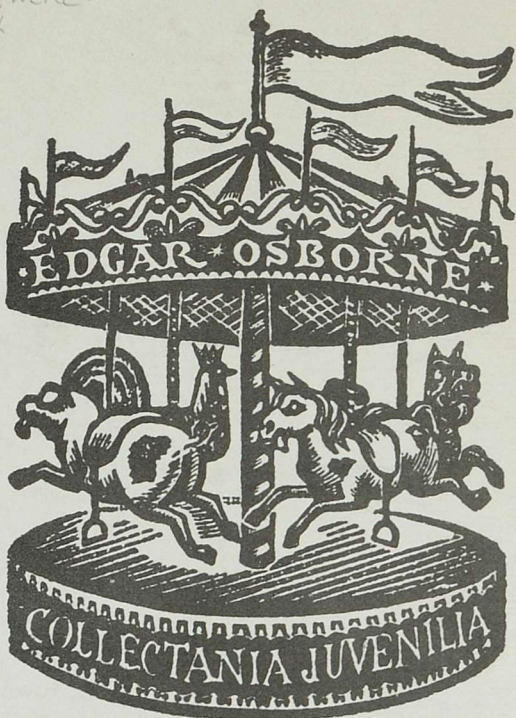




WHO WERE THE

FIRST BUILDERS

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THE BEAVER



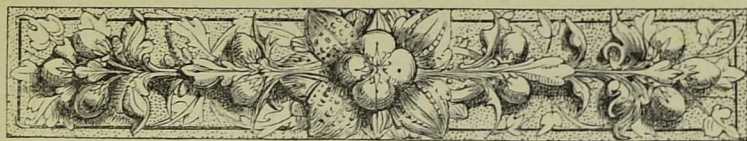
WHO WERE
THE FIRST BUILDERS?

“ But learn we might, if not too proud to stoop
To quadruped instructors, many a good
And useful quality.”

COWPER.

LONDON:
T. NELSON AND SONS, PATERNOSTER ROW;
EDINBURGH; AND NEW YORK.


1874.



WHO WERE THE FIRST BUILDERS?

CHAPTER I.

A Son's Curiosity—The Manuscript Book—Reading from a Book of Travel—Who were the First Builders?—The Inquiry Answered—The Beaver Described—His Natural History—His Patience—Construction of a Beaver's Lodge—How he sets to work to Build a Dam—Why he is Hunted—His Fur, his Flesh, and his Castor—Curious Customs—The Trappers, and their Devices—Les Paresseux—The Beaver's Enemy, the Wolverine—A Digression—Ingenuity of the Wolverine—How he Foils the Hunters—Anecdotes illustrative of his Intelligence.

APA, I saw some sheets of paper, covered with writing, on your table this morning."

"I daresay you did, Frederick; and what of it?"

"Why, I noticed that they were stitched together, like a book."

"Yes; and so they are a book, or are intended to be one."

“But then they had such a curious title.”

“Indeed; do you remember it?”

“Oh yes; I could not easily forget it. The title was, ‘Who were the First Builders?’”

“And what is there curious in a title like that?”

“Why, papa, how can you, or anybody, tell who was the first builder? Unless, indeed, it was Adam; who, I suppose, erected a hut for himself and his family.”

“But Adam may have lived in a tent, as most Asiatic people do even at the present day.”

“Well, at all events, papa, we read of men building the Tower of Babel, and there were cities *then* in existence; and we read of Sodom and Gomorrah; and we know that, thousands of years ago, men must have begun to build, though we don’t know their names.”

“Very true.”

“Then why put such a title to your book, papa ?”

“Simply because man was *not* the first builder.”

“Not man ! Who was, then—the monkey ? O papa, I think you are joking.”

“Indeed I am not. Please hand me the blue-bound volume from yonder table. Thank you. Now, listen, while I read to you a short extract :—

“‘We entered’—I am reading, remember, from a book of American travel—‘we entered a most glorious country—not, indeed, grandly picturesque, but rich and beautiful ; a country of rolling hills and fertile valleys, of lakes and streams, groves of birch and aspen, and miniature prairies ; a land of a kindly soil, and full of promise to the settler to come in future years, when an enlightened policy shall open out the wealth now uncared-for or unknown.

“‘On the way we frequently met with marks of the labours of the beaver in days long gone by, when they were a numerous and a powerful race ; and at one place we found a long chain of marshes, formed by the damming up of a stream which had now ceased to exist. Their dwelling had been abandoned ages

ago ; for the house had become a grassy mound on the dry land, and the dam in front a green and solid bank.

“ “ On Dog River, a small tributary of the Saskatchewan, a colony of these animals still survived. We found fresh tracks along the bank, and a few small trees cut down ; and following these indications up the stream, we came upon the dam. This was a weir of trunks and branches, over which the water poured gently, to resume a more rapid course below. In the quiet pool above, and close to the opposite bank, stood the *beaver-house*, a conical structure of six or seven feet in height, formed of poles and branches plastered over with mud. We watched long and silently, hid amongst the bushes which fringed the stream, hoping for a sight of some of the tenants ; but in vain. This settlement must have been in existence a very long time ; for we saw stumps of trees which had been cut down by them now moss-grown and rotten. Some of these were of large size, one measuring more than two feet in diameter. The beavers had fallen off wofully from the glory of their ancestors ; not only in the number and size of the communities, but in the magnitude of their undertakings.

“ “ The trees cut down more lately were all comparatively small ; and it would seem as if a number of beavers worked at the same tree, and a weak colony felt unequal to attempt one of the giants which their forefathers would not have hesitated to attack. Nor



AN AMERICAN FOREST.

did we ever discover any considerable stream dammed up by beavers of this present time—a work requiring

large timber and numerous workmen ; yet we frequently met with the grass-grown banks described, works of the golden age gone by, stretched across what had been streams of thirty or forty yards in width.'

Father. There, Fred, what do you think of builders who, long before men were settled in the forests of America, erected huge dams, nearly a hundred feet wide, across great rolling rivers ?

Frederick. Oh yes ; I see now, papa : your first builders are beavers.

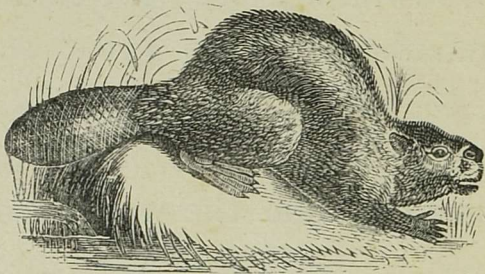
Father. Ay ; and not only beavers, but moles, termites, and the like, were building long before man was created ; and it may be that man took some hints from their work. But now seat yourself by my side, Frederick, and I will read to you the little book I have written expressly for your benefit. I hope, when you have heard it, you will think the title not unsuitable.

Frederick. Oh, that will be jolly, papa ! It will be good fun to learn something of these old original builders of yours.

Father. What you learn, I hope you will remember ; and I trust that when you have discovered how great is the ingenuity of animals, how marvellous their instinct, and how beautiful their organization, you will treat them with more gentleness. They are God's creatures ; and wonderful proofs of God's power, wisdom, and goodness. Let us behave towards them with humanity, as inferior members of the great scheme of Creation to which we ourselves belong. But fetch me my manuscript, Fred, and we will at once examine the work of the first builders.

Among the cleverest builders in the animal kingdom is the Beaver—the *Castor fiber* of zoologists—a rodent animal ; that is, a *gnawing* animal—so called because it uses its teeth, which are very large and hard, something in the same way as a man uses a saw. You can distinguish the beaver from other quadrupeds by his broad tail, which is

considerably flattened towards the extremity, and when the animal swims acts as a rudder, enabling him to steer his way with easy dexterity. His hind feet are webbed; he has a small head, and his countenance is distinguished by a singular air of shrewdness. At the first glance you say to yourself, "That's a clever fellow."



THE BEAVER.

This capital architect and skilful engineer is about three feet in length; but then his tail adds twelve inches more to his dignity. He wears a coat of fine, smooth, thick, and glossy hair, generally of a dark chestnut, but sometimes of a jet black colour. His mate is smaller, and her garment is scarcely so handsome. They live together on very

good terms, and the female generally presents her lord and master with three or four little beavers at a birth ; these are born with their eyes open, as if they were intended to make acquaintance with the world at the earliest possible date !

The beavers are a social race, and live together in communities ; which, however, vary considerably in number. They would seem to possess an extraordinary instinct as to the value of co-operation ; and by working together in perfect harmony and with a wise division of labour, they accomplish tasks of remarkable magnitude, which you would suppose to be far beyond the powers of such little creatures.

Their favourite localities for building—the “ sites ” which they best love to select—are the banks of clear rivers and fresh streams, where the supply of water is good and abundant, and where it flows in the shadow of the leafy grove. During the summer months they feed upon the fishes,



THE BEAVER'S HAUNT.

fruits, and plants which they find in the neighbourhood; in the winter they are con-

tent with the wood of the plane, the birch, and other trees, which they soak and soften in water from time to time.

The beaver is almost as fond of water as a hydropathic doctor. He swims in the water, and works in the water, and frolics in the water; and that he was intended by the Creator for these aquatic habits we know from his close furry coat, his paddle-like tail, and his webbed feet. Such being the case, you will understand why he makes his abode on the banks of streams; and it is of great importance to him, let me tell you, that these streams should never run dry, or the beaver's occupation would be gone.

And now we come to the secret purpose of the beaver's engineering. His great object is to maintain unchanged the level of his bath or swimming-basin, to keep it as nearly as possible always up to the same mark.

Let us now see how he accomplishes so difficult a task; a task which is just that of

the miller, who has to provide a continuous and regular supply of water in the canal or leat that feeds his mill-wheel.

In the first place, the beavers look out a convenient locality: wood close at hand; stream narrow but swift; and depth of water sufficient to prevent it, in winter, from freezing to the bottom. They then begin to build a dam across the stream, which shall raise it to the requisite level, and allow the superfluous water to flow away. The plan of this dam is determined by the nature of its site. If the river flows very slowly, the dam is nearly straight; but when the current is swift, the dam is curved, with its hollow or crescent side towards the stream. The materials employed are all kinds of drift-wood, and birch, poplar, alder, and green willow, together with mud and stone, so intermixed as to build up a very solid embankment. This is always kept in substantial repair; and in places where the beaver-colonies have been long

undisturbed, the dams literally grow into a massive wall, capable of resisting an immense stress both of water and ice; and as the willow trees employed, and the poplar, and the birch, generally root themselves, and bloom into lively growth, they gradually form a pretty miniature plantation, which frequently affords a shelter for the birds.

The beaver-houses—as we are told by the American traveller Hearne—are constructed of the same materials as their dams, and are invariably built just large enough for the number of their inhabitants, which seldom exceeds four old and six or eight young ones, but sometimes mounts to eight or ten seniors and sixteen to twenty juniors. According to Hearne, these houses are not nearly so well built as the dams; and, notwithstanding the sagacity of their builders, it has never been observed that they seek any other convenience than a dry place to lie on while they enjoy their victuals



BEAVERS' DWELLINGS.

or take a rest. It frequently happens that some of the large houses are found to have one or more partitions—if we may use the term—but which are in reality nothing more than portions of the main building which the sagacious beaver has left to support the roof.

Frederick. Oh yes, papa, that is exactly what the miners do in digging for coal. They leave large pillars of black shining coal to prop up the vaults of their vast underground galleries.

Father. Very good, Fred ; your illustration is most appropriate. But do you not wonder at the instinct which teaches an animal to take such a precaution ? But to continue :—

The different apartments formed by these partitions or walls communicate with each other by water only ; so that you may fancy them to resemble a row of cellars on the bank of the Thames at London, to which access is obtained by boats or barges floated in on the river-tide.

So far are the beavers, it appears, from driving stakes into the ground when building their houses, that they lay most of them cross-wise, and nearly horizontal, and without any other order than that of leaving a hollow or cavity in the middle. If any

needless branches project themselves outwards, they saw them off with their teeth, and throw them in among the rest. To prevent the mud from falling through the roof, some writers have represented that the beavers first complete the wood-work, and then plaster it. But this is a mistake ; the whole of their houses, as well as their dams, are, from the foundation upwards, one mass of mud and wood, strengthened with stones, where stones can be procured.

Our industrious builders invariably take the mud from the edge of the bank, or the bottom of the creek or pond near the door of the house, holding it between their small fore-paws close up to their throat, and taking good care not to drop a pellet. The wood they drag to and fro with their teeth. They work at night, and with so much expedition, that in the course of a dozen hours five or six beavers will collect some thousands of their little handfuls. They seem to take a great interest in their undertaking, and show an

eagerness and an energy which men and boys would profit by imitating. As another instance of their remarkable sagacity, I may mention that they cover the outside of their houses with mud every autumn, generally just as the frost sets in. Hence it freezes into a substance as solid as stone, which defies the attacks of their great enemy, the wolverene. They begin to lay in their stores as soon as the interior of their house is finished—that is, about the end of August or beginning of September ; and thus they are able to enjoy a well-deserved period of relaxation during the inclemencies of winter.

Frederick. So far so good, papa ; you have told me many interesting facts about the *houses* of the beavers, but I should like to learn something more particular about their *dams*. How do they manage to erect these across a swift stream ? When the men were building a dam down at Cayston Brook last spring, they first dug out a trench to divert the waters, and then they

were able to work in the dry bed of the brook. Do the beavers adopt the same plan?

Father. If you had thought for a moment before asking such a question, you would have answered it yourself in the negative. God gives to every animal the proper tools or implements for its own peculiar kind of work, and to the beaver he has *not* given long and strong claws suitable for digging.—

When the beaver wishes to build a dam he first looks out for a tree likely to suit his purpose; and in his selection he never makes a mistake. Then, sitting upright, he begins with his sharp-edged teeth to chisel out a groove completely round the trunk, just as boys cut a notch all round a thick pole which they want to divide into two parts. The groove is then widened and deepened by patient labour—for our little friend is never in a hurry, and seems to know the value of the maxim, “More haste,



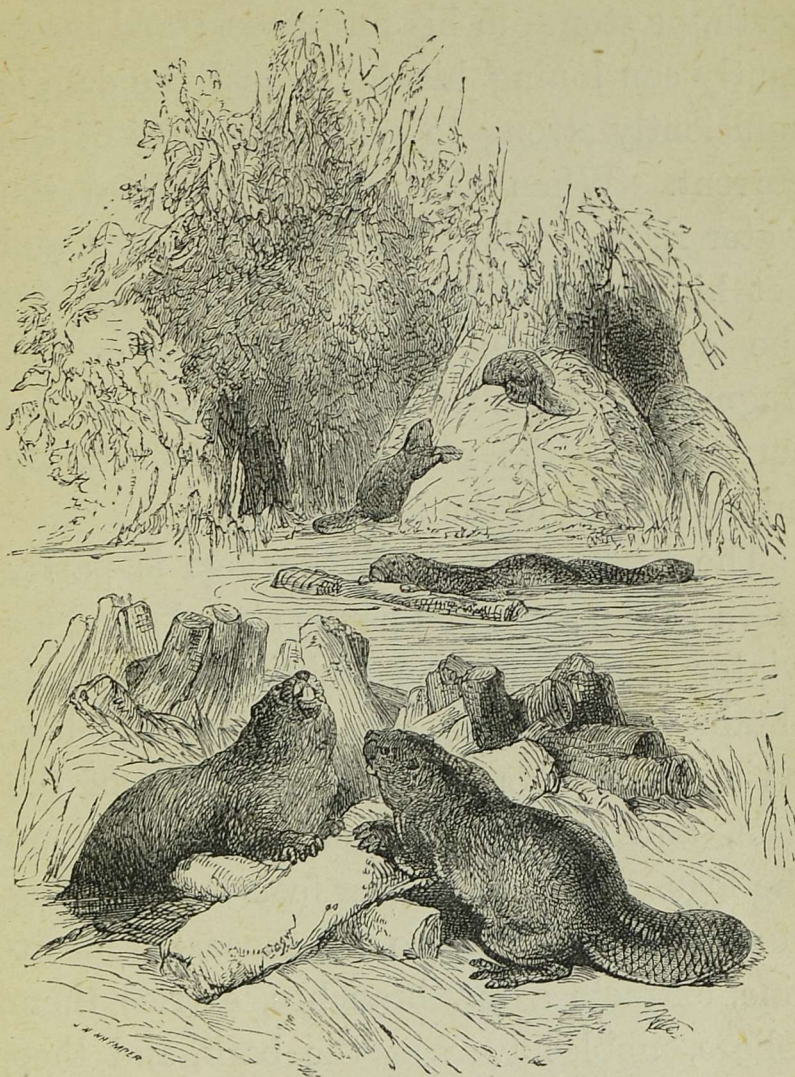
BEAVERS AT WORK.

worse speed"—and always widened in proportion to the depth; so that when the tree

is cut nearly through, it resembles to some extent the narrowed portion of an hour-glass. Having succeeded so far, the beaver anxiously examines the tree, going round and round it, until he makes up his mind in which direction it is best for it to fall. Then he goes to the opposite side, and with a few sharp bites severs the remainder of the trunk, when down to the ground, with a crash, comes the "lord of the forest."



The next task is, to cut up the prostrate trunk into lengths of about a yard; and when this is accomplished, the engineers carry them into the water, piling them up horizontally on one another, and loading them with stones and earth to prevent them from being swept away. It is almost impossible to give an accurate notion of the zeal and activity of the beaver at this part of his work. In conjunction with his fellow-labourers, he swims to and fro, pushing a log



BEAVERS COLLECTING LOGS FOR THE DAM.

before him, or fetching one from the neighbouring bank, or carrying branches in his

teeth, or stones in his fore-paws ; and incessantly continuing his task until the dam is sufficiently strong to resist the force of the current. When the rains come, and the water rises, he builds his dam higher and yet higher ; and its solidity is increased by the accumulation of broken boughs and fragments of timber brought down by the current, and the mud and clay constantly intermingling in the mass.

The bark stripped off the logs is partly eaten at the time, and partly stored away for winter provision. An additional supply is obtained by taking the smaller branches, diving with them to the foundations of the dam, and carefully fastening them among the logs. When a beaver feels the pinching of appetite, he dives to the concealed magazine, extracts a few branches, carries them ashore, nibbles away at the bark, and then lets them drop into the water, where they float away to the dam, and are soon absorbed in it.

In reference to these ingenious animals, a recent writer makes some interesting remarks. He describes their lodges as nearly circular in form, and closely resembling the well-known snow-houses of the Eskimos, being domed, and about half as high as they are wide; the average height being three feet, and the diameter six or seven feet. These are the interior dimensions; but the outer measurement is much greater, on account of the immense thickness of the walls, which, like the dam, are continually strengthened with mud and branches; so that, during the severe frosts, they are nearly as hard as solid stone. Each lodge is capable of containing several inhabitants, whose beds are arranged round the walls.

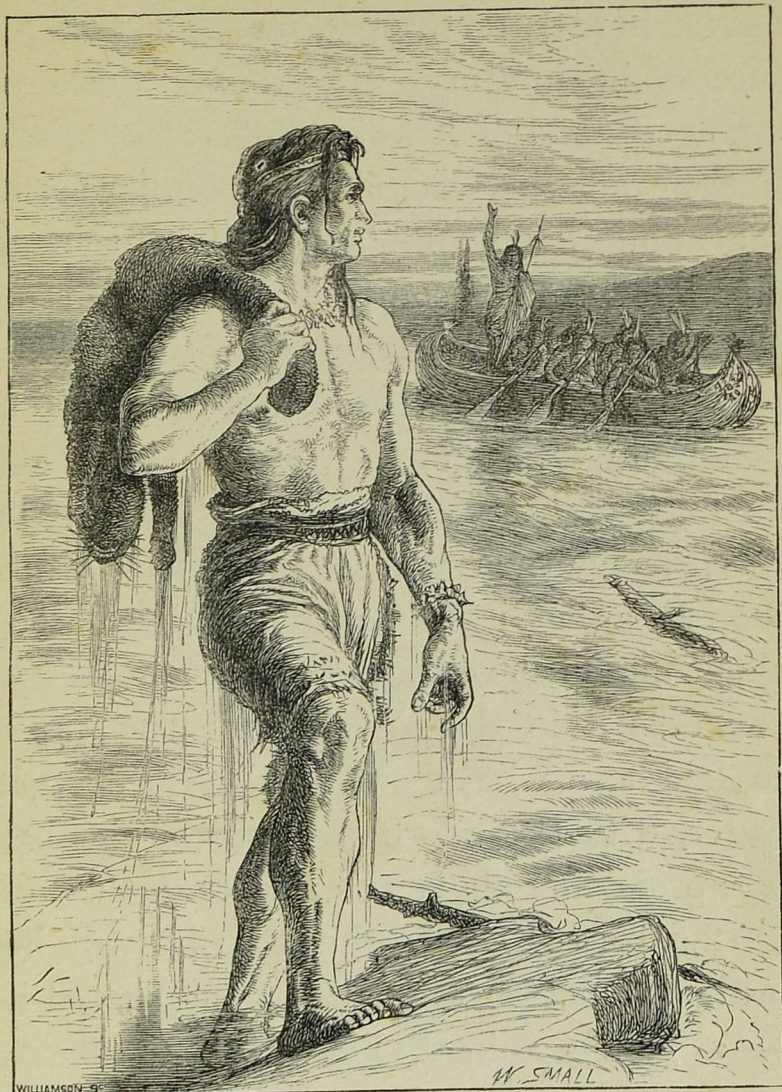
The beavers, industrious and ingenious as they are, have their enemies; the two principal being man and the wolverene. As the former is the more important, we will deal with him in the first place, and see how

he carries on his operations against our little builders.

Frederick. But why does man pursue the beaver? Oh, I recollect, on account of his fur; like the Indian in the poem, who was called—was he not?—the King of the Beavers.

Father. Yes; you are thinking of a character in Longfellow's "Hiawatha." But the beaver is also hunted on account of his flesh, which, when cooked, is said to resemble roasted pork; and, more particularly, for the sake of a certain odorous or odiferous secretion, termed *castor*, or *castoreum*, which is contained in two little bags, each about the size of a hen's egg. This said castor is a brownish oily substance, with a disagreeable smell and a bitter taste: it is much employed by perfumers. Beavers' fur is not so largely used as was once the case in the manufacture of hats, owing to the substitution of silk and other materials.—

We are told that to this *castoreum* the



“ But he reappeared triumphant,
And upon his shining shoulders
Brought the beaver, dead and dripping,
Brought the King of all the Beavers.”

From LONGFELLOW'S Hiawatha.

beaver hunter, or trapper, owes most of his success in hunting. The beavers are as strangely fond of it as cats of valerian, and if their nostrils recognize its peculiar scent, the animals sit upright, sniff about in all directions, and absolutely squeal with excitement. Taking advantage of this curious partiality, the hunter carries a supply of castoreum with him in a closed vessel, and having found a suitable spot for his trap, he sets it, and then proceeds to manufacture the bait; that is, he takes a twig of wood about nine inches long, chews one end of it, and dips it in the castoreum. The trap is so laid as to lie about six inches deep in water, with the odoriferous tip of the bait just projecting above the surface.

If a beaver scents this bait he will immediately hasten towards it; and should he be a young animal, he will assuredly be caught; but if he be a wary and experienced beaver, he not only avoids capture, but renders the trap useless until it has been re-

set. For, instead of endeavouring to get at the bait, he collects a quantity of mud and stones, and piles upon the trap until he has raised a small mound, on whose summit he deposits his own superfluous castoreum.

In connection with this subject, Audubon, the great American naturalist, mentions a singular circumstance.

If two beaver lodges are tolerably near each other, the denizens of the one depart to a short distance from their settlement, to rid themselves of the superabundant castoreum. The beavers of the second lodge, scenting the deposit, repair to the same locality, and heap over the perfumed substance a thick layer of leaves and soil. On this heap they place their own castoreum, and return home. The inhabitants of the former lodge, in their turn, repeat the same operation, until a mound is reared of from four to five feet in height.

To return to the beaver trappers. They pursue their avocation even in winter time.

They strike the frozen surface of the stream with a stick, in order to ascertain if they are near the underground openings of a beavers' lodge. When satisfied on this point, they cut away the ice and close up the aperture, in order that the beavers may not, in their alarm, escape into the water. Proceeding to the shore, they track the course of the subterranean gallery by repeated soundings, and discovering its various openings, are sure, after a careful watch, to capture the inhabitants.

While they are thus employed, it is indispensable they should spill no blood. If they do, the rest of the beavers at once take alarm, retreat to the water, and by swimming and diving are soon out of danger. The trappers have a remarkably superstitious custom. They remove a knee-cap from each of the slaughtered beavers, and throw it into the fire; apparently as a sort of offering to the goddess of Ill Luck!

A certain class of beavers are called *Les*

Paresseux, or “the Idlers.” These do not dwell in lodges, and they erect no dam, but



BEAVER ABOUT TO DIVE.

content themselves with a sluggish existence in a sort of burrow, like that of the common water-rat. They are always males, and several of them generally inhabit the same gallery. We are told that “the trapper is always pleased when he discovers the habitation of ‘an idler,’ as its capture is a comparatively easy task.”

Just observe what appropriate and impressive lessons we may learn from the

animal world. You see that to ensnare an idle beaver is considered an easy task. And so it is always easy for idleness to be entrapped into misery and ruin. Our old poet, Chaucer, says,—

“ An idle man is like a house that hath no walls ;
The devils may enter in on every side ;”

and rest assured that devils *will* take possession of the idle mind ; the devils of luxury, and greed, and falsehood, and ignorance. There is nothing like Work, to keep the brain healthy ; to ward off the incessant attacks of evil thoughts, evil ideas, evil passions.

But I have now to speak of the second enemy of the beaver, the *wolverene*.

Frederick. What is a wolverene, papa ?

Father. I am about to describe him to you. He is very commonly known as the *glutton*.

Frederick. Oh yes, the glutton ! I have heard of that voracious old fellow ; he is about the size of a large badger, is he not ?

I think I have read that he is very fierce and very strong; that he will even steal



THE GLUTTON.

their prey from the wolf and bear; and that he pounces on hares, and marmots, and even on larger animals, tearing open their neck and throat, and hiding underground what he cannot eat at a single meal.

Father. The wolverene seems to be re-

garded as a link between the badger and the polecat. He resembles the former in his aspect and figure; the latter in the structure and arrangement of his teeth. His muzzle is covered with a hard, shining, blackish-brown hair; the top of the head and back are of the same colour, but the sides are chestnut. He is a determined enemy of the beaver, which he pursues with extraordinary courage, obstinacy, and cunning.

I only refer to him here from his hostility to our clever little builder, but he is himself so clever, in a very different way, that I think you will not be disinclined to hear a few words about him. I know it is a digression; but digressions may be pardoned when they relate to subjects of peculiar interest.

He is one of the most troublesome animals the fur-hunters, or trappers, are called upon to contend with. For he diligently follows them in their expeditions, watches where they set their traps, which he renders use-

less by stealing the bait ; or, if any animal is caught in one, he coolly “extracts” it, and walks away with his booty. But more than this : being endowed with a remarkably acute sense of smell, he traces out the *caches*, or concealed stores of the hunters—which they lay by in case of failure in the chase, and a consequent want of provisions—tears them open, and devours their contents.

In illustration of his extraordinary skill in these marauding expeditions, let me relate a few short anecdotes.

In a very interesting account of American travel, “The North-West Passage by Land,” Lord Milton and Dr. Cheadle remark, that the fur-hunter’s greatest enemy is this same North American glutton, or, as he is commonly called, the wolverene or carcajou. They describe him as rather larger than an English fox, with a long body, stoutly and compactly made, mounted on exceedingly short legs of great strength. His broad

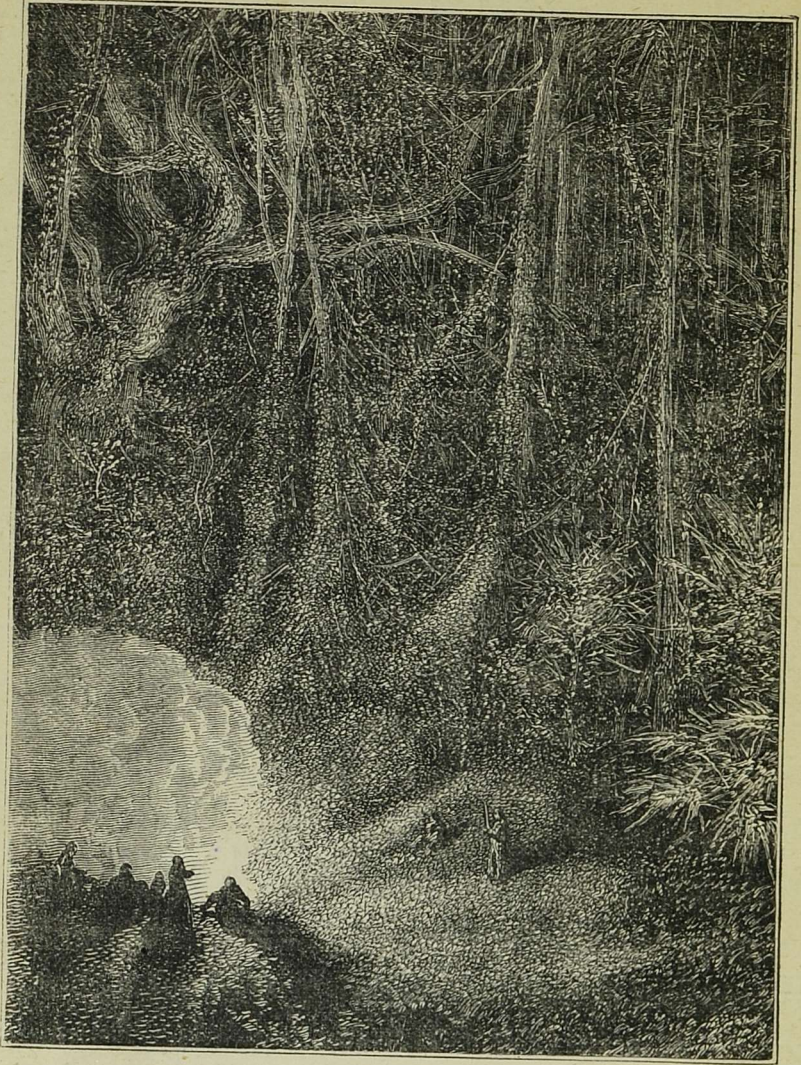
feet are armed with powerful claws, and his track in the snow is as large as the print of a man's fist. The shape of his head, and his hairy coat, give him very much the appearance of a shaggy brown dog.

During the winter months he secures "a living" by turning to his own account the labours of the trappers; and this he does to so serious an extent that the Indians have actually named him Kewaharkess, or "the Evil One." Day and night, like a sleuth-hound, and with a watchfulness that never relaxes, he hunts for the trail of man; and once it is found he follows it up unerringly. On coming to a frozen lake, where the snow has generally drifted over the track, he continues his untiring gallop round its banks until he discovers the point at which it again enters the woods, and follows it up to one of the hunter's wooden traps.

Skilfully avoiding the door, he forces open an entrance at the back, and seizes the bait without injury to himself; or, if the trap

contain an animal, he drags it out, and, with wanton malevolence, mauls and rends it, and finally hides it at some distance in the underwood, or among the branches of a lofty pine. Occasionally, if he be hard pressed by hunger, he devours it. In this manner the wolverene will despoil and demolish a whole series of traps; and when once he has established himself on a trapping-walk, the hunter's only chance is to change his ground, and build a fresh lot of traps, in the hope of securing a few furs before his industrious enemy discovers his new path.

The trappers, round their evening fire, are wont to relate strange stories of the wonderful cunning of this animal, which they believe to be gifted with an almost human intelligence. He is never caught, they say, in any ordinary snare. Sometimes one is poisoned, or captured in a steel trap; but so great is his strength, that he will often release himself from traps which are



HUNTERS IN THE AMERICAN FOREST.

sufficiently massive to hold securely a large wolf. When caught in this way, he

does not, like the fox and the mink, proceed to amputate the imprisoned limb ; but partly dragging the trap, and partly carrying it with his mouth, he hurries away to some lake or river, until he thinks himself safe from pursuit, and then devotes himself to the extrication of his leg or legs—a task in which he often succeeds.

So much for the wolverene, which, in its way, does not exhibit an inferior degree of intelligence to the beaver, its frequent victim. Such anecdotes as these with which I have enriched my pages cannot fail, I think, to inspire the reader with a deeper interest in, and a greater regard for, the various members of the animal kingdom. None are without their remarkable characteristics ; and their study is well calculated to fill the mind with sentiments of awe, love, and admiration.






CHAPTER II.

An African Scene—Columns, or Monuments?—Who were the Builders?—
The Termites, or White Ants—General Description of a Termite
Mound—Fuller Particulars—The Interior—The Exterior—King and
Queen—Their Immense Numbers—Their Enemies—The Termites
Eaten as a Dainty.

Father.



O far, then, I have answered satisfactorily—at least I would hope so—the question, “Who were the First Builders?” I have proved the claim of the Beavers to be regarded as among the very earliest constructors of houses and embankments, and that their labours began long before man himself made his appearance on the surface of our planet. But there were other labourers at work in quite as remote a period of terres-

trial history, whose descendants like our modern beavers, are still engaged in the erection of wondrous structures

For instance : let us suppose ourselves to be resting in a South African plain, under the shadow of some sheltering rock, or lofty palm. The sun burns like an orb of fire in the heavens, whose glowing sapphire blue is undimmed by a single cloud or flake of fleecy vapour. The herbage is withered and stunted—in many places has disappeared beneath the ever-shifting sand ; and scarcely a shrub or flower relieves the bare and tedious expanse. You look around in weariness of spirit ; when suddenly your attention is attracted by a row of columns standing clear and distinct against the horizon, like the dwarf pillars of a pigmy temple. You say to yourself, “ Even here, then, in the centre of a sandy waste, a tribe of men have lived in some long-past day. To what race they can have belonged I know not, but from the remains of their

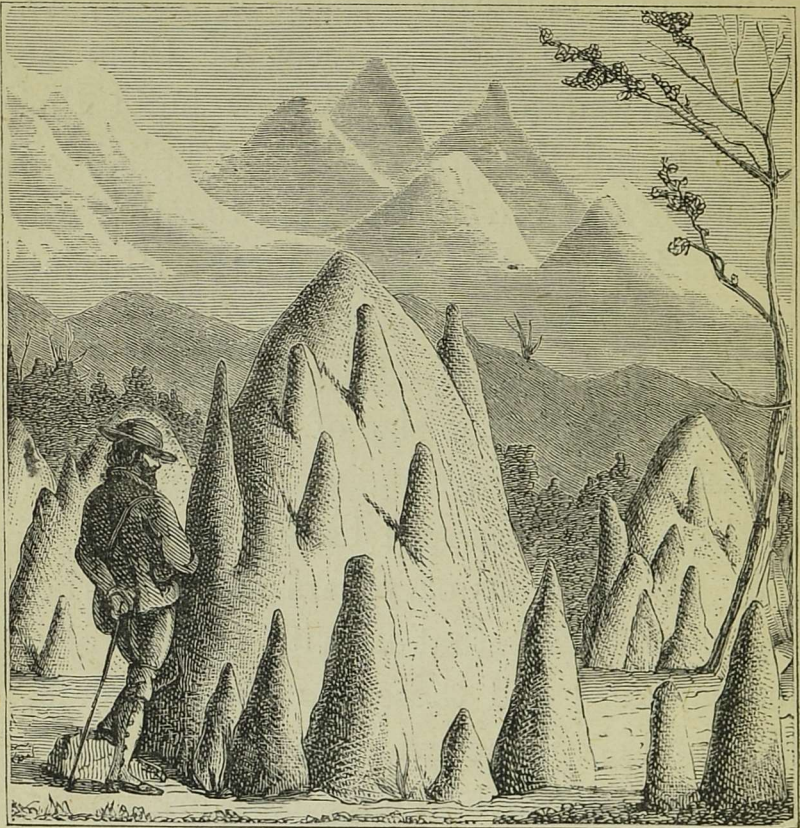
dwellings which I see yonder, it is evident they must have been of stunted form—in truth, a people of Lilliputians! But their existence is beyond all doubt; do I not recognize the memorials of their handiwork scattered over the surrounding plain?”

But approach these apparent columns, these seeming relics of a Lilliputian palace, and to your surprise you discover that “they are not what they seem;” that neither axe nor chisel has ever wrought upon them; that never were they designed or executed by man! To your astonishment, you find them to have been reared under the hot African sun by a nation of *insects*—a nation well entitled to share with the beavers and other claimants the honour of having been among the first builders. Yes; you are standing in wonder before the work of the so-called *White Ants*, the terrible *Termites*!

It is surprising what Titanic, what colossal erections are raised by these tiny insects.

There are numerous species of them, and while all are miners, most of them are builders and masons. A few build their nests round the arm of a tree; building it of bits of wood firmly fastened together with gum. But the majority excavate a labyrinth of subterranean galleries, and then raise above them a huge edifice—huge, I mean, in proportion to the size of the builders—to contain the nurseries and store-rooms. Some of these structures, as I have already hinted, look like columns or pillars of the earliest Egyptian style—that is, with great projecting capitals; and these are about two feet high and six inches wide, and constructed of a black clay which the insects work up into a substance nearly as hard as stone.

Still more remarkable, however, are the structures raised by the combined ingenuity and industry of the species of termites called *Termes bellicosus*, and consisting of irregular conical hills or mounds, flanked by a certain number of spiral turrets decreasing in height.



THE MOUNDS OF THE TERMITES.

According to Smeathman, the average height is from ten to twelve feet; according to Jobson, it actually attains to twenty feet. Yet the builders are only a fifth of an inch long! If men could rear memorials so vastly disproportionate to their size, the

Great Pyramid of Gizeh would tower to the amazing elevation of 5200 feet!

The Termite mound is not less remarkable for its solidity than for its height. Not only can several men mount upon it without disturbing its firmness, but even the buffaloes will plant themselves on the summit in security, to look out over the billowy sea of half-burned grass to discern the approach of the lion or the panther! It is hollow; but that matters little, inasmuch as its sides are hard as rock, and about twenty inches thick. The galleries in the interior connect it with the subterranean dwelling-place. The *upper* gallery, or story, immediately beneath the dome, occupies about one-third of the total elevation. The *lowermost* story consists of the royal apartment, inhabited by the Queen of the Termites: it has a flat floor, a vaulted ceiling, and is pierced with circular windows. In the middle, supported on the roof of the royal hall, are pillars of about two feet in height, which prop up the

egg rooms ; that is, certain little cells with partitions of sawdust rendered consistent by gum. All around the royal chamber are placed the offices, which are also rooms with rounded and vaulted ceilings, communicating with each other by corridors. On the sides, with their backs placed against the walls of the house, are the magazines, which are filled with gums, and with vegetable juices solidified or in powder.

Such is a general outline of the structure raised by the prodigious labours of the Termites. But to obtain a clearer conception of its admirable design and remarkable execution, I must enter somewhat more into detail.

I must first explain, however, that there are various orders or ranks among these interesting insects. Thus, those with wings are the fully developed males and females, properly called kings and queens. The undeveloped males are the soldiers of the

community, and the undeveloped females the workers.

As soon as a king and queen have reached their full growth, and taken flight from their native hive to some new locality, they are pounced upon by workers (larvæ) which are on the watch for royal leaders, and immediately enclosed in a small tenement of clay. Here they become the parents of a new community, the female attaining to an immense size, and laying eggs at the rate of 80,000 a-day, for a whole twelvemonth!

Instinct, says Rennie, directs the attention of these labouring insects to the preservation of their race, in the protection of this pair and their offspring. The chamber that forms the nucleus of a new nest is contrived for their safety, but its entrances are too small to permit them to leave it; consequently, the charge of the eggs devolves upon the workers, who construct nurseries for their reception. These are small and irregularly-shaped chambers, if chambers we

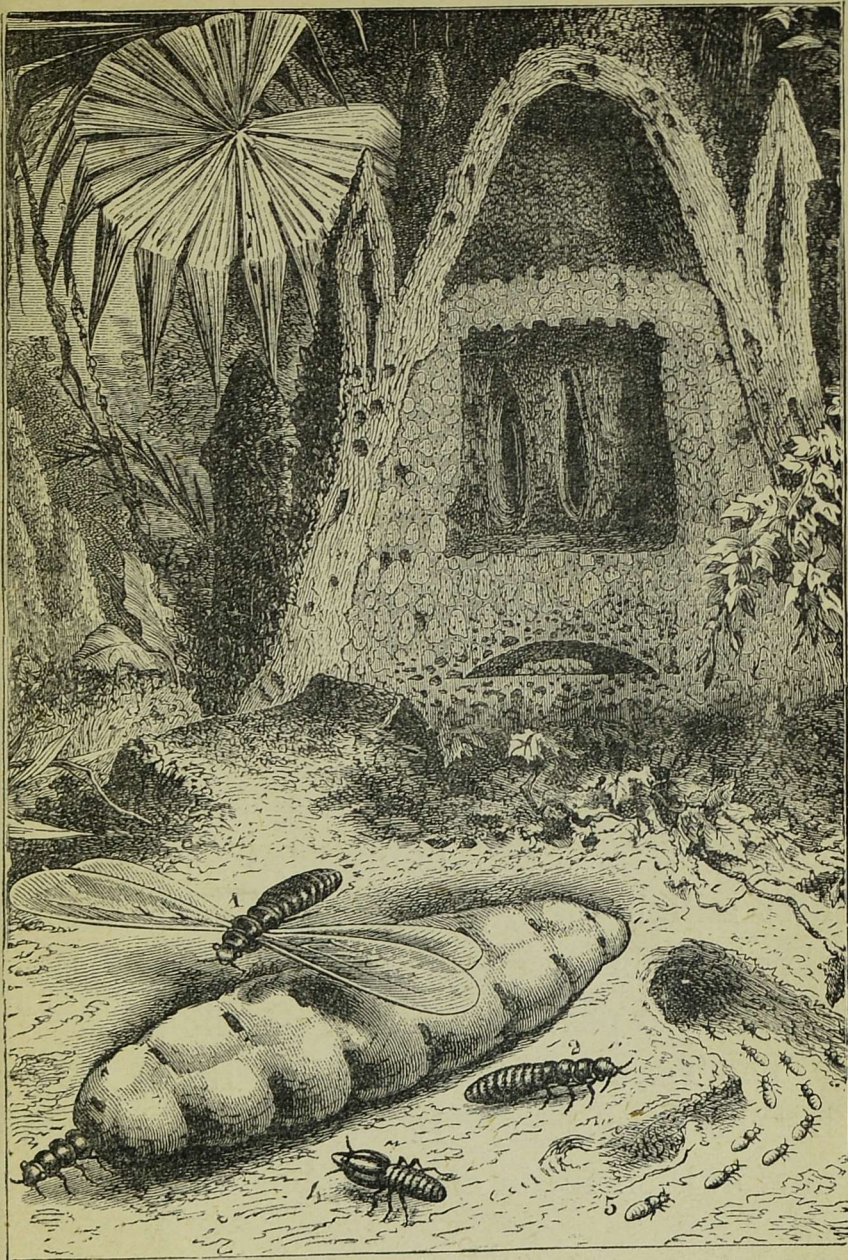
can call them when they are no larger than the inside of a hazel-nut! Just fit, you know, for the dressing-rooms of Queen Mab and her fairies! In older nests, however, they are somewhat larger, and instead of being set all around the royal apartment, are distributed at a greater distance. They are all built alike—that is, of bits of wood fastened together by gum, and cased with clay. The chamber that contains the two treasures of the community, the king and queen, lies nearly on a level with the surface of the ground; and as the other apartments are constructed around it, it is generally situated at an equal distance from the sides of the nest, and immediately beneath its conical point. The cells employed as nurseries and magazines of provisions compose a regular labyrinth, being separated from one another by small empty chambers and galleries, which surround them, or afford a communication between them. This maze extends on all sides to the outer shell, and reaches

up within to two-thirds or more of its elevation, leaving an open area (as already described) beneath the dome, which reminds the spectator of the choir of an ancient cathedral on a miniature scale. And around this choir three or four arches are erected; sometimes three feet in height next to the front of what we have called the choir, but diminishing in elevation as they recede further back, until they are lost amidst the innumerable chambers and nurseries in their rear.

Whatever building you survey, whether built by a Sir Christopher Wren or a tiny white ant, it must have *two* parts, the outside and the inside. Well, then, the *inside* of the nest or hive of the termites we have explored with some minuteness, shall we now direct our attention to the outside?

Frederick. Oh, go on, dearest papa; I am so interested that I cannot talk or criticise. I never heard before of such wonderful works.

Father. The wonderful works of God, as, indeed, we may exclaim, in all reverence and truth! Well, the outside is one large conical shell, shaped like a dome, and both large enough and strong enough to defend the interior from the changes of the weather, and its inhabitants from the attacks of natural or accidental enemies. As might be supposed, the outside is, therefore, always much stronger than the inner building, which I have already shown to be the inhabited part. The hills first make their appearance above ground by a little turret or two, not at all unlike the sugar-loaves which are so conspicuous in our grocers' shops, and much about the same height. Soon afterwards, at some little distance, while the former are increasing in magnitude and elevation, the industrious termites raise a fresh series; and so they continue their work, increasing the number of their domes, and enlarging them at their base, till all the subterranean portions are covered with these sugar-loaf tur-



TERMITES:

1, Male ; 3, Female ; 2, 4, 5, Young Termites in different stages of growth.

rets, of which they always erect the largest and highest in the centre; and finally, by filling up the intermediate spaces, they unite the whole into one extensive structure. The workmanship is neither very fanciful nor very exact, the objects aimed at being evidently solidity and strength. When, by the consolidation of the different turrets, the dome is at length completed, for which purpose the turrets answer as scaffolds, they remove the middle ones entirely, except the tops,—which, being joined together, form the crown of the dome,—and apply the clay to the erection of the interior works, or to the elevation of fresh turrets intended to raise the nest still higher; so that some part of the clay is probably used several times, like the boards and posts of a mason's scaffold.*

The Termites are often called *White Ants*, but this is an error. It is true they resemble ants in their mode of work, but they belong

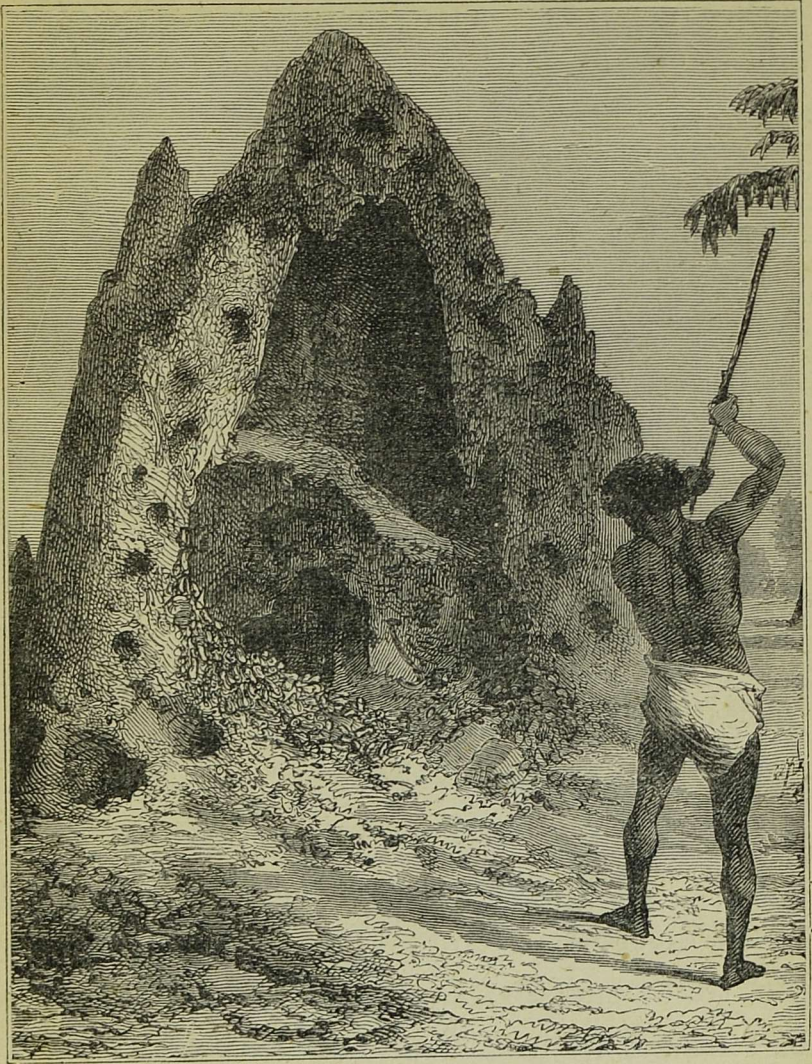
* The foregoing details are selected from the works of Smeathman and Rennie.

to an entirely different family of insects. They are endowed with wings, says Mr. Bates, simply for the purpose of flying away from the colony peopled by their wingless companions, to pair with individuals of the same or other colonies, and reproduce their kind. They make no other use of their wings; and on meeting with their mates, immediately shed them, or throw them off.

The devotion which the Termites show to their queen is very remarkable; they seem, literally, to adore her. The larger she is, says Michelet, the more fruitful, the more inexhaustible, the more does this terrible insect-mother appear to be worshipped by the fanatical rabble. If a portion of their hillock be carried away, it is interesting to see with what zeal they hasten to repair the breach, to raise a protecting arch above the head of their adored queen, and to rebuild her royal cell, which will again become the centre of a new community. "Yet I am not astonished," continues Michelet, "at the

excessive love which the tiny populace display for this instrument of fecundity. If all other species did not combine to destroy them, their truly prodigious mother would make them, by sheer numbers, the lords of the world. The fish might escape, but insects would perish. It is sufficient to remember that the mother bee does not produce in a year what the female termites can produce in a day. So through her multiplying agency they would be enabled to devour everything; but they are feeble, and they are savoury, and so everything devours them."

Birds pursue them greedily; poultry consume them by thousands and tens of thousands; ants hunt and exterminate whole legions; the Indians and the South African negroes pounce upon them as a dainty: they roast them, as we roast coffee, and eat them by handfuls; or knead them up with flour into a cake, which they consider delicious. And thus the great law of Nature is fulfilled, and no one species of animal is allowed



DEMOLISHING A TERMITE MOUND.

by its numbers to threaten the existence of another.



CHAPTER III.

The Wonderfulness of Creation—The Bird World—The House-Martin—How he Builds his Nest—An Anecdote illustrative of his Reasoning Powers—The Swallow—Sir Humphry Davy's favourite Bird—Song of the Children of Rhodes—The Swallow and his Nest—A Flight to Australia—The Tallegalla, or Brush Turkey—A Portrait of him—His Singularly Constructed Nest—Conclusion.

Father.



AND now, Freddy, let me tell you I have nearly reached the end of the manuscript book which so excited your curiosity. I see by your pleased attention that its contents have interested you; and I do not doubt but that henceforth you will look at all kinds of animals with different eyes, since you will have gained some idea of the intelligence and sagacity bestowed upon them by their Creator.

Frederick. I am sorry, papa, you are bringing your pretty stories to an end. I can assure you I am not the least weary of them.

Father. Well, I will finish what I have to say about the First Builders; and at some future time, perhaps, I will ask you to join me in considering, Who were the First Carpenters? But remember, that from all these details I want you to gain one important lesson: namely, That in all God's creation there is nothing unworthy of man's attention; and that, wherever we fix our gaze in this beautiful and wonderful world, we are confronted by abundant evidence of the Divine wisdom and power. Who endowed the Beaver with so much sagacity and forethought? Who conferred upon the Termites such powers of work, such perseverance, such strength beyond their size, such devotion to the parents of their race? For these and similar marvels we can account by no philosophical scheme whatso-

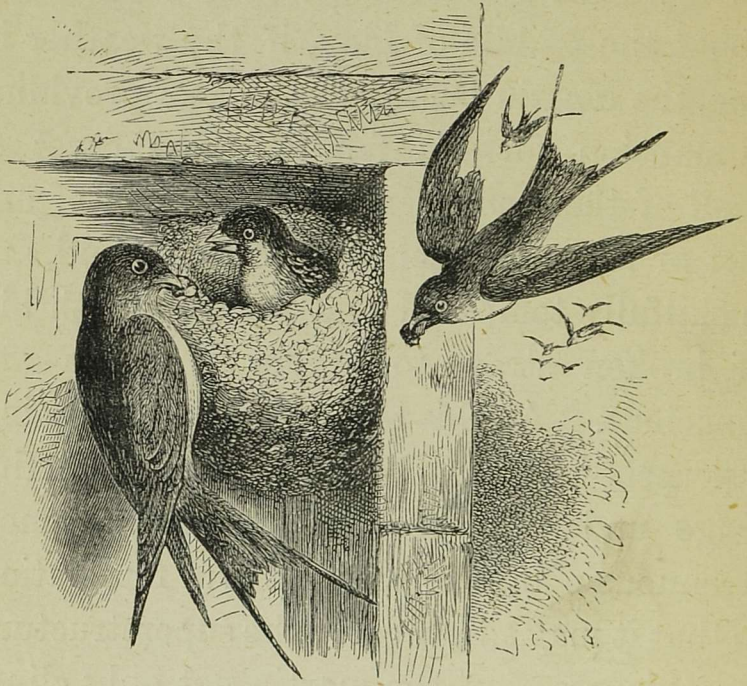
ever ; we must and can only refer them to one Supreme Creator—the Lord and Giver of Life and Light—God the eternal, the infinite, and the almighty ! Oh, never can I look forth upon the face of Nature, upon the insect, the bird, or the flower ; the valley, the mountain, or the forest ; the rolling river or the sounding sea, without a deep emotion at the heart, which seems to force from my inner self the song of thanksgiving, *Te Deum Laudamus!* “ We praise Thee, O God ; we acknowledge Thee to be the Lord ! ”

We have found our “ First Builders ” among the quadrupeds and the insects ; let us now look for some among the birds, which, as everybody knows, are among the wisest and wariest of all the members of the great Animal Kingdom.

And, at the outset, I shall not go far from home. Let us see whether the House-Martin, for instance, does not deserve, from his constructive skill, to be included in our record of honour.

About the middle of May, says dear old Gilbert White, in that most delightful of books, "The Natural History of Selbourne," about the middle of May, if the weather be fine, the Martin begins to think of providing a mansion for his family. The crust or shell of this nest seems to be formed of any dirt or loam that comes readily to hand, and is skilfully tempered and kneaded with bits of broken straw to render it tough and tenacious. As this bird often builds against a perpendicular wall, without any projecting ledge under, he requires to use his most strenuous efforts to secure a firm foundation, so that it may safely carry the superstructure. On this occasion the martin not only clings with his claws, but partly supports himself by strongly inclining his tail against the wall; and, thus steadied, he works and plasters the materials into the face of the brick or stone. But then, that his work may not, while it is soft and green, pull itself down by its own weight, the provident

builder has prudence and forbearance enough not to push on his work too rapidly; but by



MARTINS BUILDING THEIR NEST.

building only in the morning, and by giving up the rest of the day to recreation and food-seeking, he gives it time to dry and harden properly. A day's work seems to be about half an inch layer of earth. In like manner the careful human labourer,

when building a mud wall (taught first, perhaps, by the example of our little bird), raises but a moderate layer at a time, and then desists, lest the work should become top-heavy, and so be ruined by its own weight. By this cautious proceeding, in about ten or twelve days our industrious builder constructs a hemispherical nest—that is, of the shape of half a globe—with a small opening towards the top, but strong, compact, and warm, and properly fitted for the accommodation of a feathered family.

The shell or crust of the nest may be compared to what is called “rustic work,” and, on the outside, is full of little knobs and protuberances; nor is it smoothed and polished off on the inside, but rendered soft and warm, and fit for incubation, by a lining of grasses, small straws, and feathers, and sometimes by a bedding of moss interwoven with wool. In deciding on a nesting-place they often show a good deal of caprice, or what seems to *us* caprice; for, most pro-

bably, they have excellent reasons for their future changes; but when once a nest is completed in a sheltered locality, it serves for several seasons. Those which breed in a ready-finished house get the start in hatching of those that build new ones by ten days or a fortnight. They are early risers, these feathered builders, beginning their work before four in the morning. When they fix their materials they plaster them on with their chins, moving their heads about with a quick rotatory motion.

Frederick. I have seen a martin's nest, papa. Don't you remember that one was built under the eaves of uncle's old barn, on his farm at Somerton?

Father. Yes; and a very ingenious one it was too. But the fact is that the martin possesses something more than *instinct*; its operations are guided by *reason*, as the anecdote I am about to tell will prove to you.

Under the eaves of a house, not so high

as to be beyond the reach of any urchin who could procure a rod or fling a stone, a martin had built its nest, which had more than once been destroyed. There is no doubt that, under ordinary circumstances, these birds would have gone on building their habitation in the same place and manner if left to themselves and their own resources; although, even in such cases, some important variation in the structure has been known to have occurred. But in the present instance, the inhabitants of the cottage were not satisfied to see the labours of their favourites perpetually rendered void; and they set their wits to work, in what manner to secure them from harm.

The method they eventually adopted was to place a small round basket under the eaves, at the place where the nest had been, as a protection from injury below; but it was attended with the inconvenience that the handle prevented it from being pressed into contact with the stone, while the

breadth of the basket was so great as to cause the wet dripping from the eaves to fall within the cavity. It was to obviate this latter annoyance that a flat piece of board was laid as a cover to the basket, with the precaution of leaving an opening—not in front, but at the side—for the birds to enter, if they should choose to adopt this new contrivance for their advantage. And they did justice to the kind intentions of their friends by adopting it, and that, too, in a way which evinced much ingenuity. They began by placing a rim of their usual mortar round the basket, at the border where the covering-board rested on it; but in thus rendering it safe and close on every side, they observed the precaution of leaving a small hole at the side by which to enter. In this convenient piece of wicker-work they formed a cradle, in which they were able successfully to rear their brood.

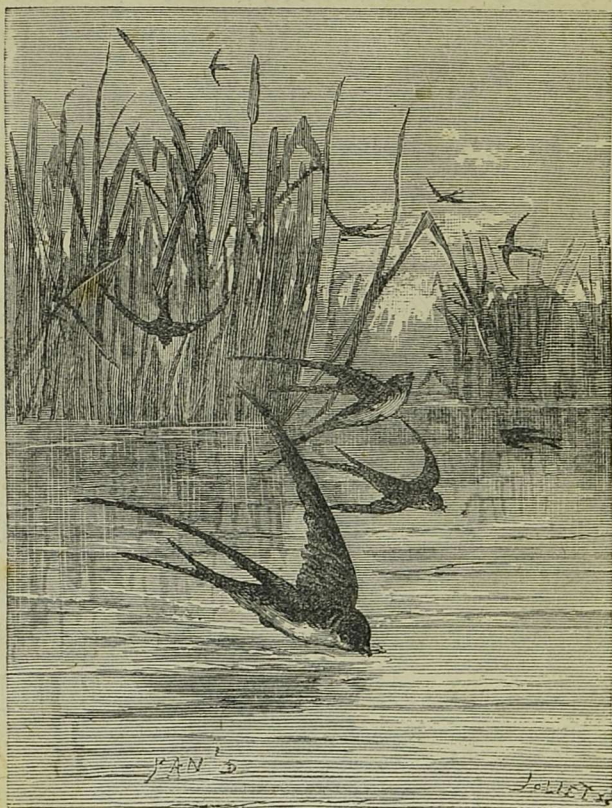
But this was not all. Another pair of birds had seen the good fortune of their

fellows, and they resolved to be sharers in the advantage they were enjoying. The space above the board, and within the arched handle of the basket, was only inferior to the basket itself as a situation for a nest, and there, accordingly, they proceeded to place it. It was formed of clay, in the usual manner; and here, immediately above their neighbours, they successfully hatched their young.

Frederick. Oh, what clever little fellows, papa! But do tell me something about the swallows; I think they are such beautiful birds, and I love to see them skimming through the air with their shining wings.

Father. You remind me of Sir Humphry Davy, Freddy, in your fondness for the swallow. He used to speak of it as one of his favourite birds; in fact, as a rival of the nightingale: the one, he said, delighted his sense of seeing as much as the other did his sense of hearing. He described him as the prophet of the year, the harbinger or fore-

runner of its best season ; as living a life of enjoyment among the loveliest forms of

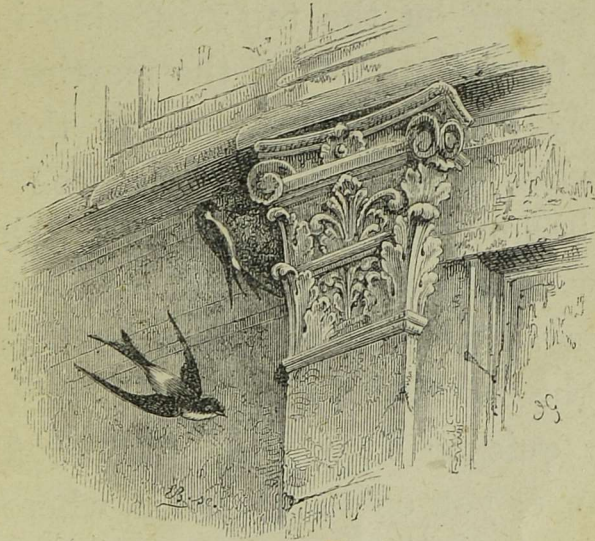


MARTINS CATCHING THEIR INSECT PREY.

nature. Winter, he said, was unknown to him ; for he left the green meadows of England in autumn, to frequent, during our dreary winter, the warm myrtle woods

of Italy and the fair palm groves of Africa. But I am diverging from my subject. Let us hear what can be said about the swallow as a builder.

In the construction of her nest the swallow exhibits a considerable degree of skill and prudence ; but, on the whole, in appearance



THE SWALLOW'S NEST.

it is not much unlike that of her relative, the martin. She prefers a warm, sheltered, and quiet locality, such as the thatched eaves of an old farm-house, the cornice of a

ruined temple, or an antique chimney, the shaft of a disused coal-pit, or a belfry. You will always find her erections among the ruins of venerable castles, and frequently an old church tower will contain a regular colony of swallows.

The nest is shaped like a cup, with a wide opening on the top; differing in this respect from the nest of the martin, which has only a narrow aperture at the side. And why is there this difference? Probably because the long forked tail of the swallow could not be crushed into the same compass as the much shorter and simpler tail of the martin.

But, quicker than the swallow flies I must hurry you off to Australia, where lives one of the most curious of the builders of the bird-world—the Brush Turkey, or Tallegalla.

The Tallegalla belongs to a family known as the *Megapodidæ*, or large-footed birds. He was originally called the New Holland

Vulture, on account of the bareness of his head and neck; but he has nothing in common with birds of prey.

The plumage of the upper parts of his body, of his wings, and his tail, is of a blackish-brown colour; of the same colour are the feathers of the under parts *at the base*, but they are silvery gray at the tip; the skin of the head and neck is of a deep pink-red, thinly sprinkled with short feathers very much like hairs; the wattle is of a bright yellow, tinged with red where it joins the red of the neck; the bill black, the feet brown. He is about the size of a turkey, and moves in small companies. When disturbed, he easily escapes pursuit by the quickness with which he can make his way through the underwood of the Australian "bush."

The nest, or rather mound, of the talle-galla is certainly one of the most curious erections raised by any of the First Builders. Here is Mr. Gould's description of it:—

"The birds first trace out a considerable circle, and

then begin to move regularly round it, continually grasping with their large feet the leaves, twigs, and dead grass lying about, and flinging them all in towards the centre. Each time that they complete their round they *narrow* the circle, until, in a very short time, they have cleared out a large circular belt, with an irregularly shaped mound in the middle of it, which continually increases in height.

“The nest being thus formed, the birds scrape away in the centre a cavity of about two feet in depth; and in this cavity they deposit their eggs, not side by side, as is generally the case, but planted at intervals of nine to twelve inches, and buried at nearly an arm’s depth, perfectly upright, with the large end upwards; these are then covered up, and allowed to remain until hatched by the joint influence of fermentation and the sunbeams.”

Here, Freddy, my manuscript ends. And now let us praise Him, the LORD, who made both bird and insect, fish and quadruped, and all the wonders of this visible creation; acknowledging in everything His greatness, His wisdom, and His boundless love;—
“Praise we the LORD!”



