THE BROOK AND ITS BANKS.

BY THE REV. J. G. WOOD, M.A., Author of "The Handy Natural History."

"Whyles owre a lim the bunnie plays,
As through the glen it dimp't;
Whyles round a rocky scuir it strays;
Whyles in a well it dimp'il;
Whyles glistered to the nightly rays,
Wh' bickerin', dancing dazzle;
Whyles coo'kit underneath the braks
Below the spreading hazel."

Burns: "Halloween."

CHAPTER I.

The many aspects of a brook—The eye sees only that which it is capable of seeing—Individuality of brooks and their banks—The rippling "burnie" of the hills—The gently-flowing brooks of low-lying districts—Individualities even of such brooks—The fresh-water brooks of Oxford and the tidal brooks of the Kentish marshes—The swarming life in which they abound—An afternoon's walk—Ditches versus hedges and walls—A brook in Cannock Chase—Its sudden changes of aspect—The brooks of the Wiltshire Downs and of Derbyshire.

A brook has many points of view.

In the first place, scarcely any two spectators see it in the same light.

To the rustic it is seldom more than a convenient water-tank, or, at most, as affording some sport to boys in fishing. To its picturesque beauties his eyes are blind, and to him the brook is, like Peter Bell's primrose, a brook and nothing more.

Then there are some who only view a brook as affording variety to the pursuit of the fox, and who pride themselves on their knowledge of the spots at which it can be most successfully leaped.

Others, again, who are of a geographical turn of mind, can only see in a brook a necessary portion of the watershed of the district.

To children it is for a time dear as a playground, possessing the inestimable advantage of enabling them to fall into it and wet their clothes from head to foot.

Then there are some who are keenly alive to its changing beauties, and are gifted with artistic spirit and power of appreciation, even if they should not have been able to cultivate the technical skill which would enable them to transfer to paper or canvas the scene which pleased them. Yet they can only see the surface, and take little, if any, heed of the wealth of animated life with which the brook and its banks are peopled, or of the sounds with which the air is filled.

Happy are those in whom are fortunately combined the appreciation of art and the gift (for it is a gift as much as an eye for art or an ear for music) of observing animal life. To them the

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THE GIRL'S OWN PAPER.

brook is all that it is to others, and much besides. To them the tinniest brook is a perpetual joy, and of such a nature I hope are the thoughts and the pages.

Not only does a brook assume different aspects, according to the individuality of the spectator, but every brook has its individuality, and its character.

Often the brook "plays many parts," as in Burns' delightful stanza, which seems to have rippled from the poet's brain as spontaneously as is its subject.

Sometimes, however, as near Oxford, it flows silently onwards with scarcely a dimple on its unruffled surface. Over its still wide green carpet, grass and marguerites dance. The swift-winged dragon-flies, blue, green, and red, swoop upon them like so many falcons on their prey; or, in the evening, the dragon-flies may be seen with whole swarms leaving their shed skins, like ghostly images of themselves, sticking on every tree trunk near the brook.

On the surface of the brook are seen the shadow-like water-gnats, drifting with apparent aimlessness over the surface, but having in view a definite and deadly purpose, as many a half-drowned insect will find to its cost.

Under the shade of the willows that overhang its banks the whirling beetles will gather, sociably circling round and round in their many trips, as if in a dance against each one of them in the swift course, but gladly shunning off under the protection given against injury by the stout coats of mail which they wear.

They are as wonderful, though clad in material forms, as any water spirit that ever was evolved from the life of the element, and they do not possess the improbable merit of being always within reach whenever we need them. I will venture to assert that so far tales, not even excepting those of New York, or Yorkshire, or marvellous in marvel the true history of the mayfly, the frog, the newt, and the dragon-fly, as will be narrated in the course of these pages. I may go even further, and assert that there is no inhabitant of the brook and its banks whose biography and structure are not full of absorbing interest, and will not occupy the longest life, if on an attempt be made to study them thoroughly.

An almost typical example of slow-flowing brooks is to be found in the remarkable channels which intersect the moors of Cornwall and Devon. It is not a small couple which, on the ordnance map, look almost like the threads of a spider's web. In that district, the fields are not divided by hedges, as in most parts of England, or by stone walls—"dykes," as they are termed in Ireland—such as are employed in Derbyshire and several other southern counties, which have a strong individuality of their own.

Even the smallest of these brooks is influenced by the tide, so that at the two periods of slack water there is no perceivable stream.

Yesterday afternoon, having an hour or so to spare at Minster, I examined slightly several of these streams and their beaches.

The contrast between them and the corresponding brooklets of Oxford, also a low-lying district, was very strongly marked.

In the first place, the willow, which forms so characteristic an ornament of the banks and rivers of England, absolutely absent. Most of the streamlets are entirely destitute of even a bush by which their course can be marked; so that when, as often is the case, a heavy white fog overhangs the whole district, looking from a distance as if the land had been sunk in an ocean of milk, no one who is not specially acquainted with the ground could guess his way over the fields without falling into the watery boundaries which surround them.

Some of them, however, are distinguished by hawthorns, which take the place of the willows, and thrive so luxuriantly that they may lay claim to the title of forest trees. Blackberries, too, are exuberant in their growth, and the stone fruit which was in its green state, the drupe-flies and haw-flies simply swarmed, telling the naturalist of their multitudinous successors, who at present are in the preliminary stages of their existence.

Among the blackberries the scarlet fruit of the woolly nightshade (a first cousin of the potato) is not wanting, and I could not help wondering whether they would endanger the health of the young Minstermen.

In some places the common frog-bit had grown with such luxuriance that it had completely hidden the water, the leaves overlapping each other as if the over-crowded plants were trying to shoulder each other out of the way.

In most of these streamlets the conspicuous bur-reed (Sparganium erectum) grew thickly, its singular growth made it visible as if it were waving the sword-like leaves. I cannot but think that the medieval weapon called the "morning star" (or "morning-tern") was derived from the globular, spiky fruit-cluster of the bur-reed.

A few of the streams were full of the fine plant which is popularly known by the name of globe-goose (Liparis bulbosa), but which ought by rights to be called the "cat's-tail" or "reed-mace." Of this plant it is said that a little girl, on seeing it growing, explained that she had never before that thought there grew on sticks. The teasel (Dipsacus) was abundant, as were also several of the true thistles.

In some cases one of these streams becomes deep for the bur-reed, and its surface is only diversified by the half-floating leaves of one or two aquatic plants.

On approaching one of these places, I find the water to be apparently without inhabitants. They had only been alarmed by my approach, which, as I had but little time to spare, was not as cautious as it ought to have been. However, I had waited perfectly still, and presently a little fish appeared from below. It was followed by a second and a third, and before long I observed almost on the surface, looking out for insects which had fallen into the water.

The day being hot, and with scarcely a breath of wind, the fish soon began to feel the heat. They did not move beyond the small spot in which they had appeared, but they all had their tails in slight movement, and their heads in one direction, thus showing that the water appeared to be perfectly motionless, there must be a current of some sort, fish always lying with their heads up the stream, so as to allow the water to enter their mouths and pass over their gills.

If then these sluggish streamlets were unlike those of Oxford, where the ground is low, and nearly level, how utterly distinct must they be from those of hilly and especially of rocky localities.

In the earlier part of the present year I was curiously examining a brook in Cammock Chase, in Staffordshire. Unfortunately, the day was summer-like, and the atmosphere maky, and a fierce north-east wind was blowing, a wind which affects animals, etc., especially the insect races, even more severely than it does man. Even the birds remain under shelter as long as they can, and not an insect will show itself. Neither, in consequence, will the fish be "on the feed." On a previous visit, we had been more fortunate, trout, crayfish, etc., testifying to the prolific character of the brook, which in one place is only four or five feet in width, and yet, with its tributaries, it has formed itself into a wide and treacherous marsh, which can only be crossed by jumping from one tussock of grass to another; and yet, again, it suddenly spreads out into a broad and shallow water, leaping and rippling over the stony bed. Scarcely a bush marks its course, and within a few yards it is quite invisible.

We shall presently notice of the chalk downs of Wiltshire, and of the regular mixture of rock and level ground, which are characteristic of Derbysire, have also their own separate individual beauty.

We shall, however, find many allusions to them in the course of the work, and we will therefore suppose ourselves to be approaching the natural habitat of any brown trout that may be interrupted by man. What will be likely to happen to us will be told in the following chapters.

CHAPTER II.

Life-history of the water-rat—No science can stand alone.—What is a water-rat?—The vole of the land and water—Their remarkable relations to each other.—The tooth and the chisel!—The slate "iron"—Chevving the cud—Teeth of the elephant—Feet of the water-vole—A false accusation—Water voles in gardens—Winter stores—Cats and water-voles—Subterranean pioneering—Mental character of the water-vole—Standing-fires—Its mode of eating.

FLOP!

A water-rat has taken alarm, and has leaped into brook—Common animal enough, but none the less worthy of notice because it is common. Indeed, it is in many respects a very remarkable creature, and fortunate for us that we have the opportunity of studying its habits and structure.

There is much more in the animal than meets the eye, and we cannot examine its biographic history without at the same time touching upon that of several other creatures. No science stands alone, neither does any animal, however insignificant it may appear to be; and we shall find that before we have done with the water-rat, we shall have had something to say of comparative anatomy, ornithology, kathalogy, ontology, and botany, to show the connection which exists between man and the lower animals, and the reciprocal influence of civilization and animal life.

In the first place, let us define our animal. What is a water-rat, and where is its place in zoological systems of the present day? It should be Rhinolophus aquaticus. This title tells its own story.

Though popularly called a rat, the animal has no right to the name, although, like the true rat, it is a rodent and much resembles the rat in size and in the length and colour of its fur. The likeness, however, extends no further.

The rats are long-nosed and sharp-moumed animals, whereas the water-rat has a short,
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Blunt nose. Then, the ears of the rats are large and stand out boldly from the head, while those of the water-rat are small, short and rounded. Again, the tail of the rat is long and slender, while that of the water-rat is comparatively short. Place the two animals side by side, and you will wonder how anyone could mistake the one for the other.

The teeth, too, are quite different. Instead of being white, like those of the rat, the incisor teeth are orange-yellow, like the tips of the beaver. Indeed, the water-rat possesses so many beaver-like characteristics, that it was ranked near the beaver in the system of Linnaeus.

Now, however, the voles, as these creatures ought rightly to be called, are thought to be of sufficient importance to be placed by themselves, and separated from the true beavers.

The voles constitute quite a large group of rodents, including several animals which are popularly ranked among the mice.

Now, it is at all times likely that the structure of their incisor teeth is of a very delicate nature. They are small, and they seem to have a very important function in the animal kingdom. How is the object to be attained?

In the solution of this problem we may see one of the many links which connect art and nature.

Should our readers know anything of carpentering, let them examine the structure of their chisels. They are not made wholly of hard steel, for that would be too brittle a material. But, if a carpenter were to snap, just as does the blade of a file when undue pressure is brought upon it. Moreover, the operation of sharpening would be exceedingly difficult.

So the blade of the chisel is merely faced with a thin plate of hardened steel, the remainder being of softer material.

Many of our readers who possess skates will find, on examination, that the greater part of the blade is, in reality, soft iron, the steel, which comes upon the toe, being sanded a little more.
Nothing is more annoying to such men than to find, when the toils of business are over, and they have settled themselves comfortably in their gardening suits, that some marauder has carried off the very vegetables on which they had doted themselves.

The water-vole has been detected in the act of climbing up a ladder which had been left standing against a plum tree, and attacking the fruit. Branches of grapes on the south side, vines are sometimes nipped off the branches by the teeth of the water-vole, and the animal has been seen to climb beans and peas, split the pods, and devour the contents.

Although not a hibernating animal, it lays up a store of food in the autumn. Mr. Groom Napier has the following description of the contents of a water-vat’s storehouse.

"Early in the spring of 1865, I dug out the burrow of a water-vole, and was surprised to find at the further extremity a cavity of about a foot in diameter, containing a quantity of fragments of carrots and potatoes, sufficient to fill a peck measure. This was undoubtedly a part of its winter store of provisions. This food had been gathered from a large potato and carrot bed in the vegetable garden.

"On pointing out my discovery to the owner of the garden, he said that his losses had been very serious that winter owing to the ravages of these animals, and said that he had brought both dogs and cats down to the stream to hunt for them; but they were too wary to be often caught."

I do not think that the owner of the garden knew very much about the characters either of the cat or water-vole.

Every one who is practically acquainted with cats knows that it is next to impossible to point out an object to a cat as we can to a dog. She looks at your finger, but can never direct her gaze to the object at which you are pointing. "She’s a good mouser," says the pussy; her eyes are not made for detecting objects at a distance.

If we throw a piece of biscuit to a dog, and he does not see where it has fallen, we can direct him by means of voice and finger. But, if a piece of meat is sliced up and thrown from a cat, all the pointing in the world will not enable her to discover it, and it is necessary to pick her up and put her nose close to the meat before she can find it.

So, even, if a water-vole should be seen by the master, the attention of the cat could not be directed to it, her instinct teaching her to take prey in quite a different manner.

The dogs, supposing that they happened to be of the right breed, would have a better chance of securing the robber, providing that they inter-cpted its retreat to the water. But, if the water-vole should succeed in gaining its burrow, or in plunging into the stream, I doubt whether any dog would be able to catch it.

Moreover, the water-vole is clever in tunneling, that when it drives its burrows into cultivated ground, it almost invariably conceals the entrance under a heap of stones, a hedge pile, or a small stack of sticks. How it is enabled to direct the course of its burrow we cannot even conjecture, except by attributing the faculty to that "most excellent gift," which we call by the conventional name of instinct.

Man has no such power, but when he wishes to drive a tunnel in any given direction he is obliged to avail himself of levels, compasses, and all the paraphernalia of the engineer. Yet, with nothing to direct it except instinct, the water-vole can, though working in darkness, drive its burrow in any desired direction and be guided exactly at the spot which it has selected.

The mole can do the same, and by means equally mysterious.

I may casually mention that the water-vole is one of the aquatic animals which, when zoological knowledge was not so universal as it is at the present day, were reckoned as fish, and might be eaten on fast days. I believe that in some parts of France this idea still prevails.

With all its wizens, the water-vole is a strangely nervous creature, being for a time almost paralysed by a sudden shock. This trait of character I discovered quite unexpectedly.

Not many, many years ago, when I was a young lad, and consequently of a destructive nature, I possessed a pistol, of which I was rather proud. It certainly was an excellent weapon, and I thought myself tolerably certain of hitting, and I was hitting a small apple at twelve yards distance.

One day, while walking along the bank of the Cherwell River, I saw a water-vole on the opposite bank. The animal was sitting on a small stump close to the water’s edge. Having, of course, the pistol with me, and wanting to disport a water-vole, I proceeded to aim at the animal. This was not easy as it looked.

A water-vole crouching upon a stump presents no point at which to aim, the brown fur of the animal and the brown surface of the old weather-beaten stump seeming to form a single object without any distinct outline; moreover, it is very difficult to calculate distances over water. However, I tired, and missed.

I naturally expected the animal to plunge into the river and escape. To my astonishment, it remained in the same position. Finding that it did not stir, I released, and again fired and missed. Four times did I fire at that water-vole, and after the last shot the animal slowly crawled off the stump, slid into the river, and made off.

Now in these days revolvers and breech-loaders did not exist, so that the process of loading a pistol with ball was rather a long and complicated one.

First, the powder had to be carefully measured from the flask; then a circular patch of greased linen had to be laid on the muzzle of the weapon, and a ball laid on it and hammered into the barrel with a leaden or wooden mallet; then it had to be driven into its place with a ramrod (often requiring the aid of the mallet), and, lastly, there was a new cap to be fitted and the chamber primed.

Yet although the shot was occupied between the shots, the animal remained as motionless as a stuffed figure.

When I crossed the river and examined the stumps, all the four bullets I had fired had travelled together just below the spot on which the animal had been sitting, and neither of them two inches from its body. Although the balls had missed the water-vole, they must have sharply jarred the stump.

I was afterwards informed that this semi-paralyses from sudden fear is a known characteristic of the animal. It seems to be shared by others of the same genus, as will be seen when we come to treat of the field mice.

In its mode of eating it much resembles the squirell, sitting on its haunches and holding the food in its forepaws, as if they were hands. I am not aware that it even eats worms or insects, and it may be absolutely acquitted from any imputation of doing harm to any of the fish tribe.

"To be continued."
CHAPTER III.

Enemies of the water-vole—The bird—The death-stroke—Ways of the heron—Watching for birds—Nest of the magpie—Observers in the New Forest—Return to wild habits—The fox, the cow, and the owl—The heron and the eel—The cormorant and the cormorant—The heron's power of wing—How the heron settles itself—Resting-place—Power of the heron's beak—Heronry in Wanstead Park.

The water-vole has but few enemies whom it need fear, and one of them is, now so scarce that the animal enjoys a practical immunity from it. A bird, in fact, is not at all fastidious about its food, and will eat fish, frogs, toads, or water-voles with perfect impartiality. It has even been known to devour young water-voles as they were lying on their nest, and snatch up the unsuspecting brood. In fact, all is fish that comes to its beck.

If the reader should be fortunate enough to catch a heron hunting for prey, let him make the most of the opportunity.

Although the heron is a large bird, it is not easily seen. In the first place, there are many different aspects. When it stalks over the ground with erect bearing and alert gestures it seems as conspicuous a bird as can well be imagined, least of all when flying, when the wings spread and the head and neck stretched backwards, and the long legs extending backwards by way of balancing. But when it is sitting still for the easily startled fish it must remain absolutely still. Though it stands motionless as a studded bird, its long neck_silk and hidden among the feathers of the shoulders, and nothing but the glancing eye noting that it is alive.

This quietness must be imitated by the observer, should he wish to watch the proceedings of the bird, as the least movement will be noticeable. The reason why so many persons fail to observe the habits of animals, and then disbelieve those who have been more successful, is that they have not mastered the art of observation, i.e., refraining from the slightest movement. A movement of the hand or foot, or even a turn of the head is certain to give alarm; whereas, if a person is so careful as not to drop the eyelids as much as possible, and not to even turn the eyes quickly, the reflection of the light on the inside of his face should attract the attention of the watchful creature.

One of the worst results of detection is that when any animal is startled it is seldom, if ever, to be within sight or hearing. It is evident that all animals of the same species have a language of their own which they perfectly understand, which is not likely that an animal belonging to one species can understand the language of another.

But there seems to be a sort of universal or lingua-franca language which is common to all the animals, whether they be beasts or birds, and one of the best known phrases in the cry of alarm, which is understood by all alike.

I need hardly say that it is almost absolutely necessary to be alone, as there is no evading a direct onlooker unless they can communicate with each other, and there is nothing which is so alarming to the beasts and birds as the sound of the human voice.

Yet there is a mode by which two persons who have learned to act in concert with each other can manage to observe in company. It was shown to me by an old African hunter, when I was staying with him in the New Forest.

In the forest, although even the snapping of a dry twig will give the owner of the bird terror, nor beast seems to be disturbed by a whistle. We therefore drew up a code of whistles, and practised ourselves thoroughly in them.

Then, we would take our chosen spot, and set down facing each other, so that no creature could pass behind one of us without being detected by the other. We were both dressed in white, and took the precaution of sitting with our backs against a tree or a bank, or any object which could perform the double duty of giving us something to lean against, and of breaking the outline of the human form. Our whistled code was as low as we could possibly consistent with being audible, and I do not think that during the whole period of our experiments we gave an intimation to a single creature.

When the observer is remaining without movement, scarcely an animal will notice him. I remember that on one occasion my friend and I were sitting opposite each other, one on either side of a narrow forest path. The sun was set, but at that time of the year there are scarcely any real twilight objects could be seen in the half light.

Presently a fox came stealthily along the path. Now the cunning of the fox is proverbial. He thought that he would pass between us without detecting our presence. Yet, he did so, passing so close, that we could have touched him with a stick.

Shortly afterwards, a cow came along the same path, walking almost noiselessly as the fox had done. It is a remarkable fact that domesticated animals, when allowed to wander at liberty in the New Forest, soon revert to the habits of their wild ancestors.

As the cow came along the path, neither of us could conjecture what the stealthy visitor would do. We feared lest it might be that of poachers, in case things would have gone hard with us, the poachers of the New Forest being a numerous set of men, always provided with firearms and blunderbusses, having scarcely the very slightest regard for the law, and almost out of reach of the police.

They would certainly have considered us as spies upon them, and as certainly would have attacked and killed, if not quite killed us, we believe.

But to our amazement as well as relief, the step was only that of a solitary cow, the animal lifting each foot high from the ground before stepping it down so cautiously as she had raised it.

Then, a barn owl came drifting silently between us, looking in the dark as large and white as if it had been the snowy owl itself. Yet, neither the fox, nor the cow, nor the owl detected us, although passing within a few feet of us.

On the daytimc, the observer, however careful he may be, is always liable to detection by a straying magpie or crow.

The bird comes flying along overhead, its keen eyes directed downwards, on the look-out for the eggs of other birds. At first he may not notice the motionless and silent observer, but sooner or later he is sure to do so.

If there are not exasperating to have all one's precautions frustrated, the shriek of terrified astonishment with which the bird announces the unexpected presence of a human being was down the specter. As it is, a feeling of wrath rather prevails over that of amusement, for at least an hour will elapse before the startled animals will have recovered from the fright they have had.
IN WANSTEAD PARK.
of a dead heron with its foot-curb, and have not succeeded.

Another suggestion is that the bird may use it to help it to impale itself on its perch, from which it may have a better view of its prey. The bird may also use it to help it to keep its balance, as it can then remain perched on a branch or tree limb much longer than it could otherwise.

Sometimes it has happened that the heron has miscalculated its powers, and seized a fish which was too large and powerful to be mastered. Anglers frequently capture fish which bear the marks of the heron's beak upon their bodies, and in such cases neither the fish nor the heron is any the worse for the struggle.

The bird's success in catching a fish is dependent upon the size of the fish and the skill of the angler. A small fish is more likely to be caught than a large one, and a skilled angler is more likely to succeed than an inexperienced one.

I have thought it best to mention the use of the foot-curb, for it is an interesting example of the adaptability of the heron's anatomy.

The above information is based on observations made by myself and other heron watchers. It is a fascinating bird, and one that should be observed and studied by all bird lovers.
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CHAPTER IV.

Another enemy of the water-vole—the Pike—Pike in brooks.—The Oxford giant-pike—a sad failure.—An ignominious end.—The pike and the eel.—The pike and the duck.—L暗s in Nature—Cousins of the water-vole.—The campagnolus, or short-tailed field mouse.—Damage which it works.—Its natural enemies—the kestrel and the owls.—How to detect and catch a campagnolus.—The kestrel—Its peculiar mode of flight.—Altering the focus of the eye.—The Nest of the campagnolus—Beams and the mouse.—The humble-bee and wasp—More connecting links—Stone chambers of the campagnolus—Bird-scavengers.—The pike, thrush, and campagnolus.—The winter and summer nests.—A beautiful specimen and remarkable locality.—Mode of euing.

We have not yet completed the life-history of the water-vole, which, as I remarked on page 34, involves that of several other creatures.

One of its two worst foes has just been described, and we now come to the second—i.e., the pike, or Jack (Esox lucius), N.B.—The pike is a most remarkable creature, and leads the ancient family of the Lenzes, of Charlote Hall, Warwickshire, so mercilessly satirised by Shakespeare. They bore upon their shield the "lucy"—i.e., the pike, the coat of arms being a good example of "cashing" heredity—i.e., in which the baronry of the shield contains a play upon the name of the pike, and the family.

There is no more inventive foe of the water-vole than the pike. In the stomach of a single pike were found the remains of three water-voles and some bird, which was probably a duck.

It might be imagined that a pike large enough to swallow a water-vole would not be likely to venture into a brook, and would restrict itself to the river where it would have plenty of room. But experience has shown that a very large pike will sometimes make its way into a very small creek, partly for the sake of food, but sometimes through sheer cunning, in the hope of evading its enemies.

By the time that a pike has attained the weight of twelve or fifteen pounds, he has had to play all his tricks and varied dangers, and escape from many foes.

While he is young and small, his worst foes are those of his own species. Anglers know that a young pike is so cautious that an old pike as a small pike. All the earlier part of his life is spent in perpetual watchfulness, he having to be always on the lookout for prey by which he can still his insatiable hunger; while he has to be equally on guard lest a larger pike should satisfy his hunger with him.

No pike, therefore, can attain to a large size without developing a considerable amount of cunning, and anyone who sets himself the task of catching such a fish will find that he must employ all his resources of intellect, aided by experience, before he can delude the fish even into touching the bait. In spite of its large size, the fish manages to elude observation in a most puzzling manner, and it is no easy matter to make sure of its position. An old fox or old rat is scarcely more cunning and full of devices than an old pike.

The largest pike that I have ever seen in a small tributary stream of the Cherwell river, near Oxford.

A pike of enormous dimensions had for some time been reported as having been seen in various parts of the Cherwell, the general remark being that it probably weighed at least thirty pounds.

All the anglers of the neighborhood had tried to capture this mighty prize, but had failed. Contrary to the habit of most large pike, this one seemed to have established itself in any particular spot, but receded from place to place.

Now, the Cherwell itself is but a very small river, and the chance of capturing any such creature appears to be easily discoverable. But it is a very "weedy" river, and its banks are edged with willows, whose long, red, plume-shaped roots hang into the water. The banks form admirable hiding-places for the fish.

One day I was trying my fortune at trolling in the Cherwell, with a six-inch gudgeon for bait, and thus I had been walking along the bank until I could find a spot narrow enough to be jumped.

Coming to a deep-lookings pool, I dropped in the bait, and by way of not wasting time, and almost immediately felt the bait taken by a pike. Following the golden rule then, and perhaps now, in force among anglers, I sat down on the bank, watch in hand, in order to wait through the weary minutes prescribed by custom, and which almost seem to drag themselves out into as many centuries.

Barley had passed when a huge head rose to the surface, and the bait was blown out, as it seemed, into the water, the head striking with a swirl of water where it disappeared. On examining the ruined bait, which had naturally been seized crosswise, I found that it was pierced from head to tail with the teeth of the pike.

I learned that the big fish was afterwards ignominiously taken with a wire in one of these tributary brooks, so that its cunning was baffled at last. I also learned that the fish had repeatedly treated other anglers as it treated me, that is, it had a short time in its mouth and then rejecting it.

So it is clear that the water-vole will by no means be safe from the pike when it is the inhabitant of the headwaters of the river.

Moreover, it does not need a very large pike to devour a full-grown water-vole. The pike can swallow an animal which seems quite disproportioned in size to itself. A young pike of barely five inches in length was seen swimming about with the tail of a gudgeon projecting from its mouth. The gudgeon was quite a specimen, but the pike was there no doubt that if the fish had been let alone the pike would soon have digested the gudgeon sufficiently to swallow it.

The late Frank Buckland mentions that a pike weighing eight pounds was caught in the River Ichen. After it was taken out of the water it disgorged a trout of a pound weight. This must have been a sore disappointment for the captor, who would think himself defrauded of a pound weight in his angling record.

The reader will remember that a heron and a mountable obstacle to the fish, and the result which was too large for them, and it is a remarkable fact that a pike has been known to suffer a similar fate. It can easily be understood that an eel, twisting itself resistively in the struggle for life, should coil itself round a bird's neck long enough to cause its death by strangulation; but it seems almost impossible for a fish to do so, and if breathing by gills, should be suffocated while in the water by an eel.

Yet in the Fisheries Exhibition of 1883 there were two very remarkable stuffed groups, and in one of them a pike weighing ten pounds had attacked an eel weighing only one pound less. Now, an eel of nine pounds weight is a very large one, 18 inches, active, and muscular as a snake, and by no means a despicable antagonist. The pike had begun to swallow the eel, but the latter in its struggles forced its weight of the mouth, the pike, not being able to traced into the water beneath the right gill-cover. But it could go no farther, the teeth of the pike having almost met through it bodily.

The result was fatal to both. The body of the eel having been forced beneath the gill-cover, the gills could not perform their office, and the pike died, and was effectually suffocated for want of breath as were the heron and the coromander. The dead bodies of the pike and eel were found on the bank of the River Bure in November, 1883.

The second group consisted of a pike and a duck. The pike had attacked the duck as the bird was diving, and had tried to swallow it. It succeeded in getting the head and neck, and part of the breast down its throat; but the duck, in its struggles for life, had naturally spread its wings. These formed an insurmountable obstacle, the pike was thus suffocated, both having died for lack of respiration.

So the "plop" of the water-vole into the brook from the bank has not been to us the mere splash of a frightened animal into the stream. It has opened a new chapter of the life-history of the water-vole, and has taken us into several sciences. It has shown us something of the links which connect it with man, birds, and fishes, and so has led us into a new branch of the natural history of the familiar animal, and have demonstrated the truth of the axiom enunciated on page 34, that no animal and no branch of science can stand alone.

Like other beings, the water-vole has its relatives, two of whom will come within the range of our subject. Being small creatures, they go by the popular name of mice, just as
A CORMORANT STRANGLED BY AN EEL.

the head. The tail is only about one-third as long as the body—a peculiarity which has earned for it the popular name of "short-tailed field-mouse." A more appropriate name for it is "campagnal.

Even in this country the campagnal is apt to be one of the worst foes of the agriculturist, especially at harvest and seed time. Not only does it devour the ripe corn in the field, but it makes its way into ricks and barns, and eats large quantities of the gathered corn. Moreover, just after the seed-corn has been sown it digs the grains out of the ground, thus doing mischief which is often attributed to the sparrow and other small birds. In France, however, where not a kestrel, or, indeed, any unprotected bird, can be seen, the campagnal can carry out his depredations without hindrance, and consequently increases until it becomes an actual plague. In the Department of Aisne alone a few years ago the birds were so honeycombed with the burrows of the animal, and the farmers spent some seventy thousand pounds in riddling their fields of the nuisances. First poison was laid down; but so many hares and rabbits were killed that another plan had to be tried. Stacks of hay and straw were then made, containing quantities of poisoned carrots, turnips, and beetroot. The campagnals, therefore, had to pay heavily for doing which the kestrel would have done to a great degree, if they had suffered to live and carry out its appointed work in preserving the balance of Nature.

The owls, again, are determined enemies of the campagnal, more than half the food on which they and their young live being composed of these mischievous little animals. Fortunately for the owls, their nocturnal habits save them from the destruction which would have befallen them had they sought their food in the daytime. Not so the campagnal, nor, that where the one is seen the other will probably be at no great distance. High in air the kestrel hovers with quivering wings, its eyes fixed on the movements of the campagnal on the field below. Suddenly it drops down to the ground, rises with something in its claws, and flies away. It has seen and caught a field-vole, and is quindi on home to its nest. From its custom of balancing itself in the air with its head to the wind, it is often known by the name of "windlover.

With this astonishing sight must not the kestrel be gifted to perform such a feat! It is difficult enough for a human being to watch a square yard of ground so carefully that a field-vole shall be seen as it glides among the dry grass. Yet, the campagnal will, therefore, must be a bird of considerable power of vision which enables it to catch a large field, to detect from that height the little, dusky animal, and pounce down upon it and carry it away in the few seconds which are consumed in making the stoop, they have accommodated themselves to an entirely different focus.

At last it is astonishing to think that in passing through a tropical forest the traveller is frequently cheated by some creeper which hangs in the path, and which is not a creeper at all, but a kestrel which has deserted it in the few seconds which are consumed in making the stoop, the stoop of the kestrel on its prey is swift as the arrow and a bird can cover a distance through the air, and in a second or two the eye has become accustomed to a range from a number of yards to that of a few inches.

The value of the kestrel in keeping down the numbers of the field-vole, and so aiding in preserving the balance of Nature, can hardly be over-estimated.

There have been cases where the field-voles bred up to such a degree that pinfauls had to be dug for their capture, and they had to be destroyed artificially, because the kestrels and other predacious birds and animals had been annihilated.

Other enemies to agriculture are also destroyed by the kestrel. Mr. Johns mentions an instance where the stomach of a kestrel was examined, and was found to contain, beside a field-vole, nearly eighty caterpillars, twenty-four beetles, and a leech!

Now, we will return to our field-vole. Like the squirrel and several other rodents, it makes two nests, one for the winter and the other for the summer.

The winter nest is mostly made at some distance from water, is formed at the end of a burrow, and seldom reaches more than a few inches below the surface of the ground. It is to this winter nest that the poet Burns refers in the delightful stanza addressed to a mouse whose nest had been destroyed by his plough-share, and beginning:

"Woe, sleekit, cow-rin', tim'rous beastie."

Such, indeed, is the fate of many a winter nest. Supposing, however, that the creature should be skipped up by the kestrel while out chasing another nest, the nest is destroyed but it will not be wasted. There are always beings who are glad to find a ready-made burrow which will save them the trouble of digging one for themselves. Among these are several species of wasp and humble-bee, most of whose nests are made in the deserted burrow of the campagnal.

Here, again, is an example of the manner in which the life-histories of dissimilar animals
are linked together. Few persons would think that there could be any connection between the wasp and the kestrel, and yet our walk along the banks of our brook has shown us that such is the case, and that the connecting link is the campagnol.

Like the water-vole, the campagnol lays up a store of winter provisions, not in its living-room, but in a chamber excavated for the purpose. The treasure-house sometimes contains a very miscellaneous store, the fruit of the hawthorn and wild rose being the staple.

Cherry-stones mostly form a large proportion of the store, as many as three hundred having been found in a single chamber. The mode in which the campagnol obtains the cherry-stones would hardly be suspected except by those who are in the habit of watching the varied phases of animal life.

The chief purveyors of cherry-stones are the blackbird and thrush. During the spring these birds are exceedingly destructive among the cherry crops, as I know from personal experience. My study overlooks a number of fine cherry-trees, one of them being so close to the house that by leaning out of the window I can touch the fruit with an ordinary walking-stick. As soon as the fruit ripens, the thrush and blackbird hold high festival, eating the cherries from the branches and feasting their young with the ripe fruit.

It is really amusing to watch the proceedings of the birds, especially the numerous manner in which the young birds peck their parents whenever they consider that the air is not fed fast enough. Neither young nor parent is in the least afraid of me as I sit at the open window, so that I can see every movement.

Sometimes the entire cherry is pulled off the branch, but when the fruit is very ripe the soft portion only is eaten, the stone still being attached to the stalk. In either case, the stone will be sure, sooner or later, to fall to the ground, whence it is picked up by the campagnol and added to its store for the coming winter.

Here, again, is a link connecting together the life-histories of the blackbird, thrush, and campagnol. Furthermore, it affords an example of the care that is taken that nothing on the earth shall be wasted.

Whenever a living being has no further use for anything which once was connected with its life-history, there is sure to be some other animal which wants it and is waiting for it.

We have already seen how the abandoned winter nest of the campagnol is utilised by the wasp orumble-bee, and we now see that when the blackbird and thrush have abandoned the cherry-stones as useless to them, there is the campagnol waiting for them and ready to carry them off to the store-chamber which it has previously prepared.

Beside the winter nest, there is the summer nest, which is primarily intended for the reception and nurture of the young. This, like the corresponding nest of the squirrel, is made of slight materials and loose structure, so that the air is freely admitted. It is generally composed of grass blades, which have been torn in strips by the campagnol. It is globular in shape, and is mostly placed on the ground, amid concealing grass or herbage.

There is, however, before me a photograph of the nest of a campagnol, which was discovered in a very remarkable position, and made of very unusual materials. It was found in a garden store-house at Castle Carey, by the Rev. W. Smith-Tomkins, Vicar of Dunstow. He kindly sent me a copy of the photograph, together with the following description—

"Bedford Villa,
"The Shrubby,
"Weston-super-Mare.

"August 8th, 1886.

"This nest of the short-tailed field-mouse was found by me a few years ago on a heap of barley straw, which was used to cover a small store of potatoes. Its chief interest to the finder, in addition to its beauty, consists in this. It was all manufactured out of one kind of raw material, namely, the leaves of the barley straw, which the maker shred up into thin threads according to her taste, so as to suit the different parts of the structure. There was no other material available for use.

"The mouse had found its way into the storehouse through a hole under the wall. I am sorry to say that she was killed when found, and before the nest had been used for its proper purpose. Two or three weeks before I had looked over the place, and she had not commenced operations.

"On referring to 'Homes without Hands,' I find it stated by Mr. J. J. Briggs that he could never find an entrance to the interior (the nests being closed up, as you say is the case with the nest of the harvest mouse). I infer from this, that it is due to its incompleteness that the entrance in this case is open and visible, and that its structure is therefore so open to inspection.

"With the description and photograph Mr. Tomkins sent a few portions of the nest, some of the barley leaves being of their original width, and others split up into fibres as fine as ordinary sewing cotton. In a subsequent letter he states that the hole through which the campagnol made her entrance into the house opened into the stable yard of a neighbour.

"Its mode of eating the provisions which it stores is rather remarkable. It would naturally be supposed that, as other beings (including man) do, it would eat the thick, soft, and sweet exterior of the 'hip' or fruit of the wild rose, and reject the hard, small seeds, with their fluffy envelope. But it does just the contrary, eating the seeds and rejecting the exterior.

"When in America in 1884, I saw a flock of pine grosbeaks busily feeding upon the berries of the mountain ash at Worcester. Very pretty they looked, the rosy plumage of the two or three males contrasting boldly with the dark, sombre green of the many females. I should not have noticed them but for their mode of feeding.

"It was at the beginning of February—the very depth of a New England winter. I had to make my way up a rather steep hill, and over paths which, by reason of constant traffic over snow, were as slippery as ice. Many persons are in the habit of scattering sand or pulverised brick on the paths, and seeing, as I fondly thought, a few yards of the latter material, I gladly made my way towards it. To my disappointment—on that ground at least—I found that the red material was not brick, but the soft, external part of the mountain ash berry, the birds only eating the seeds, and allowing the rest of the fruit to fall to the ground.

"Then, the campagnol has a remarkable way of eating the cherry stones. When the squirrel eats a nut, it nibbles off a little piece of the sharp end, inserts the edges of its incisor teeth in wedge fashion, and splits the nut in two. Thecampagnol begins like the squirrel, but when it has bitten off the end of the cherry-stone, it does not split the shell but feeds, in some way of its own contrivance to get the kernel out."

(To be continued)
THE BROOK AND ITS BANKS.

By the REV. J. G. WOOD, M.A., Author of "The Handy Natural History."

CHAPTER V.


As might be expected from its name, the **bank-vole** (*Aricola glabrata*) is to be sought upon the banks of our brook. As its tail is nearly as long as that of the common mouse, it is often called the "long-tailed field mouse," and it may easily be distinguished from a true mouse which does inhabit the country by the shortness of the ears, the bluntness of its snout, and the white colour of its paws.

It has many of the habits of the campagnol, but its diet is more diversified, including insectivorous and omnivorous food. It is accus of eating young birds.

A rather startling incident, showing its insect-eating propensities, was witnessed by my son, Theodore Wood, some years ago.

In those days he was an enthusiastic lepidopterist, and was in the habit of going out at night "treecling" for moths. This process is simple in principle, though rather difficult in practice. Many moths are irresistibly attracted by the odour of treacle mixed with the newest and coarsest rum. The moth-hunter, therefore, mixes treacle and rum, and at night paints with the mixture the trunks of suitable trees. Attracted by the odour, the moths fly to the bait, swallow the sweet mixture greedily, and become so intoxicated that they either fall or can be picked off the tree with the fingers.

Now, the "treecler" has many enemies. Slugs of the most portentous dimensions descend from their hiding places in the tree, and absorb the treacle just as if they were so many hungry leeches feeding on a lump and thin-skinned patient. Toads sit in a row round the trunk of the tree, waiting to snap up any moth that falls. The bats soon learn the value of a treated tree, and sweep rapidly by it, whipping off the pre-occupied moths as they pass by.

On one occasion my son caught sight of a bank-vole, which had climbed up the tree and was taking its fill of the treacle. All the voles are admirable climbers, as indeed is necessary, in order to enable them to gather the corn and fruit of the hawthorn and wild rose. Their paws grip the corn stems or tree trunks as if they were hands like those of the monkey, and they run about the slender branches of the hedges and shrubs that line the banks like monkeys among the trees of their native forests.

Like the campagnol, they make globular nests of grass, which may be found among the herbage of the bank by those who know where and how to look for them.

Just as the ordinary farmer jams together half-a-dozen species or so of small birds, under the comprehensive title of "sparrows," do most people consider that every animal which labours under the misfortune of being small in dimensions, brown in colour, and having a tail appended to its body, must be either a rat or a mouse, according to its size.

No one can be familiar with the banks of any brook without being acquainted with the pretty little water-shrews, which, like their relatives of the land, are almost invariably considered as mice. As we shall presently see, they are not connected in any way with the creatures which they superficially resemble.

If the observer will pick out some spot where he can be tolerably screened, and where the water of the brook is clear and rather shallow, he will be very likely to come upon the water-shrew. The name is due to the fringe of soft hairs with which the feet are edged. A similar fringe is found on the lower surface of the tail. As these fringes are easy to notice, their object will presently be seen.

The second, or specific, title is (as all specific titles ought to be) derived from the Latin, and refers to the habits of the species. It signifies a digger or burrower, and alludes to its custom of digging burrows in the banks of the brook in which it loves to dispose itself, and where it obtains much of its food.

As with other creatures, absolute stillness is required on the part of the observer before the water-shrew will even show itself. Though there may be plenty of the little animals within a few yards, not one will be visible. But in ten minutes or thereabouts the silence will reassure them, and they will make their appearance on the bank.

I have seen them playing with each other on the bank of a rivulet at which that time was so drier up by want of rain that the water was scarcely a foot in width. They were almost within reach of my hand, and I could easily have killed one or two with a stick. But as I prefer watching the habits of animals to killing them, they continued their pretty and graceful evolutions undisturbed.

Being sociable little creatures, a single water-shrew is seldom seen, and, if the observer should detect one of the animals, he may be tolerably certain that it will presently be joined by others. They are as playful as kittens, and, in their way, quite as graceful, their little bodies and active limbs being able to assume as many varied attitudes as may be seen in a family of kittens at play.

They chase each other over the bank, pretend to fight fiercely, squeaking the while as if wounded to death, just as puppies will do when playing and making believe to be hurt. Then one will jump into the water, and dive, as cats do in a fair, while others will pop in after it, and chase it under water.

Indeed, on the occasion which I have just mentioned, the whole proceedings reminded me forcibly of the games with which the bow-swimmers of Oxford were wont to indulge for the best part of a summer's day.

One of our favourite games was for one to dip into the Cherwell, directly from the top of a pollard willow, and then for the rest to dive after him, and try to catch him under water before he had swum a certain distance. We used to shriek in our sport quite as much, and as loudly in proportion to our size, as the water-shrew squeaks, and I cannot but think that if any being as much superior to man as man is to the shrew could have watched us, we should have amused him much in the same way that the shrew amuses us.

In his admirable work on the British mammals, Mr. Bell states that the water-shrew will dive into a shallow, rippling stream, and run over the stones, pushing its long snout under them, and turning them over, should they be small, for the sake of dislodging and capturing the fresh-water shrimp (**Gammarus**), and then carrying it off to the bank and eating it with an audible, crunching sound.

I have not personally observed the creature engaged in this sub-aquatic hunt, though I have often seen it dive, and have been near enough to note its singularly beautiful aspect as it wriggles its irregular way under the surface.

Air is largely entangled among the hairs of its body, the imprisoned bubbles looking just
like globules of shining silver. The water-skipper, which is also a common though unsuspected inmate of the brook, is adorned in a similar way.

No one can watch these pretty little creatures without being interested and amused. But amusement cannot be our sole object when we blame the inhabitant of the brook. Let us catch one of the animals and keep it long enough to examine it. There is little difficulty in capturing a water-shrew, as the little creature is not afraid when they think they are unobserved that a small hand-net can easily be slipped over them in their gambols. We need not keep our captive long, but, after inspecting the characteristic fringe of the feet and tail, we will examine its head and jaws.

A more grace at the head ought to tell us that it cannot be a mouse, but it is a shrew, having a long, pointed snout, which projects far beyond the lower jaw. Opening its mouth and examining its teeth, we not only see that it cannot be a mouse, but that it is a small rodent. It is, in fact, much more nearly related to the hedgehog than to the mouse. All its teeth are sharply pointed, and the lower incisors project almost horizontally forward. The shrew must, therefore, be closely related to the insectivores, of which the mole is the generally accepted type. There are, however, some systematic zoologists who hold that the shrews, and not the moles, ought to be the typical representatives of the insectivores. This, however, is a matter of opinion, and its discussion does not come within the scope of our present undertaking.

Before we release our captive, we will examine its ears.

These are small, and are those of all water-fish, for there is no cavity in which the bubble forms. They are furnished with three small valves, which, being made on the same principle as those of the heart, are closed by the muscles of the vegetative system of the animal, and the eardrums are, therefore, never exposed to the water. The two valves are the same in the animal when it dives below the surface, and open by their own elasticity when it emerges.

Now we must allow it to escape into the water, and take note of it as it swims away. I have already casually referred to the irregular course which it pursues in swimming. The fact that the shrew's body, being not only long and slender, but also thin and elongated, is very easily turned, is a peculiarity which is highly useful in the water. The tail is also of the same kind, being not only thick and strong, but also thin and elongated, the two ends being of the same thickness.

Another remarkable point in its swimming is that it does not sink, but is able to swim quickly and easily. The observer of the shrew, being the only one that has not learned to keep time, will, therefore, be able to follow the shrew, which is always in front of the observer. When passing through the air, the shrew swims in the air and is not liable to danger from the water. When passing through the air, the shrew swims in the air and is not liable to danger from the water. When passing through the air, the shrew swims in the air and is not liable to danger from the water. When passing through the air, the shrew swims in the air and is not liable to danger from the water.

Supposing the observer to be tolerably familiar with the terrestrial shrews, he must have noticed that the shrews are not the same as the shrews of the water. The terrestrial shrews are furnished with a long tail, which is工程施工 as a shrew, or a water-shrew, or a fish-shrew, as it is called.

Like the insectivora in general, the shrew is not at all particular in its diet, providing it be of an animal nature. Most of us know, the hedgehog, although its normal food consists of insects, snails, and the like, will feed on frogs, toads, mice, and even snakes and blindworms. So will the water-shrew, if it can be fortunate enough to find the food. The shrews, or any of these creatures, for it is not sufficiently powerful to kill them for itself.

In Mr. Bell's work, to which reference has already been made, there is an interesting notice of the carnivorous habits of the water-shrew. An ordinary rabbit had been caught and killed in a steel trap, and upon the body of the rabbit was perched a little black creature, which proved on examination to be a water-shrew, which was trying to make a meal upon the rabbit. It had already bored a hole in the side of the rat, and was so absorbed in its task that it suffered itself to be touched with a stick without being alarmed.

This little animal does not restrict itself to the neighbourhood of water, but is often found at some distance inland. It has been accused, and I believe with justice, of devouring the eggs of river fish, a creature whose habits I have already mentioned, is wrongly attributed to the water-vole.

Although we may see the water-shrew swim away and dive beneath the surface of the water, it may watch in vain for its reappearance. It is done by the duckbill of Australia, the animal always makes several entrances to its burrow, one of them being below the side of the bank, the other by way of the water. It can, therefore, enter or leave the brook without being observed.

All that we know whether of the land or water, were at one time the objects of universal dread, and even the toad and blindworm could scarcely be feared.

As one old writer remarks, in his sweeping condemnation of the animal, "It betokens a cruel mind, desiring to hurt anything, neither is there any creature that it loveth, or it loveth him, because it is feared of all." It was held to be the special foe of cattle, biting their hoofs while in the stall and running over their bodies as they lay chewing the cud in the field. A cow over which a shrew had passed would be attracted by the odor of the cow, and to fall straightway into a sort of consumption, accompanied with swellings of the skin.

The disease, being caused by the shrew, could only be cured by the shrew, the usual mode of treatment being to burn the animal alive and rub the cow with the ashes. As, however, a shrew might not always be at hand when a cow was taken ill, the ingenuity of our forefathers devised a plan of having essence of shrew always within reach.

A shrew was caught alive, and a hole bored into the trunk of an ash tree. The shrew, which must be still living, was put into the hole, the entrance to which was then closed with a wooden plug. As the body of the shrew decayed, its virtues were supposed to pass into the tree, so that a branch of a "shrew ash," or even a few leaves, were supposed to be an effectual cure in case of the suffering animal.

The tail of a shrew, when burned and powdered, was considered as a certain remedy for the bite of a dog; only the tail must be cut from a living shrew.

I have already made casual mention of the shrews of the land. Two species of land-shrews are recognised as inhabitants of England.

One is the common shrew, or Shrew-house (Sorex minutus), which for a long time was thought to be identical with the water-shrew. The fringed feet and tail, however, afford sufficient indications that it is a distinct species.

Towards the end of autumn there seems to be quite a mortality among the shrews, their bodies being plentifully strewn about the roadways and paths across fields. Why this should be so we can only tell, though many conjectures have been offered, one absurd theory being that man and the shrew are so antagonistic to each other, that when a shrew tries to cross a pathway made up and used by man it dies from shrew antipathy.

This fact was known to Piny, and Topsel, the old writer who has already been quoted, is of opinion that when a shrew dies in a cart-rut, the finder should not fail to secure so valuable a prize.

"The shrew which by falling by chance into a cart road or track doth die upon the same, being burned and afterwards beaten or dissolved into dust, and mingled with goose grease, being rubbed or anointed upon those who are troubled with the swelling coming by the cause of some inflammation, doth bring into them a wonderful and most admirable cure and remedy."

The same author mentions its medicinal properties, stating that it is especially good on the putrid flesh of the raven, the French using it as a bait, and killing numbers of shrews as they are feasting on the dead bird. He is especially careful to mention that the deluded shrews are killed with shovels.

The third species of British shrew is the sigbury-shrew (Sorex pygmaeus), which is even smaller than the harvest mouse, and is the smallest of all the British mammals.

I have mentioned the three species, because until quite recently much confusion reigned concerning them and their habits, and much difficulty has been found in disentangling them.

For example, no distinction had been recognised between the common shrew and the water-shrew, while the swamp-shrew was thought to be the young of the common or erd-shrew, and an exceptionally large specimen of the water-shrew was supposed to be a hybrid species, and distinguished by the name of ourld-shrew.

So, by means of carrying out our study of the water-shrews, which have not only found much that is interesting and amusing, but we have added something to our knowledge of animal physiology. (To be continued.)
THE BROOK AND ITS BANKS.

By the Rev. J. G. WOOD, M.A., Author of "The Handy Natural History.

CHAPTER VI.

previous remarks on the life-history of the campagnol show how one creature is dependent upon another, and how, when the habitation of the campagnol is abandoned by its excavator, a tenant is sure to be found as soon as the dwelling is vacated.

Such is also the case with the burrow of the water-vole, should the animal fall a victim to the marten or heron, and a more fitting or picturesque tenant cannot be found.

This is the KINGFISHER (Alcedo atthis), a bird which is far more plentiful than is generally suspected.

It may seem strange that the most brilliantly coloured of our British birds should be able to pass its life and rear its young in the vicinity of human habitations, and yet that its existence should be unknown to the resident population.

Yet I have seen this to be the case, even the country people who lived within a few hundred yards of a Kingfisher's nest hardly being able to believe their eyes when I showed them handful of the eggs.

To the frequenter of the Brook and its banks hardly any sight is more familiar than that which is so admirably described by Faber:

"There came Swift as a meteor's shining flame, A kingfisher from out the brake, And almost seemed to leave a wake Of brilliant hues behind."Faber: The Changel.

As the bird darts along its horizontal course just above the surface of the water, its flight is so swift that it leaves just as if a blue streak had been drawn through the air.

Fortunately for us, the Kingfisher is one of the few brightly-coloured birds which lose none of their brilliance in flight.

Those who have watched the humming-birds when darting through the air with speed even more rapid than that of the Kingfisher, or hovering before some flower into which they are plunging their long tongues, say that they give scarcely any indications of their glistening plumage, but look as sombre of hue as the brown humming-bird moth, which is so plentiful in the autumn.

But the Kingfisher looks, when on the wing, as bright, or, if anything, even brighter, than it does when at rest.

Possessing, though it may be of the most vivid blues, greens, red, and white, these colours are so artistically blended that even those who know the bird intimately can seldom state the exact colouring of each part, but are obliged to give a general idea of it, and say that it is green above and red below.

I know the bird well enough, and have more than once described its colours; but even now I should not choose to write the details of its hues without reference to the bird itself, or some description which had been written by a competent observer.

No one afflicted in the least degree with colour-blindness, a malady which is far more common than is generally supposed (as is shown by the reports of examinations in colour which have to be passed by candidates for the army, navy, and appointments on the railways), would make anything of the description of a Kingfisher.

Without going into needlessly minute details, we may say that the head and back of the neck are deep green, relieved by a number of blue spots upon the tips of the feathers. The shoulders are dark green, and the rest of the back is verditer-green, the tail being dark blue. The wings are coloured like the head. When the bird is darting along on its arrowy flight, the eye cannot separate these colours, and, brilliant as is the tinted streak when the sun is shining, it is impossible to say whether the hue be green or blue.

If we turn the bird over, and examine the under surface, we shall see that the throat is nearly white, and the remainder is ruddy chestnut. There is also a conspicuous white streak passing from the eyes to the back of the neck.

Though these colours are so remarkably arranged, the general effect is that of bluish-green upon the back and red below, and it is very strange to find so many people who must have seen the bird make the most extraordinary mistakes when they mentioned its colour.

No one would expect that Mary Howitt, for example, who is essentially a poet of the country, would have written of the "scarlet plume" of the Kingfisher. I fancy that at the time she must have been thinking of the woodpecker.

Now let us try to watch the Kingfisher as we have watched the water-tet, the campagnol, and the water-shrew.

There is not the least difficulty in doing so, as the Kingfisher is, when understood, a bird which but little fear of man, and, indeed, seems to prefer the neighbourhood of human habitations.

I have seen it darting over the surface of the water in the desolate "creeks" of the mouth of the Medway, and rather wondered to see it so far from human habitations. But, I afterwards learnt that upon some of the many islands which are formed by these creeks, and which, from the level of the water, appear to be totally deserted, there is a series of small settlements, only approachable by boats at high water, on account of the deep mud which surrounds their banks.

If, while sitting quietly on the bank of our brook, we catch a glimpse of the blue-green flash of a Kingfisher's back, and will remain where we are without moving, we shall be tolerably certain to see the bird again, and probably be able to track it to its nest, or at all events to its favourite fishing spot.

As its name implies, the bird lives almost entirely on fish, which it catches in a very ingenious manner.

Selecting some object which overhangs the water, it takes its perch upon it, and with its big beak sunken on its breast, awaits the approach of its prey.

Suddenly, it may be seen to drop from the perch into the water, and to emerge with a fish in its beak. Returning to the perch, it bangs the fish against it, throws it up in the
THE BROOK AND ITS BANKS.

easier of management if the eye end be thrust into the handle of a camel's hair brush) break up the bulk, and stir it up with the towel. Then put the soaking tube, introduce the end a very little way into the egg, and blow the water into the egg. This must be done very gently and steadily, and the degree that the shell is washed out by the same hole. Put the egg aside until it is thoroughly dry, which will probably occupy several days. When the egg is dry, you may use some white wax, melt it, and mix it very thoroughly with powdered lake or carmine. It should be several shades darker than the intended colour of the egg, as the wax will harden it. If the egg is not well mixed, heat it nearly to boiling point, and heat also the egg and a washing tube. Now draw up some of the hot wax into the tube, and blow it into the egg. A very little wax—say the third of a saltspoonful—will be amply sufficient for one egg.

Next hold the egg over the spirit lamp or gas, and before it is dry, keep turning it between the fingers until the coloured wax is equally distributed over the inner surface of the egg. When you see that all streakiness has disappeared, take it out of the heat, and allow it to cool, taking care to keep turning it until the wax has set.

The effect is magical. The opaque, dead white egg, which was originally compared with the glowering tints of the living being, will have disappeared, and in its place will be found the original pinkness, restored as it was before the egg was emptied of its coloured contents.

The same process will restore the colour of the eggs of the swallow tribe, wrens, etc., the ground hue being naturally a delicate pink, which is converted into dead white when the eggs are emptied.

Now, if the reader should wish to prepare an object which will be an ornament to any museum, he can do it as the Rev. Mr. J. Gould did many years ago, and procure a perfect nest of the Kingfisher, with the eggs. Here is the plan which he employed, and which the reader can follow.

By means of a stick measure the distance of the nest from the entrance of the burrow, and then cut down carefully upon it from above. Should there be no inner opening, or hole, remove it, so as to force the bird to begin afresh. Replace the sod carefully, and take precautions that it shall not be broken in by anyone inadvertently treading on the spot.

When the burrow is wholly filled with the colour of the eggs and nest, then remove the sod above the nest. When Mr. Gould did so, he found that he had secured the parent bird, as well as the eggs and nest. By means of the knife scrape away the earth under the nest, gradually, and then with a judicious handling you will then have been able to remove the nest unimpaired. Unfold the eggs, and line them with coloured wax, as was already described, replace them on (for we can hardly say in) the nest, cover them with a suitable glass, and you will have an object of much beauty and surpassing interest. It will be a true indication of the attention very carefully on their sides, so that the single hole through which they were "blown" shall not be visible, and also to fasten them to each other, and to the wall by a thread of gum tragacanth, so that they shall not be shaken apart by any casual jar.

The chief obstacle to success lies in one word. Bovs.

The brook often attracts birds is in the way of management if the eye end be thrust into the handle of a camel's hair brush) break up the bulk, and stir it up with the towel. Then put the soaking tube, introduce the end a very little way into the egg, and blow the water into the egg. This must be done very gently and steadily, and the degree that the shell is washed out by the same hole. Put the egg aside until it is thoroughly dry, which will probably occupy several days. When the egg is dry, you may use some white wax, melt it, and mix it very thoroughly with powdered lake or carmine. It should be several shades darker than the intended colour of the egg, as the wax will harden it. If the egg is not well mixed, heat it nearly to boiling point, and heat also the egg and a washing tube. Now draw up some of the hot wax into the tube, and blow it into the egg. A very little wax—say the third of a saltspoonful—will be amply sufficient for one egg.

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TINNED MEATS: THEIR VALUE TO HOUSEKEEPERS.


PART IV.

The subject of tinned meats is a much larger one than many persons will suppose. Indeed, there are probably few grocers whose business it is to trade in tinned provisions who are aware of the vast variety of meats, and by most we include fish, that can be obtained in tins. For instance, suppose you were to go to your ordinary grocer and ask him if he has some tinned tripe, tinned whitebait, and some tinned sage and onions to oblige you with, as you have heard that they are out of the market, the man will probably stare, and in his innermost thoughts will either accuse you of intoxication or insanity. Still, these goods are to be obtained in London, and can be obtained, should any grocer take the trouble to apply to some very large provision merchants who deal in tinned goods in a wholesale manner. The reason why these goods are never met with at ordinary grocers in this country is that they are almost entirely made for the purpose of exportation. It would be quite possible to be asked out to dinner in some central part of India, and to find the table supplied with fresh filleted soles and whitebait, the former of which had been caught in the sea the day before, and the latter on Blackheath. I will, however, enlighten you on the subject by giving you a list of the various articles which can be obtained in tins, about which you have probably never heard except in their way to speak—natural style. The following can all be obtained in tins, but, as I have said before, are usually kept for exportation to foreign countries, though they can be obtained in this country if they are ordered specially from any ordinary grocer. Of course you have all heard of fresh salmon in tins. To this you may now add fresh trout, fried eels, stewed eels, eel pie, eel pie and beer, whole whelks in thick gravy, whole, young, and old, fresh haddock and mackerel, as well as filleted and fried soles, and fresh turbot. Among the vegetables which will probably be unknown to exist in tins to most of our readers, we may mention beetroot, tinned onions, carrots plain, and also carrots with gravy, parsnips, turnips, as well as sage and onions. Under the head of beef we can obtain in one pound and two pound tins the following variety: beef à la mode, boiled beef, boiled beef and vegetables, broth of beef, minced beef, ox cheek, ox cheek with vegetables. Also, in addition to ordinary tinned roast beef and spiced beef, with which you are mostly acquainted, you can get in tins the stewed beef, stewed kidneys, stewed rump steak, as well as fresh tripe, and tripe with onions.

Under the heading of mutton, in addition to the ordinary boiled mutton and meat mutton with vegetables, haricot mutton, hashed mutton, Irish stew, lamb and green peas, and, strange to say, we can have tinned mutton chops, and, almost unheard of, Scotch haggis in tins.

We are often told that tinned goods are specially useful for long voyages. We will suppose rough clay in the tropics and a sea passage. Imagine the steward proposing under these circumstances a tinned Scotch haggis! The idea is too horrible! Under the heading of veal we can have in this boiled veal as well as boiled veal with vegetables, calf's head with ham; veal minced, roast and stewed with green peas; veal calves, and cutlets. Pans are also tinned whole, and in the remotest parts of India you can have served, varying in weight from ten to fourteen pounds, whole, either cooked or uncooked, thanks to this wonderful invention. I have simply run through a list of goods that can be obtained in tins, though at the same time I would remind you that in this country, practically speaking, most of them are no use, as they can be obtained cheaper and better in their natural state. Still, we must remember that, as I origi-
CHAPTER VII.

Hedera-dash—A Willshire "burnie"—Bundasia—The Catarracts—An unexpected discovery—The Dippers, or Water Ouseis.—Nesting of the Dippers.—A "cool grot" and mossy cell.—Eggs of the Dipper.—General habits of the bird.—Its mode of feeding.—The Fresh-water Shrimp.—Its marine relatives.—Its mode of Life.—The Dipper in the North.—A game-keeper's indictment—Various names of the Dipper.—Its structure not due to its habits—Song of the Dipper.

Nor very far from the Shirevansham station, in Willshire, there is a tiny brooklet, or, as Burns would call it, a "burnie," on the banks of which I have many a time watched the water rat, the watagrill, the kingfisher, and the graceful antics of the water shrew.

"Though small, and sometimes after a prolonged drought, reduced in places to less than a yard in width, it is always a place of water, a yard in width, it is never quite dried up, as is the case with more pretentious streams at no great distance. In one place it runs under a road which skirts the lower portion of a hill, and then plunges down some five feet, so as to form a waterfall on a small scale. Then, it rushes down a steep incline over stones of considerable size, and after twenty yards or so makes another plunge of two feet or so, and then flows on tranquilly over comparatively level ground. Icy moss grew profusely along the banks, almost concealing the first of the two waterfalls. It was a singularly picturesque spot, and I made a very rough and, unfortunately, hasty sketch of it, which is now before me.

We called the place by a variety of names.

The more classical among us called it "Bundasia," in allusion to Horace's exquisite and untranslatable ode. I am told that without question it is true that no line was there, nor ever will be, though there were rocks which might take its place. There were plenty of the "hollyed stones" in the middle lagoon.

Lymphae decrescentem tuo.

Some, in whom the niceties of the Latin tongue were imperfectly developed, called it by the name of Hedera-dash, an expressive, though hybrid term.

Then, the two little waterfalls were dignified in allusion to the Nile, with the name of the "First and Second Catarracts." However, the name of the "Hedera-dash," like the equally hybrid but convenient word, "bicycles," prevailed above the others, Bundasia falling into undeserved disuse; while the First and Second Catarracts were seldom named, the single word Hedera-dash being used collectively for the whole of the spot as far as the smooth water.

One afternoon, while feeling under the ivy fringe that shaded the first catarract, I came on a spot of very peculiarly luxuriant moss, and presently discovered a small round hole in it. On inserting my finger, a bird suddenly darted out into my face, startling me exceedingly. This incident made me lose my footing. There could be but one bird which would make such a nest in such a situation, and I knew, without needing to see it, that I had accidentally discovered the nest of a "Dipper" or "Water Ousei." (Cinclus aquaticus).

In accordance with the usual custom of the Dipper, the bird had covered its domed nest with fine moss, and had arranged its position so that it should be always wet with the spray of the waterfall, and should be kept as fresh and green as if it had originally grown there.

The nest of the dipper, indeed, really seems as if it had inspired the poet with the familiar words:

"Here in cool grot and mossy cell
We rural lays and fairies dwell."

In the nest were several white eggs, of which we took one or two, leaving one as a nest egg which would encourage the mother bird to complete her full number of five before she began to sit.

I afterwards found another Dipper's nest near the Swindon Reservoir, but at a much greater distance from the water than is usually the case with the nest of this bird.

Let those who are fortunate enough to meet with a Dipper watch it carefully. It cannot well be mistaken for any other bird, looking, as it does, very much like a thrush without its tail. As it finds its food chiefly in swiftly flowing brooks, it mostly inhabits the more northern parts of England and Scotland, where the country is hilly, and consequently the brooks run swiftly over their stony bed.

It is not an easy bird to watch, its sober plumage of brown above and white below rendering it peculiarly inconspicuous.

Moreover, it has a way of slipping into the water in a quiet fashion, and when there, behaves in a manner entirely different from

THE WATER OUSEL.

The Fresh-water Shrimp has a singular mode of obtaining its food. It wriggles its way under stones, searching about until it is assured that no more food is to be obtained. Then it emerges from beneath the stone, and allows itself to be carried for a foot or two down the stream. Then it arrests its progress, and with a peculiar jerking of its body, which it makes as it way up the stream again until it has found another stone under which it may renew its search for food.

Just above Erith there is a little stream which once had a place in history. Sprawling from a "holy well" at Lessness Heath, it runs swiftly down the spur of Woolwich Common, at which point it is situated Erith Church, and then spread and deepened until it formed the "Eare-Hythe," or "Old Harbour," in which the celebrated Great Harry used to lie. It is now narrowed to a tiny brooklet, which crosses a footpath between Erith and Belvedere. A small bridge is now built over it, but for some years after I came to live in the neighbourhood, it was only crossed by a
ANSWERS TO CORRESPONDENTS.

The Queen's Kindly Ways.

"A wonderful good woman to her servants is the Queen," such was the remark of the wife of one of the lodgekeepers in Windsor Forest to one who was lately talking with her. She had been a servant in the royal establishment, and was now comfortably provided for. "The Queen came several times to see my husband when he was down with rheumatic fever at Osborne," continued the lodgekeeper; "and the princesses often brought him oranges and other fruits. Many servants have had cause to say, A wonderful good woman to her servants is the Queen." In the "Queen's Journal in the Highlands," both in the text and in footnotes, there are many kindly references to those in her service, even when in very humble situations.

When she was at Holyrood Palace in Edinburgh in 1865, Her Majesty drove to Dalkeith, the home of the Buccleuch family, the heir of which, the Earl of Dalkeith, had recently lost his life by a sad accident. She took a wreath to lay on his tomb, and also on that of the good Duke of Buccleuch, whom she had long known. But, some years before, she had paid the same tribute of affectionate remembrance at the grave of a young Italian dressing-maid who had died in her service. She was buried at Rosebank Cemetery, and the Queen had caused a chaste and simple monument to be erected over the girl's grave. To this she drove from Holyrood, and it was an incident of affecting interest to see the Queen of England paying the heart's homage at the tomb of a humble domestic." — From Dr. Macalister's "Victoria R.I., Her Life and Reign."

To Our Editor.

I am a cat; Miss Jety Vogel's cat; What a nice gentle editor, of that! With fox-like tail, and tufted paw and ear; With mane and ruff when wintry days are here.

A Persian cat of somewhat mixed descent; Argent and azure in my sceptre-blend. Argent my coat, my optics azure are; Sure charms like these condone the adverse fate.

Azure mine eyes; at least, one eye is blue, The other greenish-garly in hue. But what of that? Two blue eyes they Make passies deaf when linked with snowy fur.

And now each mouse beneath the floor I hear. Each gentle epiphel delights mine ear;

And when each month the G.O.P. is read, With joy I hear the editor hath said That Persian cats require the tenderest care.

With sympathy, soft bed, and dainty fare, I purr approval; nor can I complain Of aught shortcoming in domestic ease.

For twice five years the household joy and pride, My lady respected and my wants supplied. What is my sauce, lest the milk be chill.

Fish, poultry, veal, my little platter fill. My sole complaint when on Bank Holiday With drink and life the band pursues its way; Distracted with fear, I up the chimney fly. Emerging, what a sorry wretch am I, Till, rubbed with flour, my coat regains its hue.

This wrinkle owe we, gentle sir, to you. I faint would come and visit you in town, At Paterson's Row to light me down, But cannot, for my too majestic weight Exceeds the parcel post's extended rate; So send three hairs, plucked to suggest the rest.

Where beats my heart in my snowy breast.

VARIETIES.

ANSWERS TO CORRESPONDENTS.

MISCELLANEOUS.

JANET.—We advise you to join the Young Women's Christian Association or the Girls' Friendly Society, which have reading-rooms, homes, and restaurants in the large towns. The society of this form is good. Miss Mary Weir, 17, Old Cavendish-street, Oxford-street, W., and the secretary of the latter is Miss Wright, 19, Queen's Gardens, Victoria-street, Westminster, S.W.

LAVY ROSEBART—It is not proper to ride out alone with any man to whom you are not engaged, excepting a very near relative.

A. C. C.—Your verses are not written according to the rules of metrical composition.

JENNY.—Whiting is not wholesome, either practiced by man or woman. But in absolute privacy at home mistakes are not so important, and this amusing them. At the same time we meet with certain rare instances in which it has been raised to a really beautiful art, and that it is sanctioned even in society as a curious accomplishment.

MISS NAPFEE.—We have given a long series of articles on the principles of good breeding and the various details in which it should be exemplified, in every circumstance and position of life, as well as on etiquette as it obtains in the highest circles of society. They began in vol. i., with the "Art of Letter-writing." "Enamelled" and "Diplomatic." Five of them appeared in vol. ii., six in vol. iii., three in vol. iv., four in vol. v., six in vol. vi., etc. "The whole has never been printed, and so likewise are the indexes, excepting for vol. vii., and viii., and none of these will be reprinted. But chance volumes and indexes may be obtained at booksellers' shops and stalls.

Write to our publisher, Mr. Tarn, for the globe volume.

INQUIRER.—We suppose that the landscape paintings of the Dutchmen's candles must be of some place either in Hollandia or in the mineral (Asphaltes) mines found in these countries. Its suitability for the purpose of illuminating to produce a substance available for candle-making, was discovered and introduced towards the end of the year 1081, by the Dutchmen. The Dutchmen.—"Of Tagus, from Cape Cor, of Southiards, I., i.e., the Echides of Heliaonia," as distinguished from the tagus islands. In the year 1193, the Southern and Western islands were united to the Isle of Man, having been previously made an episcopal diocese in 1098 by Magnus, King of Norway. But the Isle of Man is still a free and has its own diocesan Episcopal See since about the year 360. We have given this answer because it is so far.

AN INVALID.—Dr. Jagger's address is 31, Prince's-street, Cavendish-square, W. They would send you all particulars as to the dimensions, thicknesses of their hygienic undergarments. We cannot advertise prices.
THE BROOK AND ITS BANKS.

BY THE REV. J. G. WOOD, M.A., Author of "The Handy Natural History."

CHAPTER VIII.

SHOULD the reader be investigating one of the softly flowing Brooks about the beginning of Spring, and take up his post of observation near any part where it widens into a sort of pool, is edged with reeds or bulrushes, and is sheltered by overhanging branches, he will probably see one of the most entertaining birds that are to be found in the water.

This is the LITTLE GREBE, more popularly called the DABCHICK (Podiceps minor). Formerly it was known by the appropriate and expressive name of "Didapper," i.e., Dive-dapper, a title which is used by Shakespeare, "Like a didapper peering through a wave, Who, being looked on, ducks as quickly in."

Pope also mentions the bird, but in terms...
so absurdly at issue with its habits, that I fancy that he derived all his knowledge of it from the dim and beautiful picture which he had painted. Even though he did live on the banks of the Thames, he could never have seen the bird, or he would not have written such lines as these:—

"As when a Dabchick waddles through the
On feet and wings, and flies, and wades, and hops."

Pope, however, was a Londoner, pure and simple, and had no eyes but for the inhabitants of streets.

That is by no means easy of approach, and those who are able to watch it must have made much progress in the arts of silent approach and motionless observation, as already described in the readiness to have gained such a post as has been mentioned, and is silently scanning the dark pool, suddenly there pops up like a costi a little dark bird, which restlessly paddles hither and thither with a quick, jerky movement, and as suddenly vanishes, like a coin from a juggler's hand. After a long interval, up it pops again, swims in the same direction for a time, and again dives, not even raising a splash.

So instantaneously can it dive, and so keen is its eyesight, that Captain Mayne Reid mentions that when as a boy he was short sighted, Dabchicks with an old fashioned flett-gun, it was necessary to mask the pan with a piece of paper (much to the detriment of the aim), the bird disappeared the ball before the shot could reach it. When below the surface it swims, or rather flies, with astonishing velocity, the wings being employed as paddles, just as in the case of the Dabchick, as is the case with all the Grebes, afford a remarkable compactness between the feet of the terrestrial and aquatic birds. In most of the water birds the feet are joined by a web, as in the familiar examples of the ducks and geese. But, in the Grebes, each toe is separate, three of them having a web at each side, so as to give to the toe the appearance of a foot.

I have mentioned the spring as being the best time of year for watching the Dabchick. This is because at the approach of summer it mostly leaves the brook and takes to rivers, lakes, and similar waters, where it can hardly be seen at all except with the aid of a glass, and where its movements beneath the surface are much more interesting.

On the banks of such waters the Dabchick makes its nest, so that the wanderer by the brook will have little if any chance of seeing it. Even if he sees it, he would not be likely to recognise the nest, even if he should see it. For it does not look like a nest. To all appearance it is nothing but a dirty heap of half-decaying reeds, reedily tumbled together as if left by the retreating waters after a flood. So exact is the resemblance, that even experienced ornithologists might, by it, have have passed by the nest without suspecting its real character. The fact is, that the unsightly looking, and usually stinking heap, is not the nest at all. The real nest lies beneath the reeds, which are intentionally placed there by the

bird for the purpose of hiding the eggs. They have a singular effect on the eggs which they cover, and protect them from the cold air. When first laid the eggs are pure white, but in a very short time they become stained by the damp reeds which are laid over them, and then leave the nest covered with yellow. A newly-laid egg of the Dabchick which still retains its whiteness, is extremely rare, inasmuch as no process at present known can disfigure an egg and restore the egg to its original whiteness.

It has been thought by some ornithologists that the Dabchick does not sit upon her eggs, meaning that she leaves them entirely to themselves, and then leaves them to be hatched by the joint influences of the sun's rays and the heat evolved from the decaying reeds. This theory has been contradicted by those who are intimately acquainted with the bird, and who say that it is sufficiently wary to detect a foe at least half a mile, so that the two birds would have plenty of time to cover their nest with the reeds which were already prepared, and then to slip away silently through the water after their young. Perhaps some of my readers may be enabled to settle this dispute with a better opportunity.

Like many other birds, the Dabchick has two different suits of clothes, one for the summer and the other for the winter, the former being much the handsomer of the two.

Yet another aquatic bird which does not betray in its structure any indication of a mode of life,

In the same still, reed-fringed portions of slowly flowing brooks which shelter the dabchick, the Waterhen or Moorhen (Gallinula chloropus) may almost certainly be seen. Like that bird, it prefers wider waters, such as rivers and lakes, for nesting purposes, the brook scarcely affording sufficient shelter, but at other times it may be observed feeding in such abundant stores of food, that the bird abandons the river and returns to the brook.

Watching the Waterhen is a very different business from surprising the dabchick in its haunts, as the bird is not nearly so suspicious, neither does it possess the astonishing powers of diving that distinguish the dabchick.

Still, it is another of our precious native birds, a good practice to the lover of Nature in watching animal life without alarming the creature that is under investigation. When, however, its wiles, of which the natives are well acquainted, are easily watched by those who will take a little trouble.

In the Iris, Cherwell, and their many tributary brooks, there is an abundance of barren, and some of my boyhood and early manhood were passed in Oxford, I had many opportunities of tracing the life-history of the bird.

Like many other creatures, the Waterhen knows instinctively when it is detected. When its sharp ears are alarmed by an unguarded footstep, or, still worse, by the voice of an intruder upon its haunts, the first idea is to slip under the reeds silently to the nearest bank,既可以于 the shadow of the overhanging foliage, where its dark plumage can hardly be distinguished, and steals off until it thinks itself in safety.

Sometimes, when the cover is insufficient for this manoeuvre, it dives to some distance, always making for some floating foliage or growing weed, and then rising very gently under shelter of the leaves, only permitting its beak to appear above the surface, so as to keep the eyes of the observer at bay.

In order to retain itself securely in this position, and yet to avoid betraying its locality by the slightest movement, it grapples with its long toes the strongest plants, and so is able to baffle the keenest eye.

A trained water dog may detect and discover it from its refuge, but I presume that our ob-
ject is to watch the bird and not to frighten it, and we shall attain our purpose by patient waiting, when the bird will come near us, but not stir, but content ourselves with keeping a close watch on the surrounding objects, we shall presently be rewarded by seeing it rise from its covert and cautiously glide off with a yellow plumage in all directions, and then, having assured itself that no foe is near, it will swim about as freely as ever.

Sometime an intruder come suddenly on the bird while it is swimming, it seldom dives, but darts off horizontally on the wing, flying with unexpected speed just above the surface, and making up speed for a distance of its feet to trail in the water. A most startling effect is produced by this sudden flight, and more than once I have seen gunners so disconcerted by the bird starting up before their eyes that they have allowed it to get out of shot before they recovered from their surprise.

Like the kingfisher, the Waterhen lays seven, but takes so little trouble to conceal them that I really wonder how the bird continues to maintain its place in the country.

For nesting purposes it seldom remains near the brook, but betakes itself to rivers, and preferably to lakes or very large ponds well fringed with vegetation. Still, I have found many of the nests in the comparatively swiftly-flowing river Dove, so beloved by trout-fishers, and so celebrated for its frequent mention in Walton's "Angler." At the nest, it hides its name, being nothing more than a quantity of sticks, reeds, and leaves put together without the least attempt at art. In, or rather on, this nest, which is little more than a slight hollow in it, the bird lays a great number of eggs, yellowish brown in colour, and spotted slightly with reddish brown. Six or seven is the usual number, the rest of the eggs from a single nest. The bird always has two broods in one year, and sometimes brings up a third, if the weather be propitious—a fact which may account for its name.

When the young are hatched, they are quaint little beings, looking like round balls of dark crown, rather than birds. As soon as the egg-cases are off, the young birds thrust themselves into the water, and are at once as much at home as if they had been swimming years.

Sometimes the nest is made too far from the water for the newly-hatched young to traverse. They can swim well enough when once in the water, but their limbs are not sufficiently strong to sustain them on short flights. The long toes of the parent are now used for new purpose, the bird picking up its feeble offspring with them and carrying them to the water. She will sometimes even carry her eggs in the same manner. The bird has been seen in the act of carrying two young at the same time, one grasped in each foot.

The young can strike at the same time, and make for itself a hollow in the mud, and build another nest in the same manner, and then transfer the eggs with her feet.

After heavy and continuous rain, the rivers are apt to rise so high that the nest would be swamped and the eggs destroyed. The Waterhen, however, has an instinctive provision of a flood, and increases the thickness of the eggs so as to keep the eggs and young safe.

The same remarkable instinct has been noticed in the swan. While engaged in the task of adding to the nest, the bird dives down beyond the nest and acting as architect, while the other brings materials.

The all-useful toes of the bird serve yet
another purpose. Though so good a swimmer and diver, the Water-hen does not possess webbed feet. The extremely long toes, however, afford so much assistance to the web that the web would only add to the weight of the feet without sensibly increasing their swimming powers.

There is a bird, the Water-hen, like many other creatures, soon finds out its friends, and will voluntarily seek the habitations of man.

Some years ago, one of my friends had a house in Sussex, the garden running down to the edge of a brook. Poultry of various kinds were kept there, and among them was a pair of Water-hens which came to look at us regularly as any of the inhabitants of the poultry yard. They began by striking up an acquaintance with the ducks in the water, and then by degrees proceeded to us on land. I have seen them running about on the lawn in front of the house as much as at their case as any of the other birds.

There are two other aquatic birds which are often confounded with the Water-hen. One of these is the Coot (Fulica Atra), which in size and color much resembles the Water-hen almost as much as the crow resembles the rook.

Strange to say, the characteristic by which the bird can be so fatal is the same in both cases, namely, the color of the livery of the beak. In the Water-hen there is a large dark red patch at the base of the beak, while in the Coot, then, and the corresponding patch is white, and very conspicuous, especially if the sun shines on the bird, just as the white base of the beak distinguishes the rook.

The Coot is not so often seen in brooks as the Water-hen, and I do not know of an instance of its nesting in such a locality. Moreover, the water-hen remains in the same locality throughout the year, while the Coot is one of the partially migratory birds, haunting the brooks, rivers, and lakes during the warm weather, but betaking itself to the mouths of tidal rivers as soon as the cold weather comes on, knowing instinctively that it will find plenty of food among the young fish, shrimps, and other inhabitants of estuaries.

As to the nest of the Coot, though I have examined many of them, I never found one which could be approached without wading or the aid of a boat. I have tried both plans, and prefer either of them.

No one who studies even a tiny brook must be averse to wading when occasion demands, but the wading which is required in reaching a Coot’s nest is of the most unpleasant character. The nest is always placed at some distance from the shore, and is mostly based on a foundation of growing reeds or egrets. I have found many of them on small tussocks just rising out of the water, crowned with rushes, and surrounded by sedge.

Now, the bed of the large and shallow pond where the nests are placed is necessarily of a muddy nature, and wading through mud is by no means an agreeable process. Mud is always slippery, and always stained with bits of sticks, stones, shells of fresh-water mussels, water snails, etc., etc., on which it is not pleasant to stand with bare feet.

Then, you never know from one step what is likely to happen at the next step. You may come upon a patch of comparatively firm ground, or you may slip down into a hole a couple of feet in depth, in which latter case you will to a certain measure your length in the water, until you get your back as the case may be, and will find no slight difficulty in getting up again.

If you take a boat, a punt is the best for the purpose. A couple or two of water, a valuable property in the shallow waters which the Coot frequents, and it is so heavy that its weight will force a path through the sedge which, when growing thickly, form a wonderfully strong barrier. I have more than once vainly attempted to drive a skiff through a sedge bank. The sedge seems at first to yield, but they suddenly recoil, and then drive the boat back again, in a most exasperating manner.

The nest of the Coot is very similar in appearance to that of the water-hen, but is of rather stronger make. It is simply laid on the reeds or sedge, and is not attached to them in any way, so that if the water should suddenly rise, the nest floats away with the bird still sitting on it.

In the defence of its nest the Coot displays great courage, as is shown by Mr. Alex. Duncan in "The Naturalist’s World," Oct., 1884.

"On the 7th of February this year, a pair of Coots inhabiting the rushes at our garden foot laid the foundation of their nest. They kept building it day by day till, after a week, I noticed one morning that the nest had disappeared. Not knowing what had occurred, I imagined that the birds had sunk it so as to form a submersion, which, when built, would suffice to build the superstructure. On the morning following that on which the nest had disappeared, a new foundation or layer of reeds was laid on the top of the first one, and the birds were busy during the whole of that day in enlarging and adding to the layer. Visiting the spot again the next morning, I saw that the nest had again disappeared, till that the birds, especially the male, were in a high state of excitement. They did not attempt to build any more on the old site, but began in another place, and I was surprised to see that the first bundle of reeds which they placed in position adhered to the same fate as those of the first nest. But now the day’s work was solved in an amusing way—to me at least—but not to the subjects of the joke.

"Standing on the newly laid down reeds was one of the tame swans kept for the ornamentation of the lake, and seemingly coolly choosing the site of the Coots’ nest for its own occupation. It was bending down and breaking off all the reeds within its reach, and laying them crosswise, evidently just commencing to build its own nest. Of course this was the reason of the Coots’ nest disappearing so often, as the weight of so large a bird as a swan was more than sufficient to sink it out of sight.

"But the best part of the affair is yet to come. The Coots all the while had been rushing about very excitedly in an aimless way, seemingly without anything to do. However, things had evidently come to a climax, for one of them, munting the swan’s back with a rush, began a most furious pecking and pulling about its upper regions, while its mate boldly charged it up in front in good style, forcing the swan to cease its labors and defend itself. This could not do very well, however, as it was by the surrounding reeds, and by the dexterity of its small and nimble antagonists. It is needless to say that the Coots came off victorious, driving the swan from the lake for quite a distance, and the mate of the pair I am writing about is a noted warrior in the tribe, thoroughly punishing all that venture near its chosen domain or mate.

"They were never molested again by the swans, one lesson being enough. But I am sorry to say that the nest, when it contained three eggs, was rilled, and the Coots began another nest in deeper water, where it was secure from the swan and where they successfully reared their brood."
ferent thoughts I had left this very room but a few hours ago! How trivial all my little vanities and how small all my ideas seemed! What a small pivot they revolved upon! I had confidently expected to find Mr. Warren as little changed as I was myself. I found instead a transformed being—a man with a course of life marked out for him, but not yet traced and, of all else, he is straining his vision to try and discern whither it leads. How it could be shaped into practicable, useful, and glorious ends! Mr. Warren was no dreamer in his strictest sense. If he dreamed, it was but after the manner of Tapperit advised, his dreams should be put into a realisable shape when he had shaken himself free of their fairy gossamer.

I could not at that time have put all this into words. Like a dumb animal that looks at you and cannot express itself in any way, this one had revealed to me in some mystical way, and the only form it took was a vague but intense longing—a longing to share in these wonderful ideas of his, to be admitted into his confidence, to try and help to make clear that ruminated observation that he knew. Instead of this, so evident had been my pettiness and ignorance, that he had had to descend forcibly to the level of my intelligence.

I divested myself of my cherry-coloured bowl. How could I have thought so much about them? How had I allowed my mind to become stunted by dwelling only upon little things? I looked inwardly at myself. My stock of knowledge was pitifully small. I had been finished; "it is true; but I began to realise that it is when one is "finished" that one's education really begins.

I was in this heavy-hearted mood when I seemed to remember something which till then had been forgotten. How often forgotten, how often remembered in the trials and perplexities of life!

I knelt down and buried my head in my hands for some time, and with a feeling of calm quiet and trust gradually began to sit over the plans and so tender an age seems so unlikely that for a long time no one would believe it to be possible. However, it has often been watched, and that it is really so. In the "Field" newspaper of July 28, 1883, the following communication appeared:

A Cuckoo has lately built her nest in a wood-chest in my window. She began to build about June 17, and on the 25th I saw a Cuckoo fly in and lay an egg in the newly-built nest. On each of the four following mornings the Water-wagtail laid an egg, and two I took out of the nest. She began at once to sit on the three remaining eggs, and on the 11th and 12th of July they were all hatched.

"When two days old the Cuckoo turned one of the Water-wagtails out of the nest, and on our replacing it he turned them both out. The Water-wagtail continued to feed the young Cuckoo with great care, and one day she brought him a yellow butterfly. She chopped it up with her beak, but the Cuckoo swallowed it whole and used the wings of the butterfly in his mouth."—F. H. Halford Leubury.

It is a remarkable fact that this habit of laying eggs in the nests of other birds belongs only to the Cuckoo of the Old World, those of America making their own nests and looking after their own eggs as respectable birds might be expected to do.

Mr. H. Bowdler Sharpe, the well-known ornithologist, explains the Cuckoo's habits in a very simple and interesting manner. Some little time before these eggs were written he delivered a lecture at the Midland Institute, Birmingham. He stated that from his own experience he believed that there were at least five males to every female Cuckoo that visited the

THE BROOK AND ITS BANKS.

BY THE REV. J. G. WOOD, M.A., Author of "The Handy Natural History."

CHAPTER IX.

The brook is completely surrounded by WAGTAILS, those graceful, lovely, and prettily coloured little birds which are to be seen at almost any part of our country, even over a few inches of water exist.

Brook, river, lake, or pond, makes the reports of the Wagtails, whose food is most often found at the edge of the water. Five species are known to inhabit England. The commonest of them is the FIEDER WAGTAIL, sometimes known as the DISWASHER (Motacilla Varrella). In France the Wagtails are known by the popular name of "Laverettes," or Washerwomen, in allusion to the Continental custom of washing linen at the bank of a stream. In general shape, though not in colour, the Wagtail looks very much like a magpie seen through the wrong end of an opera glass, its long tail being very conspicuous.

The bird seems absolutely incapable of keeping its tail quiet, and immediately on alighting from the wing, or when tripping over the ground in pursuit of insects, flips its long tail up and down with a peculiar jerking movement that can be recognised at a considerable distance. Why this bird should wag its tail up and down, while the duck wags its tail sideways, no one can conjecture.

It flies as nimbly as it walks, the wings being so short that at every stroke it sinks down towards the ground, so as to describe a series of deep curves as it flies.

Roads that happen to run near water are the favourite resorts of the Wagtail, as there the bird can find plenty of the little insects on which it lives. Now and then it seems to borrow some of the habits of the flycatcher, perching on a tree, and suddenly leaping into the air after the insects as they fly past it.

If you look closely among the banks of the brook, you will probably come upon one of these little birds, almost hidden in the grass, and you may have some trouble in finding it. The bird is not very particular as to the exact locality in which it places the nest, sometimes making it among the long grass, sometimes answering to the demand of the brook itself and often placing it in a hole of an old wall. It is made of withered grass, fibrous roots and leaves, and is lined with various kinds of hair. Altogether it is a neat little nest, and displays a trim neatness which distinguishes that of the dipper. Indeed, it is hardly superior to that of the campagnolus.

In one respect, however, it is very interesting then the dipper's nest. The eggs of the Wagtail are greyish white, speckled with brown. But among them may sometimes be seen an egg of much the same size, but of a dark grey, thinly mottled with reddish brown. This is the egg of the Cuckoo (Cuculus canorus), that very remarkable bird which, instead of building her own nest and rearing her own young, puts her eggs here and there in the nests of other birds, leaving to them the task of rearing them.

The oddest point in the life-history of the Cuckoo is the great discrepancy between the size of the Cuckoo and that of its egg. The Cuckoo is about as large as the kestrel, and, indeed, has often been mistaken for a hawk; yet its egg is no larger than that of a sparrow, the object of the very small size being to enable the Cuckoo to place its eggs in the nests of the various little birds which are much smaller in size than herself. Birds seem to have but little sense of colour; for one of the birds whose nest is most frequently chosen by the Cuckoo is the hedge sparrow, whose eggs are blue and quite unlike those of the Cuckoo.

How the Cuckoo contrives to place her eggs in so small a nest was not known until lately. Now it has been ascertained that the Cuckoo first lays her egg on the ground, and then takes it in her mouth and lays it gently in the nest of the foster-parent.

The egg being so small, the young Cuckoo when first hatched is no larger than the young wagtail, redbreast, or hedge-sparrow; but, like the crocodile, which grows to a length of sixteen feet from a small egg, the young Cuckoo is already larger than that of a Muscovy duck, the Cuckoo grows with wonderful rapidity, so that there is not room in the nest for itself and the rest of the eggs.

Finding itself crowded, the Cuckoo deliberately pushes its foster-brethren out of the nest, and soon grows so large that there is scarcely room enough in the nest even for itself. That it should be able to perform such a feat at so tender an age seems so unlikely that for a long time no one would believe it to be possible. However, it has often been watched, and that it is really so. In the "Field" newspaper of July 28, 1883, the following communication appeared:

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Once, as most English birds did, but would lay them at intervals, leaving the young birds first hatched to hatch the remainder.

Cuckoos' eggs, although they are rather prized by collectors, are much more common than is generally supposed, as may be imagined from the fact that they have been found in the nests of at least ninety species of birds. My eldest son once took two Cuckoo's eggs out of the nest of the same hedge-sparrow, the second having been laid two days after the first. I have also heard of two Cuckoo's eggs having been placed simultaneously in one nest. These were probably laid by two separate birds. I believe that many of the Cuckoo's eggs which are found are mistaken for those of the sparrow, and are, therefore, destroyed.

Again, I have noticed that in some years these eggs are tolerably plentiful, while in others scarcely an egg is to be found.

Watching the proceedings of the young Cuckoo and its foster-parents is a most interesting task, but one which is very difficult of accomplishment. The nest must, as has already been mentioned with regard to the kingfisher, be in your own domains, where mischievous boys will not be allowed to meddle with it. Even when we are fortunate enough to possess a spot where the birds can be protected and where a Cuckoo has laid its egg, there is still another enemy, which is nearly as formidable as a boy, and that is the cat. Pussy is a charming animal, and I am very fond of her; but she is a determined bird-hunter, and nothing delights her more than getting hold of a nest of young birds.

Whenever the egg of the Cuckoo is found, it should be carefully protected, as the bird does inestimable service to agriculture.

Coming to this country in the spring, when the leaves are green and tender, it feeds almost wholly on caterpillars, especially the great hairy larva of the tiger-moth, which are so familiar under the title of "woolly bears." It also eats the larva of the vapourer-moth, which does such damage to fruit-trees, and whose clothing of stiff, bristly hair, arranged in bundles, is an effectual protection against any bird except the Cuckoo. So if you should be fortunate enough to have a brook running through your own grounds and to find the nest of a Wagtail, or, indeed, of any small bird, you should keep a careful watch, in hopes that a Cuckoo may deposit an egg in the nest.

The mention of watching the nest brings me to another point. Ever observe Captain Cuttle's golden rule:-

"WHEN FOUND, MAKE A NOTE ON!"

Never be without your note-book and pencil, and never omit to note down even the most trivial incident. The day is tolerably sure to come when that little incident will prove to be of inestimable value, and may, perhaps, be the means of settling some disputed point in Natural History.

The value of your note-book will be doubled if you can draw, however rudely, the object which you are describing. You may probably be ignorant of its name, so that the incident will have no scientific value; but the sketch, together with the description, will enable an expert to identify the object, and so to make your notes a valuable contribution to science.

The habit of invariably sketching everything which you notice will be of the greatest personal service to you. It is comparatively easy to make a sketch of a tree or a flower, about which you can take as much time as you like; but when you have to sketch a living creature, and especially when you wish to represent it in action, you must acquire the art of seizing the salient points and transferring them at once to paper, leaving details to be filled in afterwards.

If you happen to have seen the rough sketches which were taken by the artists of the Illustrated Journals upon the field of battle, you will understand the value of this art, which can only be acquired by constant practice.

Should the brook be one of those which are favourable to the sedge and reed, there is another bird whose nest may mostly be found, and who is often obliged to play the part of foster-parent to the Cuckoo. This is the pretty though soberly-coloured bird known by the name of Sedge Warbler (Sylvia pagana). It is quite a little bird, only measuring five inches in total length. Its colour is simply brown of one or two shades above, buff on the breast and abdomen, and white on the throat. These sober colours, together with its retiring and shy habits, render it invisible to the casual passerby, while those who are familiar with its ways have no difficulty in observing it.

While I was at Oxford, and in the habit of spending much of my "Long Vacation" on or in the river, I became quite familiar with the Sedge Warbler. In many places the reeds and sedges grew so luxuriantly that I often used to drive the boat among them until it was nearly hidden by the dense foliage, and there, myself hidden, was able to watch many a denizen of the water and the bank.

Among this herbage the Sedge Warbler was usually to be found, though less seen than heard. It mostly kept itself within shelter of
THE GIRL'S OWN PAPER.

ANOHER most interesting bird may be found in similar localities. This is the Reed Warbler (Sialinia arundinacea), sometimes called the Reed Wren. In colour this bird somewhat resembles the sedge warbler, but may be distinguished by the redder hue of its back and the white streak over the eye.

Like the preceding bird, the Reed Warbler is by no means uncommon, though seldom seen except by those who know where and how to look for it. Following the same tactics as the coot, it makes its nest somewhat out of sight, and places it in the thickest clusters of reeds, where it can with difficulty be seen, and where, even when detected, it can scarcely be approached, even in a boat.

The bird gathers together three or four of the longest and tallest reeds, and weaves its beautiful nest upon them, always placing it at a considerable height above the water. Now the reed is proverbially flexible, and bows unharmed before the storm which tears the branches off the elm and uproots the oak. What then is to become of the eggs and young of the Reed Warbler?

If you walk by the brookside on a stormy day, you may see the reeds all bending before the wind until their tips nearly touch the surface of the water. Among them will probably be several nests of the Reed Warbler, and yet not an egg or a young bird will be flung into the water. This object is attained by the peculiar structure of the nest, which, instead of being cup-shaped, as is the case with most of the warblers' nests, is exceedingly deep in proportion to its width, so that even in the severest gale, when the reeds are flung about like so many whips by the force of the tempest, the contents of the nest are retained within it.

(To be continued.)

VARIETIES.

WINNING WAYS.—Nothing is ever lost by being pleasant and agreeable. You ask for two pounds of steak—no more no less. One butcher groused that he can't cut off just two pounds, and you lead him thoroughly vexed. At the next stall the man of meat hears your request with unruffled visage, cuts off a pound and a half, throws it into the scale and out again in double quick time, rolls it up neatly and says, with a sweet smile, "Just two pounds, ma'am."

PLEASURE OR DUTY.

No, Jane, I cannot come to-day;
The mother needs me here at home.
Go with our schoolmates out to play,
And tell them, dear, I cannot come.
The household labour all day long,
Too much for her, belongs to me;
For mother is not now so strong
As years ago, she used to be.
You're going up St. Dunstan's Hill,
The path we have so often tried—
Past the old weather-beaten mill,
And through the coppice by its side?
Among the bracken, while you're there,
Such lovely will flowers you will see;
You'll find enough for all, so spare
One handful to bring back for me.
The sunshine's glorious and bright!
You'll all enjoy it while you roam;
'Twill give me just as much delight
In shining on my work at home.
—Ximenia.

A CHIP SEWING MACHINE.

A needle, if one consults a dictionary, is described as a small instrument for sewing. It may also, to suit a particular purpose, be termed a sewing machine, and an unprincipled American who adopted the latter description of it had undoubtedly a purpose of his own to serve. He was in want of money, and appears to have been fully aware that there are plenty of foolish people in the world who only require a trap to be set to fall readily into it.

His plan was an extremely simple one. He put an advertisement in one or two largely circulating American papers, stating that any person desirous of possessing an excellently-conditioned sewing machine would have the rare opportunity of earning a large sum of money, and sent the advertiser in postage stamps.

The success of his ingenious little scheme for raising money was greater than the inventor of it had any right to anticipate, for one advertiser, writing from the American papers that "XX X" received numbers of answers to his advertisement with the required shilling. In return for this sum he conscientiously sent to each address what, from his point of view, was a well-conditioned sewing machine—"a B and A Bull's foot" and a drill-drawn needle of superior quality.

A "B" and A BULL'S FOOT.—Not to know a "B" from a bull's foot is a phrase implying that a person is very little or very ignorant. The term "bull's foot" seems to have been chosen merely for the alliteration, as broomstick and bathtub in the similar phrases, she does not know a B from a broomstick or a bathtub.

LOVE.

Love is like a lamb, and Love is like a lion;
Fly from Love, he fights; fight, then does he fly on;
Love is all on fire, and yet is ever freezing;
Love is much in winning, yet is more in keeping;
Love is ever sick, and yet is never dying;
Love is ever true, and yet is ever lying;
Love does coat in liking, and is clad in loathing;
Love, indeed, is everything; yet, indeed, is nothing.
—Thomas Middleton.

A CURIOUS EPIPHANY.

The following curious epiphany is from St. Benet's Churchyard, Paul's Wharf, London:

"Here lies one More, and no more than be,
One More and no more: how can that be?
Why, one More and no more may well lie here alone,
But here lies one More, and that's more than one!"

IN PRAISE OF MUSIC.—A divine origin has been attributed to music on account of its originality, its universally beneficial tendency, and its innocence, even when cultivated to excess. No other art or science has so cheered the spirits of man, and so relieved a wearied mind as music. As to beneficial operation it leaves all other arts at a distance. Justly did a Greek author say, "Music is a great and a lasting pleasure to all who have learnt it and know anything about it."
—Chappell.

EVENSONG.

Through glowing curtains of the west
The sun sinks in the sea;
The gleaming dim the mountain's breast,
And deepens on the sea.
Slow hushing breezes sing of rest
In sweet, low songs to me.

The heavens are bright with stars that rise
And flood the stainless blue,
Unmeasured miles of radiant skies
Their lights roll into view;
Kind angels look with watchful eyes
Their sweet, kind looks on me.

God is around me and above,
His infinite peace my rest;
Light as the wings of brooding dove
Sleep folds me on his breast,
With dreams that whisper words of love
In sweet, low tones to me.

I close my eyes on toil and care,
My heart from sorrow free,
For rest is here and heaven is there,
Maybe awaiting me,
Love weaves a song of praise from prayer,
And sings her song to me.

—J. Huie.
CHAPTER X.

Now let us find some spot where the surface of the brook is smooth, where it is well sheltered from wind and bushes or buildings, where the sun can shine into the stream, and where we can lie on the bank so as to bring our eyes close to the surface of the water.

Let us look steadfastly into the water, and try to penetrate its depths. For the first few minutes we shall probably see nothing, and may be inclined to think that there is nothing there. This, however, is a mistake, the fact being that human eyes require some little training before they become fitted for water-gazing. So do not be discouraged.

Before you long you will first see one living creature traversing the depths. Then another will come into view, and another, and another, until at last the water is alive. Of these first seen quite empty, will be seen to be absolutely teeming with life.

Which creature shall we take first?

This question depends very much on the time of year. Let us suppose, then, that we are in the spring-time, say about the middle of April, and that the weather has been dull and wet and has called for animals. Here I must mention that, however closely we may watch the creatures in the brook, we must mostly remove them out of it if we wish, as we ought to do, to study them minutely. For this purpose we shall want a net, and had better make it for ourselves. The flimsy affairs which are recommended in the books are simply “made to sell,” and are practically useless.

The handle of your net should be at least five feet in length, made of the best ash, and not less than five-eighths of an inch in thickness. If using the net you are sure to include a quantity of heavy weeds, mud, etc., among your captures, and a slitter net will break with the strain.

Next get a blacksmith to make a ring of iron, nine inches in diameter, about as thick as an ordinary brass stair-rail, and weld it firmly to an iron hook about four inches in length, and large enough to allow the end of the handle to be forced into it. Two holes should be made in the socket, one within half an inch from the mouth of the socket, and the other about three inches from the first. These are for the reception of screws, and it will be as well not to have them in the same line, so as to avoid the danger of splitting the wood. Give the iron portions two or three coats of “Brunswick Black” to protect them from rust.

The net itself should be made of “mosquito netting,” as it should be able to bear up in the river. It must not be painted, but very carefully rolled at the bottom, as otherwise you will find great difficulty in taking out the creatures which you have captured, and which, as you will find, have a persistent way of crawling into the smallest crevice that will receive them.

The net should not be sewn directly on the rings, as it would soon be worn to pieces by the friction to which it must be subjected. The best plan is to fit a strip of very stout canvas upon the ring, and then sew the net to the canvas, which should be done as near as possible to the distance from your house, you will find the net rather troublesome to carry, besides dangering upon you the rather destructive attentions of various aquatic insects. Hence the recommendation to fasten the net to the handle by screws. Before you start, you can remove the net from the handle, and so can carry it with you, while you can collect samples by the hundred, another will find nothing. If you plunge your net into the water with a splash, snatch it out with a jerk, and plunge it in again with another splash, you will frighten away all the animals instead of enclosing them in the net.

You cannot be too gentle while brook-hunting. When you have marked down a spot which you think will be tolerably promising, slip the net very gently into the water at some distance from the spot, and con. so to speak, towards the required locality, so as not to alarm the inhabitants. Then draw it firmly and steadily through the water, turning it, and drawing it backwards and forwards several times.

On lifting it out you will probably find it partly choked with evil-smelling mud, among which a number of indefinite living forms are to be seen. These matter-of-fact American friends say, “squirming” like a hundred of earthworms or a basketful of live eels.

You cannot examine them while they are covered with this mud, neither can you place them in your collecting can, because they would make the rest of the brook a complete party, as they would wash them thoroughly before attempting to examine them; and for this purpose all you have to do is to dip the net repeatedly into the water and lifting the water drain from it. When the water which runs away is quite clear you may begin to investigate the contents.

In the search, always use your fingers, which were made before, and in this task are much more useful, the sense of touch often detecting creatures which had eluded the sense of sight. You must not risk getting your hands dirty. There is plenty of water about, and you can wash them as often as you like. Moreover, the mud of a brook is equal to the best soap for its cleansing properties, on its hands.

Another axiom.

Nothing that you can catch in a net can hurt you, so that you may let go your catch, without fear. Some of them, it is true, have rather a formidable aspect, and look very much as if they could sting, but set your mind at rest. No inhabitant of the fresh water can sting, and, therefore, of them can bite hard enough even to injure a young girl.

Take every creature which you do not know, "handle him as if you loved him," according to Lactae, Walton's receipt, and put him—or her—or it—as the case may be, into your collecting can, to be examined herewith. If you should already be acquainted with the capture, follow the advice, and let him away. You will injure all the animals instead of enclosing them in the net.

At home you should be provided with a number of glasses, half filled with water, to which you can transfer your captures. You can hardly have too many of these vessels, which you may call "aquaria" or "vivaria," if they be as many as ordinarily by the name is meant. Place no reliance on the picturesque groups which are so often figured, and which represent dragon-flies, butterflies, water-beetles, frogs, newts, and other insects gathered together in a sort of "happy family." Your policy must be of a totally different character, and must be one of isolation.

It may be said, and often is said, "I only live to follow Nature, and gather together in my vivarium the identical creatures which are gathered together by Nature in the brook and the pond." This argument is plausible but not sound. The conditions are not the same. No aquarium or vivarium, or a combination of both, can ever do what Nature accomplishes. The various creatures are deprived of their natural food and shelter, two very important elements in animal life. Again, the water is small in quantity, whereas in the stream it is incessantly renewed, and is always more or less in motion.

Having washed your "catch" thoroughly, you can proceed to examine it in detail.

There is one creature which you are tolerably certain to find everywhere. I might almost have written the word life, instead of "tolerably," but one result of experience is to teach the danger of employing
such sweeping terms. At all events, I have been a practical book-hunter for some fifty years, and never met a book the waters of which did not swarm with the larva, or grub, of the Rhytidicola, or Whirligig Beetle (Gyrusia), to which the mass was allusion made in the opening chapter.

Everyone who has walked by the side of any pond will have been amused and interested by these restless little beetles when they are gregarious in their ways, and you will scarcely ever see a solitary specimen. They are found all year round, and even in the winter season, when most insects, except those hibernating, are either dead or hibernating, the Whirligigs are lively as ever, provided that they can find a little moisture, and source of water, no matter how small it may be.

Viewing these beetles as they openly skim the water in their peculiarly conspicuous way, one naturally feels some surprise as to the mode of their immortality from destruction. Below them, under the surface of the water, are shoals of hungry fish, ready to snap up anything, and that may fall into the water. Yet no fish ever is found to ally its hunger with the whirligig beetle.

There are plenty of hungry birds which might easily snap it up from the surface of the water also. And it flies through the air on its long and beautiful wings. Yet no bird, when dissected, has ever been known to have the remains of the whirligig beetle in its crop.

It owes its safety to two peculiarities. In the first place, the shining armour in which it is clad is so thick and so hard that there is but little room for any insect to wear an insect worth eating. In the next place, it is endowed with an odor which may either not be perceptible to itself, or even actually pleasant to bats, and, if it be, to all other beings, is singularly repulsive, so that neither fish nor bird will eat it.

As we shall be able to examine this beetle in all its stages of development, we will first take its larva as it appears in the nest.

No one could even conjecture from the appearance of the larva what sort of insect it represents, and there is as much difference between the larval and perfect forms than there is between a Whirligig beetle and the caterpillar and the butterfly.

The gill is a long-bodied grub, with six little slender legs; soft skinned, with the exception of the head and the three segments, or body-rings, which represent the future thorax, bean-shaped, or oval, changing substances, sluggish in its movements, and quite unlike anything of forged, external gills, which look like a row of white feather forks along each side of the body; and when out of the water it looks like a most ungraceful creature, the gills clinging to the sides, and entirely altering its appearance.

The best mode of making it show itself to the best advantage is to place it in a tall narrow glass jar filled with water.

In order to breathe, the creature must have its gills continually washed with fresh supplies of water. When the running brook there is no need for the breathing; but then, when there is any thinning of the water, and especially when placed in the still water of the jar, it must either exert itself or die. Its mode of respiration is by walls, with oxygen very simple. Its body is as flexible as that of an ant, and in swimming is used in the same manner, namely, a kind of serpentine undulation which carries it swiftly through the water.

Thus having wriggled itself to the surface of the water, it spreads out its gills and sinks down again, by means of its outstretched gills in contact with the water surface and air. While floating slowly downwards it is a singularly graceful being, the white translucent gills having a beautiful effect as the light shines through them, and presenting a wonderful contrast to the mean and drabbed aspect which they present when the larva is removed from the water.

After attaining its full growth, the larva ascends the stems of some aquatic plant, and comes to a halt when it has crawled a few inches above the water. Having attained a suitable spot, it spins an oval cocoon around its body, so that it loses all appearance of an insect, and looks like a lump of mud that has become gummed up with the leaves. Within this cocoon it undergoes its development into the perfect state, and then issues from its cover in the form which we are so familiar.

Here I must call the attention of the reader to two points, namely, the Growth and the Respiration, about both of which much misinformation exists.

When I stated that the Whirligig attained its full growth in the larval state, I did so intentionally. The whole of the growth is accomplished during the larval state, and when once the insect has passed out of the larval condition it grows no more. Most people think that a little fly is a young one, and that when it has grown enough, it will become a large fly. In point of fact, the fly will grow no more. It did all its growing while it was larva, or maggot, and when it had attained a proper growth it weighed much more than it weighs as a fly.

INSECTS NEVER GROW.

It is just thirty years since I made this statement about the mangrove, and I am in the original receipt of letters calling my attention to the statement, and doubting whether it can be true. Some one has received a box containing four or five humble-bees, together with a letter couched in such terms as these—

Sir,—"You say in your 'Common Objects of the Country' that insects never grow. Is it not true? I took these humble-bees out of one nest, showing them in different stages of growth."

Or, I receive a box containing a number of cockroaches, all of different sizes, together with a letter—

Sir,—"You say in your 'Common Objects of the Country' (page 70) that insects never grow. You do not understand what you are writing about, Sir, did you never see black beetles in the adobe bins in the back yard, and I have seen them I send you a lot which I caught myself in the kitchen, and they are all of different sizes. Insects do grow, and you are quite wrong. I hope you will publish this when you write again about insects."

"Yours indignantly, A. B."

I can assure the reader that these are genuine letters, and that the samples of my usual correspondence on this subject I have no doubt that other entomologists are persecuted after a similar fashion. The mishandlings of these correspondents were corresponded to their ignorance of the insects of which they wrote.

As to the humble-bees, they, like the hive bees, ants, and wasps belong to the social hymenoptera, in which there is a division of labor and specialization, and lastly come the partly developed females, which are called 'workers.'

Now, the queens are to the hive of the three; then come the males, and the workers, which constitute the bulk of the community, are the direct offspring of all. The ants have a further sub-division, some being distinct workers, being the soldiers, and the smallest the labourers.

But, when once they have passed out of their larval state, no matter whether they be males, females, or workers, they grow no more. One of the most striking examples of this fact is to be found in the Termites, which may be seen to walk no higher than the abdomen, which stretches as if it were made of india-rubber, so as to accommodate the vast quantities of eggs which she daily supplies for the purpose of keeping up the population of the nest.

As to the cockroaches, the mistake was of a different character. The two belong to the same order as the crickets and grasshoppers, namely, the Orthoptera, or straight-winged insects, which retain very much the same size throughout their different stages of growth. The Lepidoptera, i.e., the butterflies and moths, with one or other appearance in their three stages, so that no one can doubt whether the creature be a caterpillar or a butterfly, or pupa, or egg, or adult.

But, when the larvae of the Orthoptera are first hatched from the egg, they look much like the perfect insects, the chief distinction being that they have wings. The same mode of growth belongs to the Crustacea, or the larva of which are called at the Cape by the expressive name of 'vest-gangers,' or foot-crawler, and are even more destructive than the winged species.

Now we will revert to our Whirligig beetle, and give a few lines to the Respiration of insects. This is a most interesting portion of their life history. I have mentioned the larva of the Whirligig beetle breathes in water by means of gills, as is the case with the larve of many insects. But all insects breathe in the atmospheric air; and in fact, as we do, but by means of a most complicated network of air-tubes, which divide, and subdivide, and ramify throughout the entire body, extending through the cuticule, the legs, and the wings. The wings, as a matter of fact, are not modified limbs, as in the bats and birds, but are prolongations and extensions of the air-tubes, so that the insect is, in fact, a living lung endowed with limbs.

The mode by which these tubes are used is best remarkable.

The very celebrated animals breathe they produce a vacuum in the chest by expelling the ribs, or, as is the case with the frogs, the limbs, and, by expanding the lyd's the lungs. But the insects have no bones, and, therefore, must have some other mode of producing the necessary vacuum. This is the way in which the insects breathe.

The body is composed of a number of half-rings, set in this fashion, and having the space between them filled in with a very elastic membrane so that the upper and lower halves of the body can be separated from each other. In this membrane are certain oblong holes, called 'spiracles,' which admit air to penetrate into the body of the insect, when the insect expands its body, by separating them through the cuticle, the legs, and the wings. The air rushes into the tubes through the spiracles. Then it is expelled by means of the muscles which contract the body, and the whole act of respiration is accomplished.

The popular idea on this subject was well expressed in the advertisement of a certain fly poison which appears to mount the insect with a fiery breath.

According to the advertisement, no sooner did a fly put its nose near the poison than it expired, and its head and thorax being set on fire. This is probably mereely smellying it. Now, insects have no noses, and would never enter the system through any part of the head.

See, then, what a wonderful change has taken place in the insect, which, while a larve, breathes by means of gills, and, when a perfect insect, breathes atmospheric air by
means of a system of tubes. We shall frequently have to refer to the respiration of the inhabitants of the brook.

Now, take a Whirligig out of the water, and examine its body.

Here I may mention that no student of nature is complete without a magnifying glass, the ordinary pocket lens being amply sufficient for field purposes. Of course, if you have a microscope to hand, so much the better, but this treatise deals exclusively with field work, and, so, all that the wanderer by the brook will require is the little lens with two or three glasses ground to fit, and carried in the pocket.

With this lens examine the Whirligig, and first look at its legs.

The first pair are long and slender, while the second pair are very short, flattened, so as to convert them into paddles. Here I must observe that however the legs of insects seem to differ from each other, they all possess the same joints, though those joints may be modified in accordance with the task which they have to perform. Few persons would think, when viewing these legs of the Whirligig, that the long front legs and the short, flattened intermediate and third pair are formed of exactly the same joints.

Insects are divided into three distinct portions. First comes the Head, which carries the next portion, the Thorax, which carries the organs of locomotion; and lastly comes the Abdomen, which contains the vital organs.

Firstly, then, in order that we see that it comprises the external jaws, or "mandibles," the inner jaws, or "maxillae," together with the antennae, "horn," or "feelers," as they are sometimes called, and the peculiar appendages which are called "palpi," or lesser feelers.

The eyes are "compound," i.e., composed of many lenses, varying in number from eight on each side to as many thousands. The well-known Scarlet Admiral butterfly has about fifteen thousand lenses on each side, every lens having its own branch of the optic nerve.

Next comes the Thorax, which is subdivided into three parts, namely, the "prothorax," the "mesothorax," and the "metathorax." Each of the three (or front of the thorax) has nothing to do except carry the first pair of legs. The mesothorax (or middle of the thorax) has a more complicated duty. The upper portion carries the first pair of wings, and the second pair of legs, while the lower portion, which is devoted to flight, is thickened into "clytra," or wing-cases, under which the flying wings are packed when not in use. The lower portion contains the middle or intermediate pair of legs, and half of the sockets for the last pair. The metathorax (or last portion of the thorax) contains in its upper part the second pair of wings, and in its lower part, the other half of the sockets of the intermediate legs, and the second pair of legs. Nature how much they may be modified, these structures are the same in all insects. Lastly we come to the abdomen, in which the legs differ in many cases. As we go higher up the scale, we see even more clearly than on any other portion of the body. On each side of the abdomen may be seen the ovipositors, or breathing-holes, by which the insect is nourished with air for fish in order to prevent dust or other foreign substances from getting into the spiracles, their openings are guarded by stiff bristles, which cross each other, and the current of air is through them, not directly from the spiracles.