enables the birds to make two hatches a-year.

Buffon thinks this is a modern improvement upon the ancient Roman method of breeding thrushes for the table in voleries, of which Varro and Columella have left curious details. Each of these voleries contained many thousand thrushes and blackbirds, besides other birds excellent for eating, such as ortolans and quails. So numerous were those voleries in the vicinity of Rome, and in the territory of the Sabines, that the dung of the thrushes was employed to manure the lands, and, what is remarkable, to fatten oxen and hogs.* These thrushes had little liberty in their prisons, for they were never suffered to go abroad, and they laid no eggs; but as they were supplied with abundance of choice food, they fattened to the great profit of the proprietor. Each fat thrush, except at the time of migration, sold for three denarii, equal to about two shillings sterling; and on the occasion of a triumph or public festival, this sort of trade yielded a profit of twelve hundred per cent.† The voleries were a kind of vaulted courts, the inside furnished with a number of roosts. The door was very low; the windows were few, and placed in such a manner as to prevent the prisoners from seeing the fields,

* Varo, de Re Rustica, i, 31.

† Columella, de Re Rustica, viii, 10.

the woods, the birds fluttering at liberty, or whatever might awaken their sensibility, and disturb the calm so conducive to corpulence. A little glimmering was sufficient to direct them to their food; which consisted of millet, and a sort of paste made with bruised figs and flour. They had also given them the berries of the lentisk, of the myrtle, of the ivy, and whatever, in short, would improve the delicacy and flavour of their flesh. They were supplied with a little stream of water, which ran in a gutter through the volery. Twenty days before they were intended for killing, their allowance was augmented; nay, so far was the attention carried, that they gently removed into a little anti-chamber the thrushes which were plump and in good order, to enjoy more quiet; and, frequently, to heighten the illusion, they hung boughs and verdure, imitating natural scenery, so that the birds might fancy themselves in the midst of the woods. In short, they treated their slaves well, because they knew their interest. Such as were newly caught were put in small separate voleries, along with others that had been accustomed to confinement; and every contrivance, every soothing art was employed to habituate them somewhat to bondage; yet these birds were never completely tamed.

We are not aware that any contrivance is resorted to in Britain to entice birds to build in particular places, except in the case of the house-sparrow. Sometimes, pots of unglazed delf ware, of a sub-oval shape, with a narrow hole for an entrance, are fixed upon the walls of houses, several feet below the eave; and the sparrows, finding a domicil so suited to their habits, very soon take possession of every pot thus provided for them. But those who are so careful to accommodate the sparrows, do it, not because they are fond of their neighbourhood or their yelping concerts, but to prevent their nestling

under the eaves, where they dig out the mortar with their strong bills, when they do not find holes large enough for their accommodation. It probably never struck those persons that, by thus encouraging the sparrows to breed, they are promoting the increase of the race ; and, unless they multiply their sparrow pots yearly, they may be almost certain that the supernumeraries will resort to eaves nearest their birth-place.*

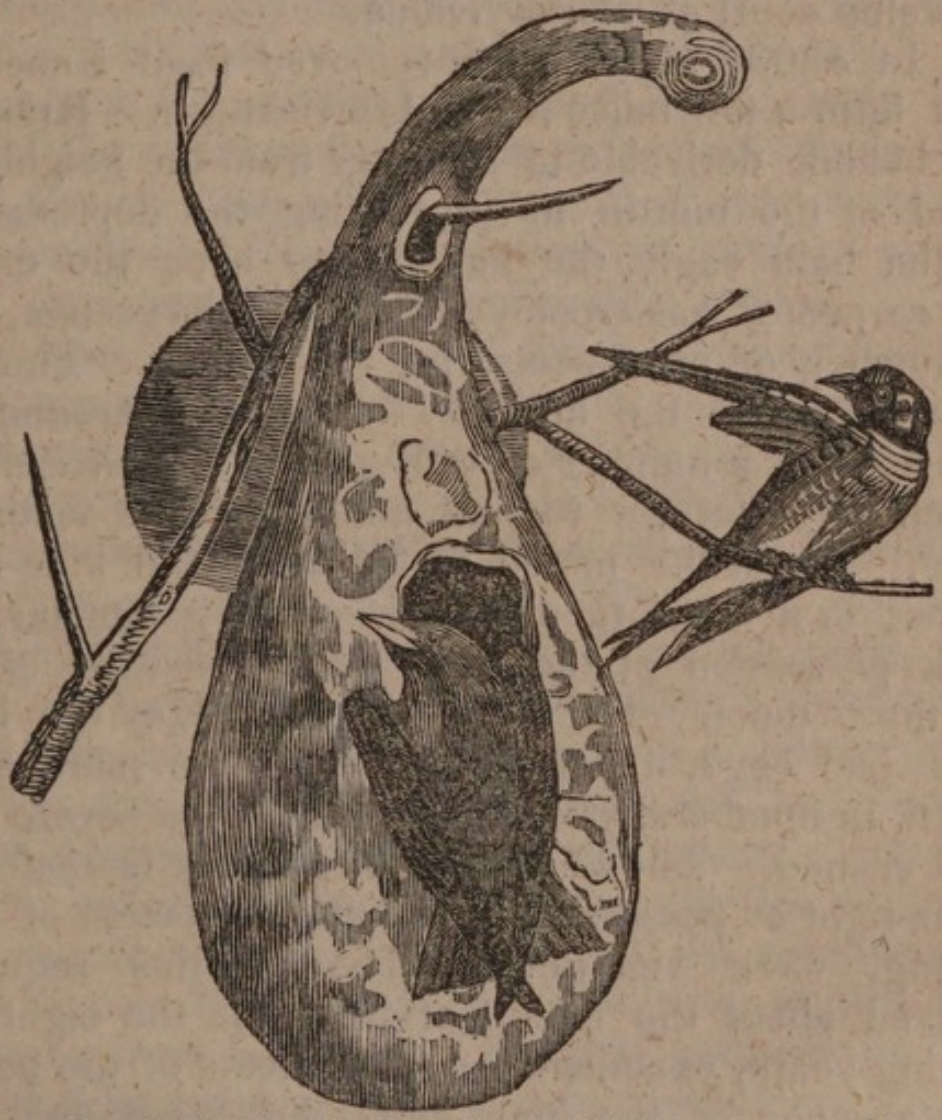
In Holland, square boxes are placed on the house-tops to entice the stork (*Ciconia alba*, Belon) to build ; and, for the same purpose, it was customary in France, in Belon's time, to place wheels there,—a practice said to be still followed in some parts of Germany.†

In North America, probably to increase as much as possible the rural charms of their brief summers, more than one species of bird is invited 'by all appliances' to nestle near the houses. Among these half-domesticated and sociable birds, the house-wren, the blue-bird, and the purple martin, are the most noted. The latter (*Hirundo purpurea*, Lath.) is, like our window-swallow, a bird of passage ; and he always makes his summer residence among the habitations of man, who, deriving considerable advantage as well as amusement from his company, is generally his friend and protector. Accordingly, whenever he comes, he is almost certain of finding some hospitable retreat fitted up for his accommodation and the reception of his family, either in the projecting wooden cornice, on the top of the roof or sign-post, or, if all these be wanting, he betakes himself to the dove-cot, among the pigeons ; and when he makes choice of a particular quarter of the latter, not a pigeon dare set foot within his premises. Some of the Anglo-Americans have large

* J. R. † Montbeillard, Oiseaux, art. La Cicogne blanche.

conveniences constructed for these birds, consisting of numerous apartments, which are for the most part fully tenanted every spring; and, in such swallow-ries, individual birds have been noted to return to the same box for several successive years.

This practice of harbouring and protecting the purple martin does not appear to be of European origin, as the aboriginal Americans had adopted a similar practice from time immemorial. The Chactaw and Chickasaw Indians, for example, cut off all



Purple-Martins (length eight inches) building in a gourd.

the top branches from a sapling near their cabins, leaving the prongs a foot or two in length, on each

of which they hang a gourd or calabash, properly hollowed out for these birds to nestle in. On the banks of the Mississippi, again, the negroes stick up long canes, with the same species of apartment fixed to their tops, in which the purple-martins regularly breed. 'Wherever,' says Wilson, 'I have travelled in this country, I have seen with pleasure the hospitality of the inhabitants to this favourite bird.' The following little trait of its domestic history was communicated by Mr Henry, judge of the supreme court of Pennsylvania.

'In 1800,' says he, 'I removed from Lancaster to a farm a few miles above Harrisburgh. Knowing the benefit derivable to a farmer from the neighbourhood of the martin in preventing the depredations of the bald eagle, the hawks, and even the crows, my carpenter was employed to form a large box, with a number of apartments, for the martin. The box was put up in the autumn. Near and around the house were a number of well-grown apple-trees and much shrubbery, a very fit haunt for the feathered race. About the middle of February the blue-birds came; in a short time they were very familiar, and took possession of the box: these consisted of two or three pairs. By the fifteenth of May the blue-birds had eggs, if not young. Now the martins arrived in numbers, visited the box, and a severe conflict ensued. The blue-birds, seemingly animated by their right of possession, or for the protection of their young, were victorious. The martins regularly arrived about the middle of May for the eight following years, examined the apartments of the box in the absence of the blue birds, but were uniformly compelled to fly upon the return of the latter. The trouble caused you by reading this note, you will be pleased to charge to the martins. A box replete with those beautiful travellers is not very distant from

my bed-head. Their notes seem discordant, because of their numbers; yet to me they are pleasing. The industrious farmer and mechanic would do well to have a box fixed near the apartments of their drowsy labourers. Just as the dawn approaches, the martin begins its notes, which last half a minute or more; and then subside until the twilight is fairly broken. An animated and incessant musical chattering now ensues, sufficient to arouse the most sleepy person. Perhaps chanticleer is not their superior in this beneficial qualification; and he is far beneath the martin in his powers of annoying birds of prey.'

'About the middle or 20th of April,' adds Wilson, 'the martins first begin to prepare their nest. The last of these which I examined was formed of dry leaves of the weeping willow, slender straws, hay, and feathers, in considerable quantity. The eggs were four, very small for the size of the bird, and pure white without any spots. The first brood appears in May, the second late in July. During the period in which the female is laying, and before she commences incubation, they are both from home the greater part of the day. When the female is sitting, she is frequently visited by the male, who also occupies her place while she takes a short recreation abroad. He also often passes a quarter of an hour in the apartment beside her, and has become quite domesticated since her confinement. He sits on the outside dressing and arranging his plumage, occasionally passing to the door of the apartment as if to inquire how she does. His notes at this time seem to have assumed a peculiar softness, and his gratulations are expressive of much tenderness. Conjugal fidelity, even where there is a number together, seems to be faithfully preserved by these birds. On the 25th of May, a male and female martin took possession of a box in Mr Bartram's garden. A day or

two after, a second female made her appearance and staid for several days; but from the cold reception she met with, being frequently beaten off by the male, she finally abandoned the place, and set off, no doubt, to seek for a more sociable companion.'*

The blue-bird (*Sialia Wilsonii*, SWAINS.), which is mentioned in conjunction with the preceding as one of those harboured by the Americans, makes his appearance, sometimes as early as February, about barns, orchards, and fence-posts, and altogether reminds us both in form and manners of our own redbreast (*Sylvia rubecula*). In fact, the American bird has also a red breast, but the whole upper part being of a fine blue colour, gives him a more splendid costume than the sober olive dun of our little favourite. On their first appearance in spring, the blue-birds pay an early visit to the box in the garden or the hole of an old apple-tree, the cradle of some generations of their ancestors, and begin to clean out the old nest, and the rubbish of the former year, and prepare for the reception of their future offspring. Soon after this another sociable little pilgrim, the house wren (*Troglodytes ædon*), also arrives, and finding so snug a birth pre-occupied, shows his spite by watching a convenient opportunity, in the absence of the owner, to pop in and pull out sticks, taking special care to make off as fast as possible. 'Whoever,' says Wilson, 'informed Dr Latham that "this bird is never seen on trees, though it makes its nest in the holes of them,"† might as well have said that the Americans are never seen in the streets, though they build their houses by the sides of them. For what is there in the construction of the feet and claws of this bird to prevent

* Wilson, Amer. Ornith., v, 62.

† Synopsis, vol. ii, p. 446 — 49. This error we find is suppressed in Latham's Gen. Hist. of Birds, vii, 192.

it from perching ? or what sight more common to an inhabitant of this country, than a blue-bird perched on the top of a peach or apple-tree ; or among the branches of those reverend broad-armed chestnut-trees, that stand alone in the middle of our fields, bleached by the rains and the blasts of ages?'*

The house-wren (*Troglodytes ædon*), just mentioned, though unable to cope with the blue-bird, seems to be almost as general a nest-robber in America as the house-sparrow in Europe, and succeeds in maintaining its felonious possessions against an apparently more powerful assailant than the blue-bird. The house-wren usually selects the hollow of a tree ; but when she cannot find a suitable excavation she keeps an eye upon the operations of the downy woodpecker (*Picus pubescens*), whom nature has furnished with a chisel-bill fit for digging into wood. The wren allows the woodpeckers to go on with their work till she thinks the hole will answer her purpose, and then attacks them with violence, and is generally successful in driving them away. 'I saw,' says Wilson, 'some weeks ago, a striking instance of this, where the downy woodpeckers, after commencing in a cherry-tree, within a few yards of the house, and having made considerable progress, were turned out by the wren : the former began again on a pear-tree in the garden, fifteen or twenty yards off, whence, after digging out a most complete apartment, and one egg being laid, they were once more assaulted by the same impertinent intruder, and finally forced to abandon the place.'† Wilson has given another instance of the parasitical habits of the same house-wren, which in this case did not make choice of a hole in a tree.

'In the spring and summer,' says he, 'of 1811, a baltimore (*Icterus baltimorus*) took up its abode

* Wilson, Amer. Ornith., i, 61. † Ibid, i, 354.

in Mr Bartram's garden, whose notes were so singular as particularly to attract my attention; they were as well known to me as the voice of my most intimate friend. On the 30th of April, 1812, I was again surprised and pleased at hearing this same baltimore in the garden, whistling his identical old chant; and I observed that he particularly frequented that quarter of the garden where the tree stood, on the pendent branches of which he had formed his nest the preceding year. This nest had been taken possession of by the house-wren, a few days after the baltimore's brood had abandoned it; and, curious to know how the little intruder had furnished it within, I had taken it down early in the fall, after the wren herself had also raised a brood of six young in it, and which was her second that season. I found it stript of its original lining, floored with sticks, or small twigs, above which were laid feathers; so that the usual complete nest of the wren occupied the interior of that of the baltimore.'*

It was, no doubt, the same universal intruder which is mentioned by Bingley, as first dispossessing and again being dispossessed by the martins, of the box appropriated for their reception. The purple martin (*Hirundo purpurea*) is to be understood, and not the window-swallow (*H. urbica*), as Bingley has it; for the latter is not a native of America. 'During the residence,' says he, 'of a Mr Simpson at Welton, in North America, he one morning heard a noise from a couple of martins that were flying from tree to tree, near his dwelling. They made several attempts to get into a box or cage which was fixed against the house, and which they had before occupied; but they always appeared to fly from it again with the utmost dread, at the same time repeating those loud cries which first drew his

* Wilson, Amer. Ornith., vi, 88.

attention. Curiosity led this gentleman to watch their motions. After some time a small wren came from the box, and perched on a tree near it; when her shrill note seemed to amaze her antagonist. Having remained a short time she flew away. The martins took this opportunity of returning to the box; but their stay was short. Their diminutive adversary entered and made them retire with the greatest precipitation. They continued manœuvring in this way during the whole day; but on the following morning, when the wren quitted the box, the martins immediately returned, took possession of their mansion, broke up their own nest, went to work afresh with extreme industry and ingenuity, and soon barricaded their door. The wren returned, but could not now re-enter. She made attempts to storm the nest, but did not succeed. The martins, abstaining from food nearly two days, persevered during the whole of that time in defending the entrance; and the wren, finding she could not force the works, raised the siege, quitted her intentions, and left the martins in quiet possession of their dwelling.'*

Mr St John, the author of the American Farmer's Letters, gives a no less interesting story of a wren, probably the same species as the preceding. Three birds, he tells us, had built their nests almost contiguous to each other, a swallow (*Hirundo pelasgia*) in the corner of a piazza next his house, a phœbe (?) in the other corner, and a wren (*Motacilla domestica* ?) in a little box which had been made on purpose for her and hung between. The wren had for some time shown signs of dislike to the box, though for what reason did not appear; but probably from jealousy at the vicinity of the swallows, for, small as it was, it set about driving them away, and

* Bingley's Anim. Biog. ii, 350; 6th edit.

in which it soon succeeded. This bold exploit was no sooner performed than the victorious wren removed all the household furniture of the swallow to its own box, with the most admirable dexterity, and with ostentatious signs of triumph. It fluttered its wings, and universal joy was perceptible in all its movements. The swallows, on the other hand, without manifesting any wish to retaliate, sat a little way off, never offering the least opposition, while the plunder was going on ; but no sooner was the destruction completed, than they went to work to repair the damage. To prevent a repetition of the robbery, Mr St John removed the wren's box to some distance.

Most of the hawks and owls, particularly, it should seem, of the smaller species, are averse to the trouble of constructing nests for themselves. Thus the brown owl (*Strix Aluco*, MEYER), and the long-eared owl (*S. Otus*, LINN.), take possession of the old nests of ravens, crows, magpies, or squirrels, to which, so far as we can learn, they never add any fresh materials, nor take any pains to repair damages or render them tidy. Buffon tells us that all the eggs and young of the long-eared owl which he received were found in the nests of other birds, often in those of magpies, and sometimes in those of buzzards.

Wilson remarks, however, that the long-eared owl breeds among the branches of tall trees, resembling in this respect the great-horned owl (*S. Virginiana*), indicating that it does construct a nest ; for the latter builds in the fork of a tall tree, with sticks lined with wool and hair, though sometimes in a hole of a tree, and in that case takes in only a very few materials. But he afterwards mentions an instance in which the former species was not at the trouble of making its own nest. 'About six or seven miles below

Philadelphia,' he says, 'and not far from the Delaware, is a low swamp, thickly covered with trees, and inundated during great part of the year. This place is the resort of great numbers of the qua-bird or night raven (*Nycticorax Europœus*, STEPHENS), where they build in large companies. On the 25th of April, while wading among the dark recesses of this place, observing the habits of these birds, I discovered a long-eared owl which had taken possession of one of their nests, and was sitting. On mounting to the nest, I found it contained four eggs, and, breaking one of these, the young appeared almost ready to leave the shell. There were numbers of qua-birds' nests on the adjoining trees all around, and one of them actually on the same tree. Thus we see,' he adds, 'how unvarying are the manners of this species, however remote and different the countries may be where it has taken up its residence.'*

The sparrow-hawk (*Accipiter fringillarius*, RAY), in the same manner, though we have known it to breed in the holes of precipitous rocks, as at Howford, near Mauchline, in Ayrshire, and Cartlan Craigs, near Lanark, very frequently takes possession of the abandoned nest of a crow or a magpie, without making any additional repairs.† 'About the tenth of July,' says White, 'a pair of sparrow-hawks bred in an old crow's nest on a low beech in Selborne-hanger; and, as their brood, which was numerous, began to grow up, became so daring and ravenous that they were a terror to all the dames in the village that had chickens or ducklings under their care. A boy climbed the tree, and found the young so fledged that they all escaped from him; but discovered that a good house had been kept: the larder was well stored with provisions; for he brought down a young blackbird, jay, and house martin, all clean picked,

* Wilson, Amer. Ornith., vi, 74. † J. R.

and some half devoured. The old birds had been observed to make sad havock for some days among the new-flown swallows and martins, which, being but lately out of their nests, had not acquired those powers and command of wing that enable them when more mature to set enemies at defiance.'*

It would appear that, in proportion to the convenience of a nest, and the protection it affords, it is the more liable to be seized upon by those birds which are fond of shelter, but dislike the trouble of procuring it by their own labour. The very ingenious nest of the baker (*Merops rufus*), formerly described, is in this predicament. Azara accordingly tells us that the brown swallows (*Hirundo torquata?*), the chopi, parroquets (*Psittacidæ*, LEACH), and other birds, take possession of their old nests. As the bakers, however, do not always construct a fresh nest every season, contenting themselves with making the necessary repairs upon the old ones; they often beat away the usurpers of their lawful tenements, but sometimes have to sustain a hard contested combat before they recover possession.†

The crested fly-catcher (*Muscicapa crinita*), although it uses some rather singular materials of its own, does not seem to like the labour of making the whole structure of its nest. It arrives in Pennsylvania early in May, and nestles in the hollow of a tree deserted by the blue-bird (*Sialis Wilsonii*). 'The materials,' says Wilson, 'are scanty and rather novel. One of these nests, now before me, is formed of a little loose hay, feathers of the guinea-fowl, hog's bristles, pieces of cast snakes' skin, and dogs' hair. Snake skins with this bird appear to be an indispensable article, for I have never yet found one of his nests without this material forming a part of it. Whether he surrounds his nest with this by way

* Nat. Hist. of Selborne, i, 188. † Azara, iii, 43.

of *terrorem*, to prevent other birds or animals from entering, or whether it be that he finds its silk a softness suitable for his young, is uncertain ; the fact, however, is notorious.'*

Another species of this family, the red-eyed fly catcher (*Muscicapa olivacea*), which makes an exceedingly ingenious nest, as we have described in a preceding page, has it frequently taken possession of, not only by birds, but by mice ; the durable materials of which they are composed rendering them strongly weather-proof.† It is not, indeed, a usual circumstance for quadrupeds to invade in this manner the domicils of birds, though we have instances of the converse in the jackdaws of Colchester, formerly mentioned, and perhaps in the Coquimbo owl. Quadrupeds, however, among themselves, not unfrequently take possession of the burrows of others which they can master. We could not suppose that a rabbit would ever be silly enough to invade a fox-earth in order to save himself the labour of digging ; but we know of an instance in which an extensive warren was nearly routed out by an invading colony of rats. It is mentioned in the earliest records of Scotland, that there are no rats in the district of Buchan ; and old Hector Boëthius adds, ' als sone as thay are brocht there thay die ;'‡ a circumstance likewise asserted in a recent history of Morayshire.§ The adjacent county of Kincardine, however, seems very congenial to them. A foreign vessel was several years ago wrecked upon the coast, where a populous rabbit-warren extended for several miles, and a number of large lead-coloured rats (the species not ascertained) swam ashore from the wreck, and fled for

* Wilson, Amer. Ornith., ii, 75. † Wilson, *ut supra*, ii, 56.
‡ Bellenden's Transl. of Boëce's Cronikilis, Cosmographie Ca. iiii.
§ Shaw's Morayshire, page 160, edit. Edin., 1775.

shelter to the nearest rabbit-burrows, from which they soon drove the legitimate possessors. Here they throve and multiplied so fast, that in a short time they far out-numbered the rabbits, upon whose young they committed so much depredation, that it was found necessary by the lord of the manor to give orders (more easily issued than executed) for their destruction. We are not aware whether this foreign colony of rats was thereby exterminated, or now maintains its ground.*

* J R.

Chapter XVIII.

Parasite Birds, continued. — The Cuckoo. The Cow Bunting.

A considerable number of birds, as we have just seen, save themselves the labour of constructing a nest, by taking possession of one built by some more industrious pair; but, in these cases, the intruders always hatch their own eggs and nurse their own young. We have now, however, to give the singular history of more than one species, which take no trouble at all with their offspring, except in finding a suitable nest in which their eggs may be deposited. It is very common, in the poultry-yard, to see a brood of ducklings nursed by a hen; a practice which was known to the ancients: 'It is sport alone,' says Pliny, 'to see the maner of a hen that hath sitten vpon ducks egs and hatched them, how at first she will wonder to haue a teem of ducklings about her, and not acknowledge them for her owne; but soone after shee will clucke and call this doubtfull brood to her very carefully and diligently: but at the last, when she perceives them, according to their kind, to take the water and swim, how she will mourn and lament about the fish-poole, that it would pitty ones heart to see them what moane they will make.'* This, however, is an artificial process; and no one, we believe, ever knew a female duck, of her own accord, select the nest of a hen to deposit her eggs, and there abandon them to be hatched by a foster-mother.

* Holland's Plinie, i, 299.

Before we enter upon a detail of this practice of the cuckoos and other birds, we shall endeavour to clear one species accused of this singular habit from what appears to be misrepresentation through mistake.

The bird we refer to is the night-jar (*Caprimulgus Europæus*), and it is not the first mistake which has occurred in its history. We quote the original account of its supposed parasitical habits. 'Is it generally known,' says Mr Masters, curator of the Canterbury Museum, 'that the night-jar is reared in the manner of the cuckoo? At least, one circumstance of the kind has occurred within my knowledge. Last spring, a large bird was observed to visit a hedge contiguous to the road-side, and enclosing a garden at Newington, near Sittingbourne, in Kent. It was soon remarked that a hedge-sparrow had built her nest there, and that there was an egg of a larger size than hers, and of a different colour, in the nest. The incubation was watched, and a stranger of larger dimensions than the progeny of the hedge-sparrow was hatched with her own offspring. In a short time the intruder grew so fast, that it occupied the whole nest itself, having previously ejected the young of the rightful owner. When the bird was fledged, and nearly ready to take wing, it was placed in a cage, supposing it to be a young cuckoo; but as the plumage became perfected, it proved itself a night-jar. I am not aware that a similar circumstance of this bird has been recorded.'*

We adopt the following remarks of another correspondent of the same work,† called forth by this statement, elucidating what appears so very anomalous and unprecedented. 'We have not the slightest doubt

* Mag. of Nat. Hist., Mar. 1830, p. 192.

† J. Rennie, in Mag. of Nat. Hist., vol. iii, p. 399.

that the bird in question was not a night-jar, but a cuckoo, for which it may be readily mistaken, even by naturalists of considerable experience, as a young cuckoo is so unlike the full-grown bird that it has led to many mistakes. Bloch,* as well as Professor Sanders,† has even mistaken the egg, and Sepp, who is usually so accurate in the most minute particulars, has figured the large oval, white marbled with brown, egg of the night-jar‡ for that of the cuckoo, which is always small, rounded, and greenish, yellowish, blueish, or grayish-white, and always dotted (not marbled) with olive or ash-colour, being about the size of a house-sparrow's, and very like it in colour and markings, while the night-jar's egg is larger than a blackbird's.§ The young of the night-jar does not differ from the full-grown bird, but the cuckoo does not attain its mature plumage till the third year, and, instead of the grayish lead-blue of the old birds, is brown, with numerous spots and cross streaks of a reddish rust colour, very similar to the markings of the night-jar. The two birds, when full-grown, are also precisely of the same size, namely, ten inches and a half in length.‖

'As the young of the cuckoo,' says Colonel Montagu, 'differs so materially in the first years of plumage from the adult, it may not be improper to give a description for the information of those who may wish to know the distinction. The irides are grayish, the whole upper part of the plumage is a mixture of dusky black and ferruginous in transverse bars, except the forehead and a patch on the back of the head, which is white, and the tips of the scapulars

* Besch. der Berlin, Gessel iv, tab. 18, fig. 1.
† Naturf., xiv, s. 49.
‡ Sepp, Nederland. Vogel., ii, 117.
§ Latham, General History of Birds, iii, 261.
‖ Temminck, Manuel d'Ornith., i, p. 382—432.

are pale; the feathers of the whole under part are sullied white, with distant transverse bars of dusky black; in general each feather possesses two or three bars; the sides of the neck and breast tinged with rufous; the lateral feathers of the tail and the inner webs of the quills more or less barred with white; the coverts of the tail, which, as well as those on the rump, are usually long, dashed with cinereous, and slightly tipped with white.'*

Young Cuckoo, from Vaillant's figure.

The young cuckoo, on account of the reddish-brown plumage just described, has, by some distin-

* Supplement to Ornith. Dict., art. Cuckoo.

guished naturalists, been ranked as a separate species, under the name of the red cuckoo (*Cuculus rufus*, Brisson, *Cuculus Hepaticus*, Lath. Index.) There can be no doubt, however, from recent investigations, that this supposed red or hepatic cuckoo is not distinct from the common species. M. Payrandeau states distinctly, on the authority of a series of specimens, as well as of repeated dissection, that both the male and female young of the common cuckoo, before the first moult, have the same colour; that, after the first moult, the males have a deep olive-ash colour, and the red spots on the male disappear altogether, while, in the female, they continue to the most advanced age, when it puts on the plumage of an old male, of which change M. Payrandeau possesses a specimen.* Vieillot, the father of the French ornithologists, as well as Meyer, Jules Delamothe, and Baillon of Abbeville, agree in the same opinion. M. Temminck and Dr Latham, in his last work, regard the red cuckoo as the young of the common species of one year old.

The variety of the colouring in the cuckoo has likewise more than once caused it to be mistaken for several other birds, such as different kinds of hawks, for the wood-pigeon,† and for a merlin‡ (*Falco Æsalon*, Temminck), so that Mr Masters is by no means alone in the affair. A passage in White's Selborne furnishes a circumstance exactly parallel. 'A countryman told me,' says White, 'he had found a young fern-owl (*Caprimulgus Europæus*) in the nest of a small bird on the ground, and that it was fed by the little bird. I went to see this extraordinary phenomenon, and found that it was a

* Bulletin des Sciences, Nat. for 1828.

† M. Herissant in Mem. de l'Acad. des Sciences pour 52, p. 417.

‡ Salerne, Hist. des Oiseaux, p. 40.

young cuckoo hatched in the nest of a titlark; it was become vastly too big for its nest, appearing

'To have stretched its wings beyond the little nest,'*

and was very fierce and pugnacious, pursuing my finger, as I teased it, for many feet from the nest, sparring and buffeting with its wings like a game-cock. The dupe of a dam appeared at a distance, hovering about with meat in her mouth, and expressing the greatest solicitude.'† We think, after

The Night-Jar (Caprimulgus Europæus.)

* ——— in tenui re
Majores pennas nido extendisse.

† Nat. Hist. of Selborne, i, 225.

these circumstances being justly weighed, that the night-jar ought to be exculpated from the charge of being a parasite; though it certainly does not take the trouble of constructing any sort of nest, but lays its two eggs on the bare ground among heath, furze, or long grass, and usually near a wood, sometimes at the foot of trees, or in the holes of their trunks.

It serves in some measure to confirm the non-parasitical habits of the night-jar, that the American species has precisely the same manner of nestling as the European one. The night-hawk (*Caprimulgus Virginianus*), for example, sometimes lays its eggs in an open space in the woods, frequently in ploughed ground, or the border of a corn field, in all cases in a dry situation, but without a vestige of collected materials. So also does the whip-poor-will (*C. vociferus*), which, however, more usually lays its eggs on the fallen leaves. 'In traversing the woods one day,' says Wilson, 'in the early part of June, along the brow of a rocky declivity, a whip-poor-will rose from my feet and fluttered along, sometimes prostrating herself and beating the ground with her wings as if just expiring. Aware of her purpose, I stood still, and began to examine the space immediately around me for the eggs or young, one or other of which I was certain must be near. After a long search, to my mortification I could find neither, and was just going to abandon the spot, when I perceived somewhat like a slight mouldiness among the withered leaves, and on stooping down discovered it to be a young whip-poor-will, seemingly asleep, as its eyelids were nearly closed, or, perhaps, this might only be to protect its tender eyes from the glare of day. I sat down by it on the leaves and drew it as it then appeared. It was probably not a week old. All the while I was thus engaged it neither moved its body

nor opened its eyes more than half, and I left it as I found it. After I had walked about a quarter of a mile from the spot, recollecting that I had left a pencil behind, I returned and found my pencil, but the young bird was gone.'*

Female Whip-Poor-Will (C. vociferus), and young one. Length, about nine inches.

To many it may appear altogether an unproved fancy that the cuckoo or any other bird lays its eggs in the nest of one of a different species, and has them hatched and the young nursed by a strange foster-mother; but the fact has been ascertained beyond all possible doubt. 'I myself,' says Willughby, 'with many others, have seen a wag-tail (*Motacilla alba*) feeding a young cuckoo. The cuckoo herself builds no nest; but, having found the nest of some little bird, she either devours or destroys the eggs

* Wilson, Amer. Ornith. v, 74.

she there finds,* and in the room thereof lays one of her own, and so forsakes it. The silly bird returning sits on this egg, hatches it, and with a great deal of care and toil broods, feeds, and cherishes the young cuckoo for her own until it be grown up and able to fly and shift for itself. Which thing seems so strange, monstrous, and absurd, that for my part I cannot sufficiently wonder there should be such an example in nature, nor could I have ever been induced to believe that such a thing had been done by nature's instinct had I not with my own eyes seen it.'† These circumstances, indeed, have been known from the earliest times. They are distinctly mentioned by Aristotle in more than one passage. 'The cuckoo,' he says, 'lays in a nest which she has not herself built, but of some smaller bird, eating the eggs she finds there, and leaving her own;‡ and elsewhere he gives an account of the carnivorous propensities of the young cuckoo,§ from mistaking, as we shall afterwards see, a curious circumstance in its history. But the most complete account of what was anciently known and believed of these singular birds is given by Pliny. 'They alwaies,' he says, 'lay in other birds' nests, and most of all in the stock-dove's, commonly one egge and no more (which no other bird doth besides), and seldom twain. The reason why they would have other birds to sit vpon their eggs and hatch them, is, because they know how all birds hate them, for even the very little birds are readie to war with them: for feare, therefore, that the whole race be utterly destroyed by the furie of others of the same kind, they make no nest of their owne (being otherwise timorous and feareful naturally of themselves) and so are forced by this craftie

* This we believe to be an error: see below.
† Willughby's Ornithol. p. 98. ‡ Hist. Anim. v, 7.
§ Ibid. ix, 27.

shift to a avoid the danger. The titling (*Anthus pratensis*? TEMMINCK), therefore, that sitteth, being thus deceived, hatcheth the egge and bringeth up the chick of another bird. And this young cuckoo being greedy by kind, beguiling the other young birds and intercepting the nest from them, groweth hereby fat and fair-liking, whereby it comes into special grace and favour with the dam of the rest and nurse to it. She joyeth to see so goodly a bird toward, and wonders at herselfe that she hath hatched and reared so trim a chick. The rest, which are her owne, indeed, she sets no store by, as if they were changelings, but in regard of that one counteth them all misbegotten, yea, and suffereth them to be eaten and devoured of the other even before her face; and this she doth so long, until the young cuckoo, being once fledged and readie to flie abroad, is so bold as to seize on the old titling and to eat her up that hatched her.'*

The explanation of the origin of the errors which in this account are interwoven with the genuine facts, will lead us to the true history of the cuckoo's manner of breeding; and we shall give this the more readily, that several of the grossest of those errors are repeated in works of high modern authority. Linnæus, for example, repeats the story of the young cuckoo devouring its foster-mother;† and hence the German proverb, 'ungrateful as a cuckoo,' upon which, as a text, Melancthon has left a splendid harangue. But it is physically impossible that the young cuckoo, whose bill is only adapted for feeding on soft caterpillars, could ever perpetrate this alleged crime: some circumstance similar to the following may have given origin to the accusation.

Klein, the naturalist, at the age of sixteen, having discovered the nest of the fauvette (*Sylvia hortensis*, TEMMINCK) in his father's garden with a

* Holland's Plinie, i, 275. † Fauna Suecica, 1746.

single egg, which was supposed to belong to a cuckoo, suffered it to be hatched, and, waiting till the bird was feathered, he shut it up with the nest in a cage, which he left on the same spot. A few days after he found the hen fauvette entangled in the wires of the cage and its head sticking in the throat of the young cuckoo, which seemed to have swallowed it through mistake while catching greedily at the food she had brought to it.*

M. Montbeillard put the matter beyond doubt by experiment. On the 27th of June he put a young cuckoo, already nine inches long, in an open cage with three young fauvettes, which were scarcely fledged, and could not eat without assistance. The cuckoo, however, so far from devouring, or even threatening them, seemed eager to repay its obligations to the species, suffering the little birds, which were not in the least afraid, to warm themselves under its wings. On the other hand a young owl, which had as yet only been fed by hand, began of itself to eat by devouring a fauvette which was lodged with it. The account of the carnivorous habits of the young cuckoo has by some been qualified, by alleging that it swallows its foster-nestlings just as they burst from the shell; and as these little embryos might be looked upon as something intermediate between eggs and birds, they might therefore be eaten by the cuckoo, which is said to feed on eggs. This, however, requires to be confirmed by observation; but of the insatiable voracity of the cuckoo there can be little doubt. In the summer of 1829, a gardener at Lee, in Kent, kept a young cuckoo for several months, and such was its appetite that it never seemed to have enough. Yet it did not make any attempt to eat, unless it was fed, up till October; of course after all its brethren had

* Klein, Ordo Avium, p. 29.

migrated, and the possessor, disliking the constant trouble of feeding it, had it killed and stuffed.

The disappearance of the foster-nestlings from the nest in which a cuckoo is hatched, is more satisfactorily accounted for by the observations of the late Dr Jenner, to whom the world was indebted for the inestimable discovery of vaccination. 'On the 18th of June, 1787,' says he, 'I examined the nest of a hedge-sparrow (*Accentor modularis*), which then contained a cuckoo and three hedge-sparrows' eggs. On inspecting it the day following, the bird had hatched; but the nest then contained only a young cuckoo and one hedge-sparrow. The nest was placed so near the extremity of a hedge, that I could distinctly see what was going forward in it; and, to my great astonishment, I saw the young cuckoo, though so lately hatched, in the act of turning out the young hedge-sparrow. The mode of accomplishing this was very curious: the little animal, with the assistance of its rump and wings, contrived to get the bird upon its back, and making a lodgment for its burthen by elevating its elbows, clambered backwards with it up the side of the nest till it reached the top, where, resting for a moment, it threw off its load with a jerk, and quite disengaged it from the nest. It remained in this situation for a short time, feeling about with the extremities of its wings, as if to be convinced whether the business was properly executed, and then dropped into the nest again. With these, the extremities of its wings, I have often seen it examine, as it were, an egg and nestling before it began its operations; and the nice sensibilities which these parts seem to possess, seemed sufficiently to compensate the want of sight, which as yet it was destitute of. I afterwards put in an egg, and this, by a similar process, was conveyed to the edge of the nest and thrown out. These experiments I have

since repeated several times, in different nests, and have always found the young cuckoo disposed to act in the same manner. In climbing up the nest, it sometimes drops its burthen, and thus is foiled in its endeavours; but after a little respite the work is resumed, and goes on almost incessantly till it is effected. The singularity of its shape is well adapted to these purposes; for, different from other newly-hatched birds, its back, from the shoulders downwards, is very broad, with a considerable depression in the middle. This depression seems formed by nature for the design of giving a more secure lodgment to the egg of the hedge-sparrow, or its young one, when the young cuckoo is employed in removing either of them from the nest. When it is about twelve days old this cavity is quite filled up, and then the back assumes the shape of nestling birds in general.' 'It sometimes happens (which disproves Pliny's statement) that two cuckoo's eggs are deposited in the same nest, and then the young produced from one of them must inevitably perish. Two cuckoos and one hedge-sparrow were hatched in the same nest, and one hedge-sparrow's egg remained unhatched. In a few hours afterwards a contest began between the cuckoos for the possession of the nest, which continued undetermined till the next afternoon, when one of them, which was somewhat superior in size, turned out the other, together with the young hedge-sparrow and the unhatched egg. The combatants alternately appeared to have the advantage, as each carried the other several times to the top of the nest, and then sunk down again, oppressed by the weight of the burthen; till at length, after various efforts, the strongest prevailed, and was afterwards brought up by the hedge-sparrow.'*

Here, then, we have the high authority of one of

* Philosophical Transactions for 1788, Pt ii.

the most celebrated scientific men of his day for these very remarkable circumstances, which clearly explain the origin of the mistakes of Aristotle and Pliny, as well as of many modern writers, who, having ascertained the disappearance of the eggs and young of the cuckoo's foster-parents, conceived (plausibly enough, though erroneously) that they were devoured by the young cuckoo. We have another authority for the facts above stated, no less high upon such a subject than the preceding :—

'I was so far fortunate,' says Colonel Montagu, 'as to have ocular proof of the fact related by Dr Jenner, of a young cuckoo turning out of a hedge-sparrow's nest a young swallow I had put in for the purpose of experiment. I first saw it, when a few days old, in the hedge-sparrow's nest in a garden close to a cottage, the owner of which assured me the hedge-sparrow had four eggs when the cuckoo dropped in a fifth ; that on the morning the young cuckoo was hatched two young hedge-sparrows were also excluded, and that, on his return from work in the evening, nothing was left in the nest but the cuckoo. At five or six days old I took it to my house, where I frequently saw it throw out the young swallow for four or five days after. This singular action was performed by insinuating itself under the swallow and with its rump forcing it out of the nest with a sort of jerk. Sometimes, indeed, it failed, after much struggle, by reason of the strength of the swallow, which was nearly full feathered ; but after a small respite from the seeming fatigue, it renewed its efforts, and seemed continually restless till it succeeded. At the end of the fifth day this disposition ceased, and it suffered the swallow to remain unmolested.'*

A living observer, also, whose shrewd remarks on

* Ornithological Dict., Intr. p. viii, 1st ed.

some difficult questions in natural history excite us to wish that he would favour us with more, has verified these observations of Jenner and Montagu. 'On the 30th of June,' says he, 'I took a young cuckoo that was hatched in a titlark's nest on the 28th : seven days after the old birds had quitted that neighbourhood ; and this nestling, while in my possession, turned both young birds and eggs out of its nest, in which I had placed them for the purpose, and gave me an opportunity of contemplating at leisure the whole process of this astonishing proceeding, so minutely and accurately described by Dr Jenner. I observed that this bird, though so young, threw itself backwards with considerable force when anything touched it unexpectedly.'*

M. Montbeillard, following the ancients it would appear, tells us that, as the male cuckoo instinctively devours the eggs of birds, the female must be careful to conceal her's, and therefore she must not return to the spot where she has deposited one, lest the male discover it ; and must choose the most concealed foster-nest, and the most remote from his usual haunts. It is also on the same account, he thinks, that if she has two eggs (six is the usual number), she must entrust them to different nurses. But this evidently proves too much ; for if the female can discover a nest to leave her egg in it, may not the male make the same discovery after the egg is laid ? Besides, so far from choosing the most concealed nests, or the most remote from the haunts of the male, the hedge-sparrow's is the one most commonly selected, and this is perhaps the least concealed of any of the small birds. Dr Jenner tells us, he has known as many as four of these nests in one paddock, each containing a cuckoo's egg at the same time, and in the very hedges, no doubt, where

* Blackwall, in Manchester Memoirs for 1824, p. 463.

the male supplied himself with a daily breakfast of caterpillars, which is his natural food, and not eggs. Indeed we much question whether either sex of the cuckoo sucks eggs at all. Even M. Montbeillard himself takes some pains to prove that the female does not devour the eggs of the dupe-dam. Amongst others, he particularizes — five eggs of a titmouse (*Parus*), with one of the cuckoo; five eggs of the redbreast, with one of the cuckoo; four eggs of the nightingale, with one of the cuckoo; and two eggs of the titmouse, under a young cuckoo, but which were not hatched.

At the same time there can be no doubt, if we may trust numerous reports, that male birds (peacocks, for example) are often eager to discover the eggs or newly-hatched young of their own family, for the purpose of devouring them; and, what is no less remarkable, the hen of several birds will sometimes devour the very eggs she is sitting on, as was amply proved by the experiments of M. Montbeillard. About the end of April, he tells us, a hen canary having laid an egg, it was taken away, and when replaced, three or four days afterwards, she devoured it. In two days more she laid another and sat on it, when two chaffinch's eggs were put under her, and she continued to sit though she had broken her own. At the end of ten days the chaffinch's eggs were removed, and two newly-hatched yellow-hammers (*Emberiza citrinella*) were given her, which she reared very well. Afterwards she laid two eggs, of which she devoured one; and, on the other being taken away, she continued to brood as if she had had eggs, upon which a redbreast's egg was given her, which she successfully hatched. Another hen canary, having laid three eggs, broke them almost immediately; and upon substituting two chaffinch's eggs, and one of the black-cap, she sat upon them, and

on three others, which she successively laid. After this the same bird laid again one egg, to which was joined one of the nuthatch, and then two others, to which a linnet's nest was added. She sat on them all seven days; but preferring the eggs of the two strangers, she threw out her own successively on the three following days, with that of the nuthatch; but she hatched the linnet's. On the 5th of June a cuckoo's egg was placed under another hen canary, along with three of her own; but she successively devoured all these — the cuckoo's the last.*

It appears to us to be a most inexplicable circumstance that mothers should devour their own eggs, though it is not unmatched among viviparous animals, where it appears even more singular, since the female cat, as well as the bitch and sow, and even the rabbit, have been recorded to eat their young; for which Dr Darwin accounts in his usual ingenious, but fanciful manner.† We have observed a cat, apparently in good health, abandon her kittens of two days old, which she could not by any means be made to nurse, nor even to permit them to suck, and they ultimately died, as she turned a deaf ear to their most piteous wailing.‡ This, as well as the instances mentioned of birds sucking their eggs, most probably depends on changes, inscrutable to us, in the health of the mother, or in the development of appetite, from some diseased state of the stomach, or of the organs of smell.

Be this as it may, it does not appear that the hatching of a young cuckoo has any effect in preventing its foster-mother from attending to her own progeny, when these are artificially retained in the nest.

'Having found,' says Dr Jenner, 'that the old hedge-

* Montbeillard, Oiseaux, art. 'Le Coucou.'
† Zoonomia, sect. xvi, 5, 1; and xiv, 8.
‡ J. R.

sparrow commonly throws out some of her own eggs, after her nest has received the cuckoo, and not knowing how she might treat her young ones, if the young cuckoo was deprived of the power of dispossessing them of the nest, I made the following experiment:—July 9th, a young cuckoo, that had been hatched by a hedge-sparrow about four hours, was confined in the nest in such a manner that it could not possibly turn out the young hedge-sparrows, which were hatched at the same time, though it was almost incessantly making attempts to effect it. The consequence was, the old birds fed the whole alike, and appeared in every respect to pay the same attention to their own young as to the young cuckoo, until the 13th, when the nest was unfortunately plundered.'

'The circumstance of the young cuckoos being destined by nature to throw out the young hedge-sparrows, seems to account for the parent cuckoo's dropping her egg in the nests of birds so small as those I have particularised. If she were to do this in the nest of a bird which produced a large egg, and consequently a large nestling, the young cuckoo would probably find an insurmountable difficulty in solely possessing the nest, as its exertions would be unequal to the labour of turning out the young birds.'* It would seem, indeed, from all that has been ascertained by the accurate observation of modern naturalists, that it must have been a mistake of the ancients, to assign the stock-dove, or any pigeon, as the cuckoo's nurse. The nests most commonly selected appear to be those of the hedge-sparrow, the wagtail, and the titlark (*Anthus pratensis*, Temminck): but, besides these, which are mentioned by Dr Jenner and other authors, M. Montbeillard enumerates twenty other birds upon his own

* Philosophical Transactions for 1788, p. 227, &c.

knowledge; among which are the redbreast, the brown wren, the yellow wren, the skylark, the woodlark, the linnet, the greenfinch, the bulfinch. the song-thrush, the jay, the blackbird, and the shrike. The cuckoo's eggs, according to him, are never found in the nests of partridges or quails, or at least they do not succeed in them. When the nest containing a young cuckoo belongs to a small bird, and is of course constructed on a small scale, it is usually found so much flattened that it can hardly be recognised, the natural effect of the bulk and weight of so large a bird.

Cuckoo (length about fourteen inches) and Hedge Sparrow's Nest.

'On the 5th of May, 1822,' says Mr Blackwall,

'I saw a cuckoo in the act of watching a pair of titlarks construct their nest. The larks had just commenced building, and did not seem to be at all disconcerted at the presence of the cuckoo, which sat on the ground about seven or eight yards from the spot, attentively observing them; and, when disturbed, flew away with great reluctance, and only to a short distance. This nest, which was on Kersal Moor, where the races are annually held, was too distant from my residence to permit me to examine it frequently, and to make such numerous and minute observations as I wished; but on the 12th of May, I again visited it, in the confident expectation that it would contain a cuckoo's egg, and I was not disappointed. I may further remark, in confirmation of this discovery, which, by exhibiting a curious and hitherto unnoticed instinctive propensity of this bird, forms an interesting addition to its history, that cuckoos almost invariably deposit their eggs in the nests of other birds, as soon as those birds begin to lay; not unfrequently, indeed, immediately after the exclusion of the first egg: and Mr Baker informs me, that he saw the hen of that pair of cuckoos, which he observed so closely last spring, fly directly to a titlark's nest, as to a place with which she was perfectly familiar, though he had never seen her there before, and after raising her head, and looking round, as if to ascertain whether she was noticed, went and deposited her egg in the nest, before the larks had begun to lay.'*

'The mean number of eggs,' Mr Blackwall adds, 'laid by those birds that are usually selected by the cuckoo to provide for its progeny is five. Now, according to Pinkerton, the area of England and Wales is 49,450 square miles, which, reduced to square yards, gives 153,176,320,000. This, divided by

* Manchester Memoirs, 2d series, vol. iv, p. 456.

3,301,816 square yards, the area of the township of Crumpsall, and the quotient, multiplied by 3, the mean number of hen cuckoos for every 3,301,816 square yards, gives 139,173, the mean annual number of female cuckoos that visit England and Wales ; which, multiplied by 5, the mean number of eggs laid by the cuckoo, gives 695,865, the number of nestlings produced annually by the mean number of females ; and this product, multiplied by 5, the mean number of eggs laid by those birds to whose care cuckoos usually intrust their offspring, gives 3,479,325, the mean annual number of nestling birds destroyed by young cuckoos in England and Wales. Enormous as this destruction appears, it is probably rather under than over-rated.'*

'The injuries,' continues Mr Blackwall, 'which so frequently happen to the eggs of those birds in whose nests cuckoos lay, are occasioned, as I have often proved experimentally, by the sitting bird in attempting to accommodate herself to eggs of different sizes. If comparatively large and small eggs are placed in the same nest, some of the smaller ones are generally thrown out, or rendered addle, by the hen bird in endeavouring to arrange them so that she may distribute nearly an equal degree of warmth and pressure to all : but the larger ones, which chiefly sustain her weight, and consequently are less liable to be moved, usually remain unmolested. When the eggs of birds are exchanged for others of a uniform magnitude, whether larger or smaller, than their own, provided the difference is not so great as to occasion them to be forsaken, no disturbance ensues, whatever their colour may be, the change either not being perceived, or totally disregarded.'†

If there be no mistake in the fact of the cuckoo's

* Manchester Memoirs, 2d series, vol. iv, p. 460.
† Manchester Memoirs, 2d series, vol. iv, p. 461.

having been found in the nests of wrens, it may well excite a question in what manner it was introduced, for the entrance of any of these little nests being in the side, and not more than an inch or an inch and a half in diameter either way, it is obviously impossible so large a bird as the cuckoo could get into the nest, which is barely wide enough to admit the wren herself. Should we reject (though we have no reason to do so) the evidence of M. Montbeillard with respect to the wrens, we cannot refuse to believe the accuracy of Dr Jenner, who found a cuckoo's egg in the nest of a wagtail in a hole under the eave of a cottage ; though we think this was rather a singular place for a wagtail to build in. Nay, even leaving these domed nests with a narrow entrance out of the question, and taking the nests most usually chosen by the cuckoo for her progeny, we must conclude that she cannot in many instances sit upon the nest while depositing her egg. She may, indeed, manage this in the nests of the larks, and in the wagtail's, when built, as it usually is, on the ground ; but the case is very different with the hedge-sparrow, the greenfinch, the linnet, or the whitethroat, all of whose nests are usually placed in thick thorn-bushes, or among brambles, and so closely fenced in therewith, that the school-boy can with difficulty reach in his hand (which is not one third the size of a cuckoo) to rob them of their eggs. From these facts, we think we are fully entitled to infer that it is physically impossible for the cuckoo to sit upon the nests in question when she deposits her egg. We are unable, however, to offer anything beyond conjecture as to the actual manner in which the thing is done ; though Vaillant obtained pretty satisfactory evidence that one at least of the African cuckoos carries the egg in her bill in order to lay it in nests having a narrow side entrance such as that of the

capocier (*Sylvia macroura*, LATHAM), whose ingenious construction we described in a preceding page, and that of the pinc-pinc (*Parus capensis*), also described. In treating of a matter of so great nicety as this, it may be well to translate Vaillant's own account of his singular discovery, in the case of the didric or gilded cuckoo (*Cuculus auratus*, GMELIN).

'Of all the cuckoos,' he says, 'which I observed in Africa, the didric was by far the most numerous; for I perceive, by referring to my journal, that I and my faithful Klaas shot 210 males, 130 females, and 103 young ones, in all 443; whilst it would not have been difficult to have procured a much greater number. If I add, besides, that we found 83 of their eggs in as many nests, belonging to insectivorous birds, I think it will appear that I have not wanted opportunities of studying its history. Although this bird be so common, not, indeed, in the environs, but about one hundred leagues from Cape-town, it was scarcely known in Europe before my voyage, and in France there was only one mutilated and badly preserved specimen of it to be seen in the Royal Museum at Paris. I myself brought over 150 males and females, as well as young ones, which are now exhibited in the chief cabinets of Europe. To this beautiful species, also, I am indebted for my principal knowledge of the cuckoo family. From the facility I had of leisurely and successfully observing its manners, I always entertained the hope that I should one day surprise a female didric in the act of depositing its egg in the nest of another bird; but having been disappointed in this respect, I began to imagine that my ignorance on this point would never be removed, when one day, having killed a female of this species, and wishing to introduce into its throat a hempen stopper, according to my custom after

bringing down a bird, in order to prevent the blood from staining its plumage, I was not a little surprised, on opening its bill for this purpose, to find in its throat an entire egg, which I knew immediately, from its form, size, and beautiful whiteness, to belong to the didric. Delighted at length, after so many useless efforts, at having obtained a confirmation of my suspicions, I loudly called my faithful Klaas, who was only a few paces distant from me, to whom I imparted my discovery with much pleasure, as he had used his best exertions to second my views. Klaas, on seeing the egg in the bird's gullet, told me that, after killing female cuckoos, he had frequently observed a newly-broken egg lying upon the ground near where they had fallen, which, he supposed, they had dropped in their fall, from being at that moment ready to lay. I recollect very well, that when this good Hottentot brought me the fruits of his sports, he frequently remarked, as he pointed to the cuckoo, 'This one laid her egg as she fell from the tree.' Although I was convinced, from this circumstance, that the female cuckoo deposits her egg in the nests of other birds by conveying it in her beak, I was very desirous to collect what facts I could upon the subject. Klaas and I therefore began to shoot as many cuckoos as we could meet with, which accounts for the great number of this species we procured. However, among all the specimens, there occurred only one instance similar to that which I have just mentioned — that, namely, of a second female who was transporting her egg in her mouth, like the former.'*

M. Vaillant likewise found an egg, supposed to be that of another cuckoo, which he calls edolio (*Cuculus melanoleucos*, Temminck), in the nest of a capocier, and also in the nest of the red-crowned

* Oiseaux d'Afrique, v, 33.

warbler (*Rousse-Tête*, VAILL.), though the cuckoo's egg is twice the size of the warbler's. But one of the most remarkable circumstances is, that though the birds which feed on grain are more numerous in Southern Africa, and their nests more easily found, the cuckoos never select them for depositing their eggs, but uniformly the nests of birds which feed on insects. Colonel Montagu makes a remark nearly similar with respect to our common cuckoo; for, amongst a number which he examined, he found only one with any vegetable materials in its stomach.* Temminck, who seems to have studied the cuckoos with great care, expressly says, the cuckoos 'live solitary; do not construct nests; the female, by some means not yet positively ascertained, carries the eggs which she has laid into the nests of different species of small birds.'† Of course he means the genuine cuckoos, excluding the honey-guide (*Indicator*, VIEILLOT), and a number of others allied to the genus.

Dr Fleming, in his recent work, has been led, upon doubtful premises as it appears to us, to maintain a different doctrine with regard to the universality of the mode in which the cuckoo, according to the authorities we have given, provides for the continuance of its species. 'Nests,' says he, 'are *seldom* constructed by the cuckoo itself, the eggs being *generally* dropped, separately, into the nests of the hedge-sparrow, wagtail, titlark, yellow-hammer, greenfinch, or whinchat, in the temporary absence of their owners. In *some* cases, however, it appears that the cuckoo constructs its own nest. Thus, in a manuscript of Derham's on Instinct, communicated by Pennant to Barrington, it is stated, that 'the Rev. Mr Stafford was walking in Glossopdale, in

* Ornith. Dict., Intr.

† Manuel d'Ornith., p. 380, 2nd Edit.

the Peak of Derbyshire, and saw a cuckoo rise from its nest, which was on the stump of a tree that had been some time felled, so as much to resemble the colour of the bird. In this nest were two young cuckoos, one of which he fastened to the ground by means of a peg and line, and very frequently, for many days, beheld the old cuckoo feed there her young ones." '* Such is the evidence adduced by Dr Fleming.†

Darwin mentions a similar instance of what was supposed to be a cuckoo's nest, likewise discovered in Derbyshire, by the Rev. Mr Wilmot of Morley. 'In the beginning of July, 1792,' says Mr Wilmot, 'I was attending some labourers on my farm, when one of them said to me, 'There is a bird's nest on one of the coal-slack hills; the bird is now sitting and is exactly like a cuckoo. They say that cuckoos never hatch their own eggs, otherwise I should have sworn it was one.' He took me to the spot. It was in an open fallow ground; the bird was upon the nest; I stood and observed her some time, and was perfectly satisfied it was a cuckoo; I then put my hand towards her, and she almost let me touch her before she rose from the nest, which she appeared to quit with great uneasiness, skimming over the ground in the manner that a hen patridge does when disturbed from a new-hatched brood, and went only to a thicket about forty or fifty yards from the nest, continuing there as long as I staid to observe her. In the nest, which was barely a hole scratched out of the coal-slack, in the manner of a plover's nest, I observed three eggs, but did not touch them.' The narrator goes on to mention that two young ones were hatched which he and his friends observed for several days to be constantly fed by the attentive

* Phil. Trans. for 1772, p. 299.
† British Animals, p. 91.

parents, till they successively disappeared either by accident or by flying away.*

We have not the slightest doubt, however, that in both these instances the supposed cuckoos were night-jars — a mistake, the converse of those noticed in a preceding page, in which the night-jar was taken for a cuckoo. We are supported in this inference by the authority of the late Dr Jenner. 'With due deference to Dr Darwin,' says he, 'I am inclined to think that the opinion he set forth respecting the pairing of cuckoos was taken up hastily, and that the birds which his friend saw feeding their nestlings were not cuckoos, but goat-suckers, whose mode of nestling corresponds with the relation given, and whose appearance might be mistaken for them by one not perfectly conversant with the plumage and the general appearance of cuckoos when on the wing.'† Mr Blackwall, also, comes to the same conclusion, and farther tells us that he knows the night-jar breeds near Glossop.‡

We are indebted to Wilson for establishing upon evidence apparently unquestionable, the fact of another bird laying its eggs parasitically, like the cuckoo, in the nests of other birds. It has no immediate affinity to the cuckoos, which it so closely resembles in its habits of breeding as well as of migration. Of this singular habit in the case of the cow-bird, Wilson says, 'I can myself speak with confidence from personal observation, and from the testimony of gentlemen, unknown to each other, residing in different and distant parts of the United States.' It may prove interesting to give the history of the discovery in his own words.

'I had, in numerous instances,' he says, 'found

* Darwin's Zoon. i, 248, 6th edit.

† Phil. Trans. 1824, p. 42.

‡ Manchester Memoirs, 2d series, iv, 465.

in the nests of three or four particular species of birds, one egg much larger and differently marked from those beside it ; I had remarked that these odd-looking eggs were all of the same colour, and marked nearly in the same manner, in whatever nest they lay, though frequently the eggs beside them were of a quite different tint ; and I had also been told, in a vague way, that the cow-bird laid in other birds' nests. At length I detected the female of this very bird in the nest of the red-eyed flycatcher, which nest is very small, and very singularly constructed ; suspecting her purpose, I cautiously withdrew without disturbing her, and had the satisfaction to find, on my return, that the egg which she had just dropped corresponded as nearly as eggs of the same species usually do, in its size, tint, and markings, to those formerly taken notice of. Since that time I have found the young cow bunting, in many instances, in the nests of one or other of these small birds ; I have seen these last followed by the young cow-bird, calling out clamorously for food, and often engaged in feeding it, and I have now, in a cage before me, a very fine one, which six months ago I took from the nest of the Maryland yellow-throat, and from which the figures of the young bird and male cow-bird were taken ; the figure in the act of feeding it is th female Maryland yellow-throat (*Sylvia Marylandica*), in whose nest it was found. I claim, however, no merit for a discovery not originally my own, these singular habits having long been known to people of observation resident in the country, whose information in this case has preceded that of all our school-philosophers and closest naturalists, to whom the matter has till now been totally unknown. Those birds are frequently observed loitering singly about solitary thickets, reconnoitring, no doubt, for proper nurses, to whose care they may commit the hatching

Female Maryland Yellow-throat (Sylvia Marylandica), length about four inches; and young Cow-Bird, length about seven inches.

of their eggs and the rearing of their helpless orphans. Among the birds selected for this duty are the following, the blue-bird (*Sialia Wilsonii*), which builds in a hollow tree; the chipping-sparrow (*Fringilla socialis*), in a cedar bush; the golden-crowned thrush (*Turdus auro-capillus*), on the ground, in the shape of an oven; the red-eyed flycatcher (*Sylvia alivacea*), in a neat pensile nest, hung by the two upper edges on a small sapling or drooping branch; the yellow-bird, in the fork of an alder; the Maryland yellow-throat, on the ground at the roots of briar bushes; the white-eyed flycatcher (*Muscicapa cantatrix*), a pensile nest on the bending of a smilax vine, and the small blue-gray flycatcher (*M. cærulea*), also a pensile nest, fastened to the slender twigs of a tree, sometimes

at the height of fifty or sixty feet from the ground. There are, no doubt, others to whom the same charge is committed; but all these I have myself met with acting in that capacity. Among these the yellow-throat and the red-eyed flycatcher appear to be particular favourites, and the kindness and affectionate attention which these two little birds seem to pay to their nurslings fully justify the partiality of the parents. It is well known to those who have paid attention to the manners of birds, that, after their nest is fully finished, a day or two generally elapses before the female begins to lay. This delay is, in most cases, necessary to give firmness to the yet damp materials and allow them time to dry. In this state it is sometimes met with, and laid in by the cow-bunting, the result of which I have invariably found to be the desertion of the nest by its rightful owner, and the consequent loss of the egg thus dropped in it by the intruder. But when the owner herself has begun to lay, and there are one or more eggs in the nest before the cow-bunting deposits hers, the attachment of the proprietor is secured, and remains unshaken until incubation is fully performed and the little stranger is able to provide for itself. In the month of July last,' continues Wilson, 'I took from the nest of the Maryland yellow-throat, which was built among the dry leaves at the root of a briar bush, a young male cow-bunting, which filled and occupied the whole nest. I had previously watched the motions of the foster-parents for more than an hour, in order to ascertain whether any more of their young were lurking about or not, and was fully satisfied that there were none. They had, in all probability, perished in the manner before mentioned. I took this bird home with me, and placed it in the same cage with a red-bird (*Loxia cardinalis*), who at first, and for several minutes after, examined it closely, and

seemingly with great curiosity. It soon became clamorous for food, and from that moment the red-bird seemed to adopt it as his own, feeding it with all the assiduity and tenderness of the most affectionate nurse. When he found that the grasshopper which he had brought it was too large for it to swallow, he took the insect from it, broke it in small portions, chewed them a little to soften them, and, with all the gentleness and delicacy imaginable, put them separately into its mouth. He often spent several minutes in looking at and examining it all over, and in picking off any particles of dirt that he observed on its plumage. In teaching and encouraging it to eat of itself he often reminded me of the lines of Goldsmith,

> 'He tried each art, reprov'd each dull delay,
> Allur'd to "fav'rite food," and led the way.'

This cow-bird is now six months old, is in complete plumage, and repays the affectionate services of his foster-parent with a frequent display of all the musical talents with which nature has gifted him. These, it must be confessed, are far from being ravishing; yet, for their singularity, are worthy of notice. He spreads his wings, swells his body into a globular form, bristling every feather in the manner of a turkey-cock, and, with great seeming difficulty, utters a few low, spluttering notes, as if proceeding from his belly; always, on these occasions, strutting in front of the spectator with great consequential affectation. To see the red-bird, who is himself so excellent a performer, silently listening to all this guttural splutter, reminds me of the great Handel contemplating a wretched cat-gut scraper. Perhaps, however, these may be meant for the notes of love and gratitude, which are sweeter to the ear,

and dearer to the heart, than all the artificial solos or concertos on this side heaven.'*

Besides these personal observations, Wilson received communications from various quarters, all corroborative of the singular habits just described; and, amongst others, one from Dr Potter, of Baltimore, the more interesting parts of which we shall endeavour to condense. He remarked that the cow-birds do not appear to pair, no more than the cuckoos observed by Dr Jenner, being seen during the breeding season in odd or even numbers from one to twenty; and when a female separates from the company, her departure is not noticed, no gallant partner accompanies her, nor manifests any solicitude in her absence; nor is her return greeted by the fond tenderness which is so remarkable in most other birds. This want of reciprocal attachment, however, is quite consistent with the general economy of the cow-birds; for such attachments would be superfluous, seeing that they neither build a nest nor nurse their own young. By watching a number of these birds during the breeding season, the female may be observed to desert her associates, assume a sickly aspect, and perch upon some eminence where she can reconnoitre the proceedings of birds in constructing their nests; but if she cannot from such a station make a discovery suitable for her purpose, she becomes restless, and flits about from tree to tree till she finds a nest to her mind.

'Seeing a female,' says Dr Potter, 'prying into a group of bushes in search of a nest, I determined to see the result, if practicable; and knowing how easily they are disconcerted by the near approach of man, I mounted my horse, and proceeded slowly, sometimes seeing and sometimes losing sight

* Wilson's Amer. Ornith., ii, 162.

of her, till I had travelled nearly two miles along the margin of a creek. She entered every thick place, prying with the strictest scrutiny into places where the small birds usually build, and at last darted suddenly into a thick copse of alders (*Alni*) and briars, where she remained for five or six minutes, when she returned, soaring above the underwood, and returned to the company she had left feeding in the field. Upon entering the covert, I found the nest of a yellow-throat (*Sylvia Marylandica*), with an egg of each. In the progress of the cow-bird along the creek's side, she entered the thick boughs of a small cedar, and returned several times before she could prevail on herself to quit the place; and, upon examination, I found a sparrow sitting on its nest, on which she no doubt would have stolen in the absence of the owner. It is, I believe, certain, that the cow-bird never makes a forcible entry upon the premises, by attacking other birds and ejecting them from their rightful tenements, although they are all, perhaps, inferior in strength, except the blue-bird, which, although of a mild as well as affectionate disposition, makes a vigorous resistance when assaulted. Like most tyrants and thieves, they are cowardly, and accomplish by stealth what they cannot obtain by force.

'The yellow-throat returned while I waited near the spot, and darted into her nest, but returned immediately, and perched upon a bough near the place, remained a minute or two, and entered it again, returned and disappeared. In ten minutes she returned with the male. They chattered with great agitation for half an hour, seeming to participate in the affront, and then left the place.'

It is a most remarkable circumstance, that the eggs of the rightful owners of a nest, both in the instance of the cuckoo and the cow-bird, should always dis-

appear upon the young parasite being hatched. Dr Potter is of opinion that it is the foster-mother which does this in the case of the cow-bird, and not the young of the latter, as Dr Jenner and Colonel Montagu ascertained with respect to the cuckoo. Some of the circumstances, indeed, mentioned by Dr Potter, seem inexplicable on any other supposition; in the case, for example, of the nest of a blue-bird (*Sialia Wilsonii*), built in a hollow stump, containing five eggs of the owner and one of the cow-bird. Three or four days after the discovery, he found a young cow-bird hatched, and only three eggs remaining, and one of the two which had disappeared lying at the bottom of the stump and rotten. The cavity in the stump was a foot deep, the nest at the bottom, and the entrance perpendicular; and hence it would seem to follow that the eggs could not have been ejected by the young cow-bird, but must have been carried out by its foster-mother. This is a wise provision of nature under such circumstances; for if all the eggs were hatched, the nest could not contain the young, and unless the foster-parents attended exclusively to the parasite, the species might soon become extinct.

Although, in the preceding pages, we have considered birds as miners, as ground-builders, as masons, as carpenters, as platform-builders, as basket-makers, as weavers, as tailors, as felt-makers, as cementers, and as dome-builders, we have not dwelt at much length upon any fancied analogies between their arts and those of the human race. The great distinction between man and the inferior animals is, that the one learns almost every art progressively, by his own experience operating with the accumulated knowledge of past generations, whilst the others work by a fixed rule, improving very little if any during the course of their own lives, and rarely deviating to-day from the plans pursued by the same species a thousand years ago. It is true that the swallow, which doubtless once built its nest in hollow trees, has now accommodated itself to the progress of human society by choosing chimneys for nestling; and it is also to be noticed, that in the selection of materials a great many birds, as we have already shown, accommodate themselves to their individual opportunities of procuring substances differing in some degree from those used in other situations by the same species. These adaptations only show that the instinct which guides them to the construction of the nests best fitted to their habits is not a blind one; that it is very nearly allied to the reasoning faculty, if it is not identified with it. But that the rule by which birds conduct their architectural labours is exceedingly limited, must be evident from the consideration that no species whatever is in a state of

progression from a rude to a polished style of construction. There is nearly as much difference between the comparative beauty of the nests of a wood-pigeon and of a bottle-tit, as between the hut of a North American savage and a Grecian temple. But although the savage, in the course of ages, may attain as much civilization as would lead him to the construction of a new Parthenon, the wood-pigeon will continue only to make a platform of sticks to the end of time. It is evident, from a contemplation of all nature, that the faculties of quadrupeds, birds, insects, and all the inferior animals, are stationary:—those of man only are progressive. It is this distinction which enables him, agreeably to the will of his Creator, to 'have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.' But within their limited range the inferior animals perform their proper labours with an unwearied industry, and an unerring precision, which call forth our wonder and admiration. Of these remarkable qualities we have given abundant examples in the preceding pages; and they are not without moral instruction. Elevated as our minds are in the comparative scale of nature, we may still take example from the diligence, the perseverance, and the cheerfulness, which preside over the *Architecture of Birds.*