

WALKS
OF A

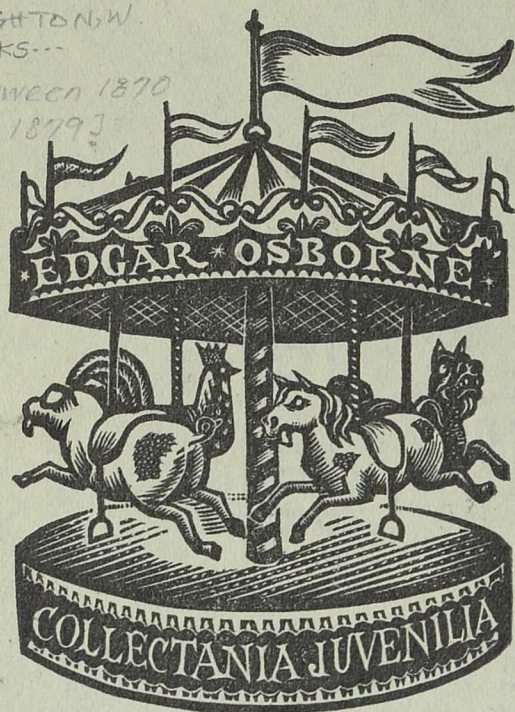
NATURALIST



by Rev. W. MOUGHTON.

N.S.
HOUGHTON & W.
WALKS---

[between 1870
and 1879]



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ON THE SEA SHORE.

A. F. DODD

WALKS OF A NATURALIST

WITH

HIS CHILDREN.

BY

REV. W. HOUGHTON, M.A., F.L.S.,

Rector of Preston on the Wild Moors, Shropshire.

CONTAINING

COUNTRY WALKS OF A NATURALIST.

SEASIDE WALKS OF A NATURALIST.

ILLUSTRATED WITH
SIXTEEN COLOURED PLATES AND NUMEROUS WOOD ENGRAVINGS.

LONDON:
GROOMBRIDGE AND SONS,
5, PATERNOSTER ROW.

PREFACE.

IN this little book my desire has been, not so much to impart knowledge to young people, as to induce them to acquire it for themselves. I have endeavoured to show that Country Walks may be full of interest and instruction to all who care to make good use of their eyes. If I have failed, the fault rests with me for the way in which I have treated the subject. I am aware that I have occasionally used words and phrases which may puzzle young brains, but I hope that nearly all will be intelligible to boys and girls of nine or ten years old, with a little explanation from parents or teachers.

The chief, if not the sole merit of this little book consists in the illustrations which adorn it; and I must express my sincere gratitude to Mr. Gould, the eminent ornithologist, for his

kind permission to copy some of the magnificent drawings in his work on 'The Birds of Great Britain.' To Mr. R. S. Chattock, of Solihull, I am also deeply indebted, for the pains he has taken in reproducing, on a reduced scale, Mr. Gould's drawings, and for the drawings of the sticklebacks and the frontispiece. My generous friend and neighbour, Mr. Eyton, of Eyton, has furnished another instance of his numerous acts of kindness, in allowing me the use of Mr. Gould's work and of various woodcuts. To two lady friends I also express my best thanks; and last, though not least, to the publishers, Messrs. Groombridge, for the care they have taken to present the volume to the public in a very attractive form.

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COUNTRY WALKS OF A NATURALIST

WITH

HIS CHILDREN.

WALK I.

APRIL.

E could not have a more pleasant day, children, for a ramble in the fields than to-day. It is warm and bright, and the birds are singing merrily, thoroughly enjoying the sunshine; the little lambs are frisking about, and running races with each other. Put away lessons then, and we will have a holiday. "Oh," said Willy, "it will be so pleasant, and I will take one or two bottles, and my gauze net, because we are sure to find something interesting to bring home. Where shall we go?" "I do not think it much matters where, for there is always much to observe and to admire wherever we stroll in the country." "Let us go on the moors, then," said Jack, "for you know, papa, a little boy in the village told me the other day he had found a peewit's nest with four eggs in, and I should like to

try and find one myself." Well, here we are, then; we shall have to jump over a drain or two in our ramble, and as the banks are soft it will be necessary to take great care, or we may tumble in. Ah! do you see, there are two sand-martins, the first I have seen this year. See how fast they fly, now sailing high up in the air, now skimming quite close to the ground. I have not seen any swallows or house-martins yet, but no doubt they will make their appearance in a few days. "Where do they come from, papa," asked May, "because we never see these birds in the winter? You often say, when the spring comes we shall see the swallows, and then they go away again towards the end of summer." Let us sit down on this clump of wood, and I will tell you about the swallows.

We have in this country four different species of the swallow family which visit us every year; they come to us from Africa: these are the sand-martin, two specimens of which we have just seen, the swallow, the house-martin, and the swift. A very little attention will enable you to distinguish these different kinds. The sand-martin is the smallest of the family; as the birds fly by us you notice that the back part is brown, or mouse colour; the under part white. The back of the house-martin is of a glossy black or bluish-black colour; it is white underneath; while the swallow, which is larger than the other two, has a glossy back, like the house-martin; but underneath it is more or less tinged with buff; and see, as I speak here is one flying past us. To-day is the 12th of April, about the time the swallow generally comes to this country. Now you

see clearly enough its colour, and you will notice, too, a very marked difference in the form of its tail; see how much forked it is, much more so than the tail of the martin. This forked appearance is produced by the two outer tail feathers, which are much longer than the rest. Now I hope you will take notice of these differences, and call things by their right names, instead of jumbling them all up together under the name of swallow. I have not spoken of the swift, which does not visit this country till May; it is the largest of the swallow family, and has the whole of its body, both above and beneath, of a blackish-brown colour, except a small patch of dirty white under the chin.

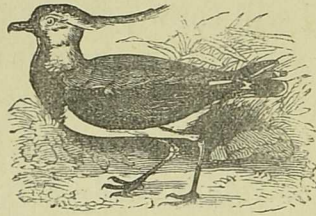
“But, papa,” said Jack, “do all these four kinds of swallows come from Africa? It is very curious to know how they can find their way backwards and forwards from Africa to this country, and how they come back to the very spots they visited the year before?” Indeed, it is a very curious thing; nevertheless experiments have been made to show that these birds return every year to the same localities.

Many years ago Dr. Jenner procured several swifts from a farmhouse in Gloucestershire, and marked them by cutting off two claws from the foot of twelve of them. Next year their hiding places were examined in the evening, when the birds had gone to roost, when Dr. Jenner found many of the birds he had marked by cutting off the two claws. For two or three consecutive years he examined their nesting places, and always found some of his marked birds. At the end of seven years a cat brought a swift into the farmer's kitchen,

and this was one of those which Dr. Jenner had marked. Now, Willy, I will ask you a question in geography. The swallow family visits this country from Africa. What sea, then, must the birds fly across? "The Mediterranean, papa." Quite right; and now can you tell me the narrowest part of the Mediterranean Sea? "The Straits of Gibraltar." Right again; and there the passage is about five miles wide; and at Gibraltar swallows, swifts, and martins are often seen as well as several other bird-visitors of this country. People on board ship have seen swallows a long way from land passing between Europe and Africa. Sometimes the poor birds are so tired from their flight that they are obliged to rest on the masts, yards, and rigging of the vessels. This often happens when the weather is hazy. Holloa, Jack, what is that splash in the water about six yards off? Keep quiet, and we shall see what it was. Ah! it is one of my friends, the water-voles; I see the rogue, with his large yellow teeth and black eyes. Do you see? He is on the other side of the drain, nibbling away at something. People generally call him a water-rat, but he is no relation at all to a rat, nor is he an injurious creature like it. "Well, but papa," said Willy, "the lads in the village always kill these water-rats, as they call them, whenever they can. I suppose they take them for common rats. Do you say they do no harm?" Very little, water-voles will not eat young chickens and ducklings; nor do they find their way into stacks and consume the corn; their food is entirely confined to vegetables, such as the roots and stems of water-weeds. I feel, however,

pretty sure that the water-vole is fond of beans, and will occasionally do some mischief where a field of newly-sown beans adjoins the river or stream, in the banks of which these animals form their holes. I will clap my hands, and off our little friend with his dusky coat starts, diving under the water, whence when he comes out he will probably escape into a hole on the bank. Some day I will show you the skulls of a water-vole and a rat, and you will see there is a great difference in the form and arrangement of the teeth, and that the first-named animal is not, as I said before, related to the rat. The water-vole is really a relative of that interesting creature you have often read of—I mean the beaver. “Well, papa,” said Jack, “I am tired of sitting here, let us now go and hunt for peewit’s eggs.” All right, Jack, and if you find any you shall each have one for your breakfast in the morning. When hard-boiled and cold, a peewit’s egg is a very delicious thing, though I think the peewits are such valuable birds, and do so much good, that I should not like to take many of their eggs. We had better separate from each other, so as to have a better chance of finding a nest. Soon we hear a shout from Willy, whose sharp eyes had discovered a nest with four eggs in it; so off we all scamper to him. See how the old bird screams and flaps, and how near she comes to us; she knows we have found her eggs, and wishes to lure us away from the spot; so she pretends she has been wounded, and tries to make us follow after her. Now, Jack, run and catch her. Hah! Hah! There they go. I will back the peewit against the boy. So you have given

up the chase, have you? Well, rest again, and take breath. The peewit, as you saw, makes scarcely any nest, merely a hollow in the ground, with, perhaps, a few dried grasses. The peculiar instinct of the peewit in misleading people as to the whereabouts of its eggs, or young ones, is very curious. A very observant



LAPWING.

naturalist says, "As soon as any one appears in the fields where the nest is, the bird runs quietly and rapidly in a stooping posture to some distance from it, and then rises with loud cries and appearance of alarm, as if her nest was immediately below the spot she rose from. When the young ones are hatched, too, the place to look for them is, *not* where the parent birds are screaming and fluttering about, but at some little distance from it. As soon as you actually come to the spot where their young are, the old birds alight on the ground a hundred yards or so from you, watching your movements. If, however, you pick up one of the young ones, both male and female immediately throw off all disguise, and come wheeling and screaming around your head, as if about to fly in your face." Peewits are certainly bold birds when their young ones are in danger. Mr. Charles St. John says he has often seen

the hooded crows hunting the fields frequented by the peewits, as regularly as a pointer, flying a few yards above the ground, and searching for the eggs. The cunning crow always selects the time when the old birds are away on the shore. As soon as he is perceived, however, the peewits all combine in chasing him away. We are told that they will also attack any bird of prey that ventures near their breeding ground; they are quarrelsome, too, and the cock birds will fight with each other should they come into too close quarters. A cock bird one day attacked a wounded male bird which came near his nest; the pugnacious little fellow ran up to the intruder, and taking advantage of his weakness, jumped on him, and pecking at his head, dragged him along the ground as fiercely as a game cock. This was witnessed by Mr. St. John.* "I have often heard peewits uttering their peculiar noise," said Willy, "quite late at night. What do they feed on? I should so much like to have a tame young one." The food of the peewits consists of insects, worms, snails, slugs, the larvæ of various insects; I am certain they do much good to the farmer by destroying numerous insect-pests. "Oh, papa," exclaimed May, "do come here, what a splendid cluster of bright golden flowers is growing on the side of the drain." Yes, indeed it is a beautiful cluster; it is the marsh-marigold, and looks like a gigantic buttercup; it is sometimes in flower as early as March, and continues to blossom for three months or more. Country people often call it the may-flower, as being one of the flowers once used for

* 'Wild Sports of the Highlands,' p. 136.

may-garlands. I dare say you have sometimes seen wreaths hanging on cottage doors. Some people have invented what I think very ugly names for this showy plant, such as horse-blob, water-blob.

“Beneath the shelving bank’s retreat
The horseblob swells its golden ball.”

I have somewhere read that the young buds are sometimes pickled and used instead of capers, but I do not think I should like to try them. “And what,” asked May, “are those bright green feathery tufts under the water? they are very pretty, but they do not bear any flowers.” No, there are no flowers at present, but in about a month’s time you will see plenty. Out of the middle of the feathery tuft there grows a single tall stem with whorls of four, five, or six pale purple flowers occurring at intervals. Its English name is water-violet,—not a fitting name for it, because this plant is not at all related to the violet tribe, but is one of the primrose family; so we should more correctly call it water-primrose. Its Latin name is *Hottonia palustris*; it is called *Hottonia* in honour of a German botanist, Professor Hotton, of Leyden. Willy will tell us that the word *palustris* means “marshy,” in allusion to the places where the water primrose is found growing. It is a very common plant in the ditches on the moors here, and I will take care to show you its pretty tall stem when the flowers appear. While I was talking to May about the water primrose, Jack espied a sulphur-coloured butterfly, and off he set in full chase; he did not, however, succeed in capturing it, for his foot tripped

over a molehill and down he tumbled—the beautiful sulphur butterfly having fled across a wide ditch and escaped. Not far from where he fell there was a thorn bush and a number of unfortunate moles gibbeted thereon : some had been killed quite recently, so I took three or four from the thorn with the intention of taking them home and examining their stomachs to see what they had eaten. In the meantime, down we sat on an adjoining bank covered with primroses looking so gay and smelling so sweet. Willy then wanted to know the history of the mole ; why people generally think it right to kill these animals, and whether they really are blind. May, of course, could not resist the charm of collecting primroses for mamma. The two boys cared more for animals, so I answered their questions about the mole. First of all I pointed out the amazing strength of its feet, its soft and silky fur, the form of its body so well adapted for a rapid progress through the underground passages it forms. Look, I said, at its soft fur, how it will lie in any direction ; each delicate hair is inserted in the skin perpendicularly to its surface, so that the mole can move rapidly either backwards or forwards with great ease ; the fur, lying as readily in one direction as another, makes no difficulty to a backward retreat. If you look closely when I push away the fur with my finger and breath in the neighbourhood of the eyes, you will see two tiny black specs ; so we can hardly call the mole a blind animal ; but as it lives for the most part underground its power of vision must be small. The fore feet do the work of the spade and potato-fork combined ; its sense of smell is acute, and

this, no doubt, aids the animal in the search of its food; the mole's sense of hearing is also very good. "Well, but, papa," exclaimed Jack, "a mole has got no ears, so how can it hear?" There is no outward appearance of ears, it is true, but look: I blow away the fur, and now you see clearly a hole which is the beginning of the passage that leads to the internal ear. The ears of many animals are very admirably made and fitted for the purpose of receiving sounds, but you must not suppose that because some animals—as moles, seals, whales, &c.—have no outward appendages, they are destitute of ears and the power of hearing. But you must wait till you are a little older, and then I will explain to you the matter more fully. The little curiously shaped earbones which are found in all mammalia are found also in the mole; and I have in my drawer at home a mole's ear-bones which I dissected from the animal.

But here comes, I do think, the mole-catcher himself; let us hear what he has to say. "Good morning, Mr. Mole-catcher; have you been setting any more traps to day? I suppose those unfortunate fellows gibbeted on yonder thorn were caught by you." "Well, yeez, sir," he replied, "I reckons as they were; I have stopped their play, I guess; but there's a plaguey lot more on them about, I'm a thinking." "What harm do you consider that moles do?" I asked. "Harm, maister? why, lor' bless you, see them hummocks they throw up all about. The farmers dunna like them ugly heaps, I can assure you." "Probably not; still if they were spread on the land the soil would be as good as

top-dressing. Do you know what moles eat?" "Well, sir, I believe they eat worms." "Yes, they feed principally on worms, but they also devour wireworms and other creatures which prey upon the farmer's crops. I think moles do more good than harm, and I have examined the stomachs of many, and I am of opinion that it is a mistake to kill them." "Lor', sir, you be's a gemman that has seen the inside of a mole's stomach, has you? You may be a cliver sort of a mon, but moles be varmint." Thus saying, the old fellow wished us good morning and left us. "Papa," said Willy, "do not moles make very curious places under the ground in which they reside at times? I think I have somewhere seen pictures of these encampments." Yes, they do; but I only know of them from description and figures; the fortress is generally made under a hillock; it consists of many galleries connected with each other, and with a central chamber. You remember a young mole was brought to us last summer, and that we put it into a box with plenty of loose earth and some worms. We only kept it a day or two. One morning I found it dead. I suppose it had not enough to eat. The mole has an insatiable appetite, and, according to the observations of some naturalists, it will devour birds. Mr. Bell says that "even the weaker of its own species under particular circumstances are not exempted from this promiscuous ferocity; for if two moles be placed together in a box without a very plentiful supply of food the weaker certainly falls a prey to the stronger. No thoroughbred bulldog keeps a firmer hold of the object of its attack than the mole. Mr. Jackson, a very

intelligent mole-catcher, says that, when a boy, his hand was so severely and firmly laid hold of by one that he was obliged to use his teeth in order to loosen its hold."

We now proceeded on our ramble, and I espied about one hundred yards off a heron on the bank of the Strine. He did not see us at first, but when we got a little nearer, off he flew, with his long legs stretched out behind, and his head bent close to his shoulders. He had evidently been fishing, for we could see the scales of fish on the side of the bank. Willy asked whether herons built on trees, and Jack wanted to know how they managed with their great long legs while sitting on their nests. These birds in the breeding season assemble together and make their nests on tall firs or oak trees; sometimes they build on rocks near the sea coast. It is said, too, that they will occasionally build on the ground. The heron's nest is not unlike that of the rook, only larger and broader; it is made of sticks and lined with wool and coarse grass; the female lays four or five eggs of a green colour, her long legs are tucked under her. Rooks and jackdaws sometimes take up their quarters near to a heronry, and do you know they steal their eggs, the rogues, and devour them. Both male and female herons take great care of their little ones and bring them food. Besides fish the heron will eat frogs, rats, young ducks, and coots. Eels are great dainties in the opinion of Mr. Heron; and sometimes an eel, after being pierced through the head by the sharp and strong bill of the heron, manages to wrap himself so tight round the bird's



HERON AND YOUNG.

neck as to stop his breathing and cause his death. A good many years ago herons were protected by the law; they were considered royal game, and their capture by the peregrine falcon was looked upon as very exciting sport. As we followed the bank of the stream out flew a couple of kingfishers with straight and rapid flight; we distinctly heard the shrill note these birds utter; they flew about two hundred yards and lighted on a rail near the water's edge. Let us see if we can get a little nearer to them, I said, and then sit down and see what they will do. "Papa," said May, "is not the kingfisher a very beautiful bird, and the most brightly coloured of all British birds?" Yes, it is; its splendid colours remind one of the gorgeous plumage of tropical birds, and we have no other British bird with such brilliant colours. There, did you see that? one of the birds darted off the rail into the water. I have no doubt he has caught a small fish; and now he has lighted on the same rail, and with my pocket telescope I can see him throw his head up and swallow some dainty morsel. It is not at all an uncommon sight to see a kingfisher hover over the water after the manner of a kestrel-hawk; suddenly it will descend with the greatest rapidity and again emerge, seldom failing to secure a fish for its dinner. "Did you ever find a kingfisher's nest, papa?" Willy inquired. Yes; some years ago I found one in a hole in a bank; there were four eggs in it, and I had to put my whole arm into the hole before I got at the nest, which consisted of sand mixed with a great quantity of very small fish bones. The eggs are very pretty, having a delicate pink tinge, the shell is thin, and the

form of the egg almost round. "But where," asked Jack, "do the little fish bones of the nest come from?" I think I have told you that many birds—hawks, eagles, owls, shrikes, &c.—throw up from their crops the indigestible portions of their food. It is not uncommon to find these on the ground in the course of one's rambles. Kingfishers possess this power; they throw up the undigested fishbones, and curiously enough, as it would appear, form them into a nest. There is a kingfisher's nest in the British Museum, which I remember to have seen a few years ago. It has been a disputed point whether the parent bird throws the fishbones up at random into the hole where she is going to lay, or whether she forms them into a nest. The nest in the British Museum was secured at the expense of great patience and pains by the celebrated ornithologist and splendid draughtsman, Mr. Gould, whose drawings you may one day see in the library of the museum at Eyton. This specimen, if I remember right, was of a flattened form and fully half an inch thick. It is said that the kingfisher always selects a hole that has an upward slope, so that, though heavy rains may cause the water of the river bank to rise into the hole, the eggs will be dry. Some naturalists have said that kingfishers do not make their own holes, but use those already made by other animals. Mr. Gould, however, is of opinion that kingfishers drill their own holes. The tunnels always slope upwards, as I said; at the further end of the tunnel is an oven-like chamber where the nest is made. The fish-bone nest is thought by Mr. Gould to be really a nest, and intended

to keep the eggs off the damp ground. However, there is difference of opinion on this point, and I reserve my own. We will see if we cannot find a king-fisher's nest some time this summer. Now, May, what little plant have you got hold of? "Indeed I don't know, papa, but it is a very curious little plant; I gathered it at the bottom of that hedge bank." Ah, I know it well, and a little favorite it is too; it is the moschatell. You see it is about five inches high, with pale green flowers and leaves; the flowers are arranged in heads of five each, namely, four on the side, and one on the top; it has a delicate musk-like odour, very pleasant and refreshing. Take a few specimens home and put them in water with your primroses. Mamma, I know, is very fond of the pretty little moschatell.

"Oh, papa," exclaimed Willy, "look at the bottom of this drain; what is that strange-looking insect crawling slowly about at the bottom?" I see; it is a water-scorpion, a very common insect in these drains on the moors,—indeed, it is common everywhere; let us catch him and take him home for examination. He is a queer-looking creature, with a small head and pointed beak; his fore-arms are something like lobster's claws; his prevailing colour blackish-brown, like the mud upon which he crawls; his body is very flat, and ends in two long stick-like projections; underneath these horny covers of the creature may be seen his two wings. He is an aquatic murderer; inserting that pointed beak into the body of some other insect, and holding his victim in his lobster-like forearms—oh! fatal embrace—he sucks out the juices of the struggling

prey. Kirby and Spence say that some of the tribe of insects to which the water-scorpion belongs are so savage that they seem to love destruction for its own sake. A water-scorpion which was put into a basin of water with several young tadpoles killed them all without attempting to eat one. The tail projections, I ought to tell you, are connected with the insect's breathing; they are protruded out of the water and conduct the air to the spiracles at the end of the body, about which I must tell you more at another time. The eggs of the water-scorpion I have frequently found; they are of an oval form, with seven long hair-like projections at one end. But it is time to go home, our walk to-day is over; let us look forward to another holiday and another country ramble.



WALK II.

APRIL.

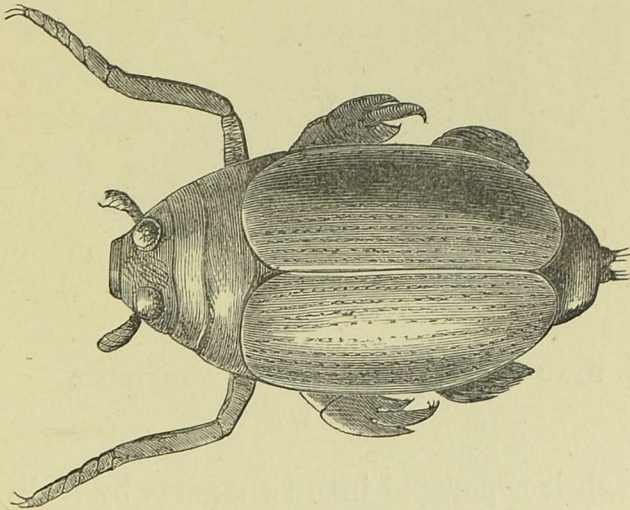


WE will walk to-day along the side of the canal bank as far as the aqueduct, then take the Duke's Drive and home by Lubstree Park; we shall find lots to see and to admire in the course of our ramble. We notice plenty of those beautiful balls of green jelly (*Ophrydium versatile*) in the clear water of the canal which, you know, we see every spring. These balls vary in size from that of a pea to that of Jack's fist; they are, you see, generally attached to some water-weed, and consist of myriads of very minute creatures called *infusoria*, which are imbedded in a mass of whitish jelly; these animals can detach themselves from the jelly and swim freely about; of course it requires a microscope to see the tiny green animalcules. If we examine a single specimen under a high power of the microscope we shall see its shape, which, when fully extended, is long and cylindrical, having at one end a mouth surrounded, as is usually the case in the *infusoria*, by a circle of very fine hairs, or *cilia*, as they are called, from the Latin word *cilium* an eyelash; the mouth opens into a long narrow channel, the creature's throat, which leads to its stomach; towards the opposite extremity the animal

tapers, till it ends in an extremely long fine hair-like tail which is fixed in the jelly-like ball; when the little creature prefers to swim freely about in the water it leaves its tail behind it, unlike, in this respect, to little Bo-peep's sheep! These balls were once supposed to belong to the vegetable kingdom, but there is no doubt about their animal nature.

“Oh! papa, what is that bird with a black head that flew from the side of the canal to the hedge?” said Willy “There, don't you see it?” Yes! I see, my boy, it is the black-headed Bunting or Reed Sparrow, common on the sides of rivers, canals, and ponds. The specimen you see on the hedge is a male bird, the females are a little smaller and have not black heads. See how beautifully contrasted are the deep-black head and white collar on the neck. In the spring and summer these birds may be frequently seen, male and female together; in winter they associate with others of the finch tribe, forming large flocks. The nest is generally placed on the ground amongst the sedges and coarse grass; the eggs, which are four or five in number, are laid in May and, I believe, a second brood sometimes is produced in July. The nests of the Reed-bunting are difficult to find, at least, I have seldom been successful. You know how cunning the peewit is in trying to lead people away from its nest or young ones. Well, some observers have remarked the same thing in the case of the reed-bunting. One writer says, “Walking last spring amongst some rushes growing near a river my attention was arrested by observing a black-headed bunting shuffling through the rushes and trailing along

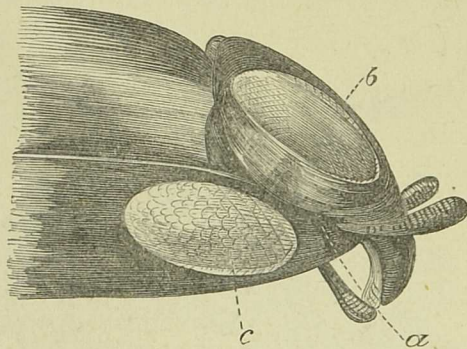
the ground, as if one of her legs or wings was broken. I followed her to see the result, and she, having led me to some considerable distance, took wing, no doubt much rejoiced on return to find her stratagems had been successful in preserving her young brood." "Ha! ha!" interrupted Jack, "the gentleman was nicely deceived then." No, not entirely, because he goes on to say he afterwards found the nest, which had five young ones in it. One thing more I ought to tell you; not to confuse the reed-bunting with the reed-warbler, a very different bird, which very probably we may notice in to-day's ramble.



WHIRLIGIG BEETLE, MAGNIFIED.

We now had another look into the canal, and saw numerous little whirligig beetles, performing their merry-go-rounds on the top of the water. With what amazing rapidity they skim along, to be sure! Some diving beneath the surface, some resting on a water

leaf. If we catch one in our net and examine it more closely we shall see that, in form, it is like a miniature boat. It seems surprising that these little "whirligigs," "whirl-wigs," or "shiners," as they are called, should perform their rounds so closely together, without sometimes coming into collision. If you will look ever so long a time you will not see one animated boat run foul of another. Just think of a couple of hundred skaters on a small piece of ice playing at cross-stick. Oh! would they not be constantly knocking one another over? Now look at Mr. Whirligig's eyes,

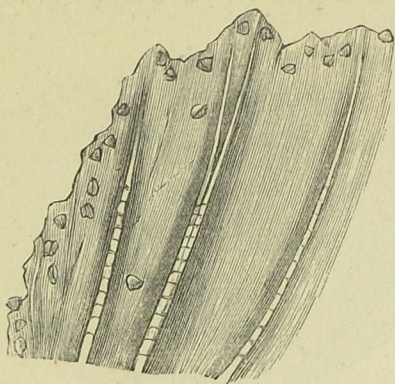


HEAD OF WHIRLIGIG BEETLE, MAGNIFIED.

a. Mouth. *b, c.* Eye.

you see each is separated into two parts by a division; the one is on the upper part of the head and looks towards the sky, the other is on the under part of the head and looks into the water. Now let us all keep quite still—the whirligigs rest. Now let us move—just look, they see our motions and off they start on their merry-go-rounds. It was with this upper part of the eye they saw us; should some sly fish, from below

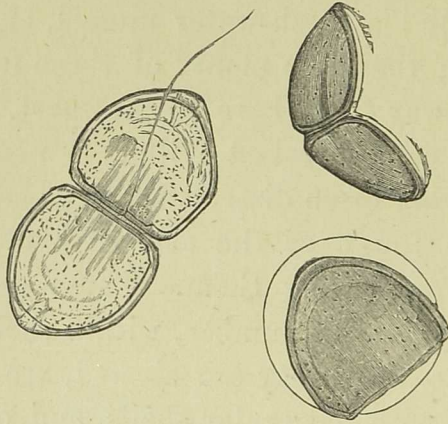
the surface of the water, make a rush at one, the beetle sees the enemy with his under eye and avoids him. What have you caught now, Jack? fish him out whatever it is. Oh! a fresh-water mussel, and a very fine specimen too; there are plenty of these fellows in the canal all the way from here to Newport. "Are they good to eat, papa?" asked Willy. I never tried one, but, from having often dissected specimens, I should say they were as tough as the sole of a boot. I never heard of anyone eating them. These molluscs carry their eggs, myriads in number, within their gills. The young, at the time they are ejected, are very curious little animals with triangular shells, and, oddly enough, they will fasten upon the fins or tails of fish, on which they will stick for some time, but how long I do not know. This particular mollusc is known by the



FRY OF SWAN-MUSSEL, PARASITIC ON A FISH'S FIN.

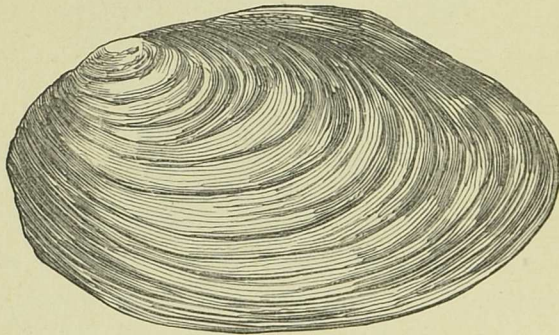
name of swan-mussel; the young fry are sent into the water in April and May. There is another kind of fresh-water mussel in rivers and streams, called the pearl-mussel, pearls being occasionally found

in them. I had one of these pearls once given me by a lad, taken from a river in the Isle of Man. I



FRY OF SWAN-MUSSEL, HIGHLY MAGNIFIED.

took it to a jeweller, in Liverpool, who valued it at a guinea. Your uncle Arthur, to whom I gave it, had it set in gold as a pin. "I wish," said May, who had

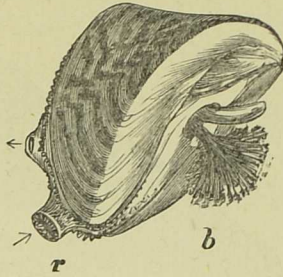


FRESH-WATER MUSSEL.

listened to this part of the story with great attention, "I wish pearl-mussels would live in the canal, it would be so nice to get the pearls out of them." Very few mussels are found to contain the pearls; perhaps you

might have to open many hundreds before you found a single pearl, and I should not like to cause the death of so many harmless animals for the sake of a single pearl.

“Here is another swan-mussel, and, just look, papa,” said Jack, “some other shells are fastened on it.” So there are; it is a lot of the curious and pretty little zebra-mussel. How prettily they are marked with zig-

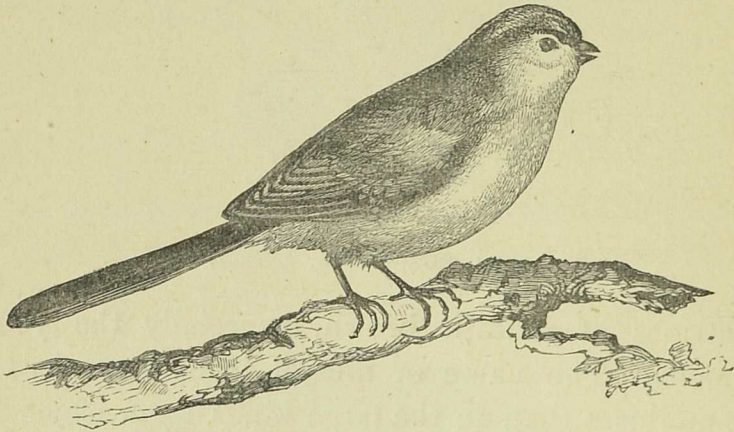


ZEBRA MUSSEL.—*b*. Byssus.

zag stripes of reddish brown, especially the young specimens. The name of mussel is better suited to these molluscs than to the large kinds upon which the “zebras” are often attached, because, like the salt water mussel you have often seen at New Brighton, they have the power of spinning, what is called, “a byssus”—here, you see, is the substance I mean—by which they fasten themselves to shells, or to stones, roots, and other things.

There flies one of those pretty little birds, the long-tailed titmouse; it is common enough, certainly, but I never fail to notice several upon the hedges and poplar trees of the “Duke’s drive.” There are several members of the titmouse family found in Great

Britain; let me count them. First we have the great tit, then the little blue-tit, the long-tailed tit, the cole tit, the marsh, the crested and the bearded tit. How many does that make? Seven; but the crested tit is very uncommon, and the bearded tit does not occur in Shropshire. The other five are quite common and we shall, I dare say, be able to see all in the course of to-day's walk. The long-tailed tit, so called on account of the great length of the tail feathers, is a very



LONG-TAILED TIT.

active, lively little bird. Indeed, activity and liveliness belong to all the tit family. See how the little fellow flits from branch to branch, seldom remaining long on one spot. It is a very small bird, almost the smallest British bird we have; of course I am thinking of the tit's body and not taking into account its tail. The skin is remarkably tender, and thin as tissue paper. Like all the titmice, the long-tailed tit feeds on insects and

their larvæ. I do not remember to have heard or seen this species tapping the bark of a tree with its beak, as the great and the blue tit are frequently in the habit of doing, but most probably they do the same. "What do they tap for, papa?" asked May. I suppose for the purpose of frightening the tiny insects, which lurk under the bark, from their hiding places, when they quickly snap them up with their sharply-pointed bills and devour them. "Is not this the tit which the people about here call a bottle tit, and which makes a very beautiful nest?" asked Willy. Yes, the nest is indeed a very pretty object, and one that you would never, I think, confuse with the nest of any other bird. The outside is formed of that white-coloured lichen, so pretty and so common, and moss, and if you were to put your finger, May, into the inside, which is full of the softest feathers, you would say it was as nice as your own muff. The nest is oval, with a hole at the side. I believe that sometimes two holes exist, but I have never seen two in a nest. The eggs are very small, and are white with a few lilac spots. As many as a dozen or more are sometimes found in a nest.

The little blue-tit, which has just fled across our path is a very pretty active bird and common everywhere, in lanes, woods, and gardens. The blue-tit makes its nest in a wall or a hole in a tree and lays about nine or ten pretty little spotted eggs. How often I remember, when I was a boy, to have been bitten rather sharply by this little bird into whose nest I had placed my hand; I can fancy I hear the snake-like hissing which the blue-tit utters when some rude hand invades its

home. Its food consists of various kinds of insects and insect larvæ, which it finds on the bark of trees and in fruit buds. I think it does much good by destroying numbers of injurious insects, though gardeners and others destroy this bird, because they say it harms the fruit buds. Look at that little sprightly fellow, how restless he is; in what curious attitudes he puts himself on yonder branch. Hark! you hear him tapping quite distinctly. Besides insects, blue-tit does not object to make a meal of dead mice or rats. Mr. St. John tells us that a blue-tomtit once took up his abode in the drawing-room, having been first attracted there by the house flies which crawl on the window. "These he was most active in searching for and catching, inserting his little bill into every corner and crevice and detecting every fly which had escaped the brush of the housemaid." He soon became more bold and came down to pick up crumbs which the children placed for him on the table, looking up into Mr. St. John's face without the least apparent fear. Boys sometimes call the little blue-tit Billy Biter, no doubt from personal experience of the sharpness of Mr. Tit's beak. The great tit which we can see under the yew tree in our garden, almost any hour of the day, is very common in the neighbourhood, and I dare say if we look well about us during our walk we shall see some to-day.

"Oh! papa," exclaimed Willy, "there are some birds on the towing-path of the canal, about sixty yards off; they seem to be breaking something with their beaks by knocking it against the ground; just

look." Yes, they are thrushes, and I can tell you what they are doing and what we shall find when we come up to the spot. We shall see several broken snail shells (*Helix*), which the thrushes find on the grassy slopes of the canal bank, and then bring up to the path in order to get at the animals inside the shells by breaking them against the hard ground and stones. There! as I told you, you see at least a dozen broken snail shells. I am sure the thrushes do a great deal of good by destroying both snails and young slugs, and it is a pity their labours are not more appreciated than they are. Lads in the village, and great grown men from the collieries, are continually hunting for the nests, eggs, or young of thrushes, and many other useful birds, which they wantonly destroy. Now we get on the Duke's Drive, and there, on a branch of a poplar tree, I see the great tit. Look at him; he is the king of the titmice, and he seems to know it. He is a restless fellow, like tits in general. Look at his black head and breast, white cheeks and greenish back. Now, by one of his hooked claws, he hangs suspended from a branch; now again he is clinging by both legs; see how busy he is, examining the leaves and bark in search for insects. But Major Tit is a bit of a tyrant sometimes and uses that sharp short straight bill of his with deadly effect upon some of his feathered companions, on whose heads he beats repeated blows till he cracks the skulls and eats the brains! The marsh-tit and the cole-tit are pretty common in this neighbourhood, we may often notice them in our walks.

If Willy were to get over the hedge with his net and

dip it amongst the weeds of the pool, I dare say he will succeed in catching a few water-insects, which he can put in his bottle and bring to me. Of course the boy was delighted at the idea of dabbling with his net in the water—boys generally get immense fun from such amusement, and their clothes frequently not a little dirt. A weedy pond is a grand place for naturalists, and various are the beautiful and strange forms of animal life which are found there. Dipping amongst the duckweed and water-crowfoot is always attended with numerous captures, and Willy's bottle was soon full of active little creatures. Let us see what it contains. A large beetle is very conspicuous amongst the contents, now rushing to the top of the water, now sinking to the bottom, scattering far and wide the tiny water-fleas, and other little creatures by the strong and rapid movements of his swimming legs. This is the great water beetle; we will sit down on this clump of poplar tree by the side of the road, and take the beetle out and examine him; we must take care he does not bite our fingers as we hold him, for his jaws are powerful and sharp. Mr. *Dyticus*, for that is his learned name—from a Greek word which means “fond of diving”—is one of the most voracious of water-insects, but let us first examine his form. You see it is well adapted for the kind of life the beetle leads; look at that long oar-shaped pair of feet, what a broad fringe of hairs besets them, how admirably fitted they are for swimming; the wing-covers are smooth and glossy, without any furrows; by this I know the specimen to be a male, for the wing-covers of the female are fur-

rowed. The structure of the forefeet is very curious ; you observe its under portion forms a broad circular shield, covered with a number of sucking-cups, two or three being much larger than the rest ; by means of these sucking-cups the beetle can attach itself securely to any object it wishes. The wings are large and strong, and situated, as in all the beetle tribe, under the horny wing-covers. I will put this bit of stick near his mouth ; there, Jack, you see his strong jaws, and great use he can make of them I can tell you. If Willy were to put one of these beetles into his aquarium with his favourite sticklebacks, he would soon have cause to lament the untimely loss of some of them ; woe betide the unfortunate fish or newt that is once caught by the strong jaws of this fresh-water tyrant ! I have seen Mr. Dyticus rush upon a full-grown newt, and no twistings and writhings could free the victim from the fatal embrace. They will attack young gold and silver fish, and Mr. Frank Buckland has told us of the sad havoc these water-beetles do to young salmon, as witnessed by himself in a pond in Ireland. The forefeet you see are strong but small ; the beetle uses them as claws in seizing its prey and conveying it to the mouth. A young and tender fish, you can easily imagine, Mr. Dyticus would very readily devour, but he will attack beetles as large and even larger than himself, seizing them on the under side where the head joins the body, the only soft place in a beetle. Dr. Burmeister, a naturalist who paid great attention to insects, tells us that he once kept a beetle related to the great water-beetle, and saw it devour two frogs in the space of

forty hours. After the eggs are laid, which always takes place in the water, the larvæ are hatched in about a fortnight. In time—I do not know how long—these larvæ grow to the size of about two inches in length, and queer fellows they are, and very voracious and formidable-looking. Now, Willy, lend me your net, and I dare say we shall soon secure a specimen. What have we here? how the pond swarms with water-fleas! Oh! here is a treasure! What can it be? a long animated thread of glass—we will put it into a bottle by itself and I will tell you about it afterwards. Splash goes the net again, but no water-beetle larvæ. Never mind; what does the child's songbook say—

“If at once you don't succeed,
Try, try, try again.

A capital little verse to remember, so we will try again; and there now we are rewarded by the capture of a dyticus larva—a creature with a long body—in some respects reminding one of a shrimp. Oh! look at his jaws, how wide he opens them! You see that the last segment of the body is provided with a long pair of bristly tails, by means of which the creature can suspend itself at the top of the water. I have often kept specimens of these larvæ in vessels of water and noticed their predaceous habits; they feed on the larvæ of other water insects, but are not able to destroy fish, not being furnished with jaws or bodies nearly so strong as the perfect insect itself possesses. When the larva wishes to turn into its pupa state, it makes a round hole in the bank of the pond it inhabits, and there undergoes its change, turning into a full-grown beetle in about three

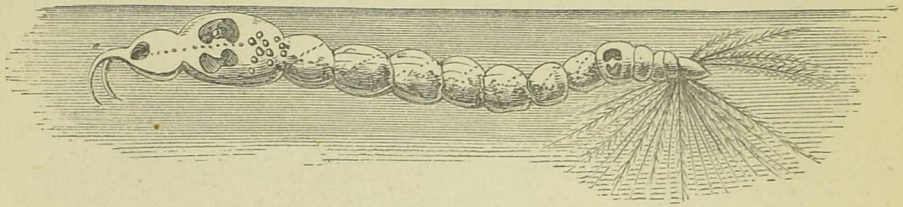
weeks' time. "Papa," said Willy, "I have often caught beetles that remind me of the great water-beetle, but



GREAT WATER-BEETLE, LARVA AND PUPA.

they are not so large; what are they?" They belong to the same family as the great water-beetles, and are called *Colymbetes*, *Acilius*, *Cybister*; I do not know that they have any English names. Come, we have dabbled in this pond long enough for the present, let us proceed on our walk. "Well, but, papa," said May, "you have not told us what that long worm-like creature is in the separate bottle; do let us look at it again. Oh! really it is a curious creature, why it is as transparent as glass, now it jerks itself about, now it floats without motion in mid-water. What is it?" "I am inclined to think,"

said Willy, "judging from its wriggling, jerking motions that it must be the larva of some kind of gnat." Right again, my boy, it *is* the larva of a gnat, and one known to naturalists by the name of *Corethra*; you see there are eleven divisions or segments in the body; the head is of strange form, and near the mouth are two hooked arms which spring from the middle of the forehead and bend down in front of the mouth; with these weapons the *Corethra* larva seizes its prey and crushes it between two rows of sharp spikes placed under the mouth; after being bruised and mangled by this apparatus the prey



CORETHRA LARVA, MAGNIFIED.

is ready to be swallowed. "But what," asked Jack, "are those four curious black bodies; one pair near the head, the other pair near the tail of the animal?" They are air-sacs, and are connected with the breathing or respiration of the larvæ. Some have supposed that they serve the same office as the swimming bladder of certain fish, which being compressed or dilated at will enables the creature to remain still in mid-water or to rise or sink in it. After a time the larva changes to a pupa, in which state it lives without eating for a few days, and then turns into a gnat. We now proceed on our walk and come to a part of the road which has a plantation on either side; we see a little active

creature crossing the road and at once recognise a weasel. Let us keep quite still and silent, and we shall, I dare say, have an opportunity of watching it for a short time. Just look at him! how nimbly the little creature runs along; now he stops and raises his head as if listening for something, now off he starts again; he is evidently hunting, and probably is on the scent of a young rabbit, rat, or field-mouse. Ah! see he has caught something on the grass near the hedge; what has he got in his mouth? it is a small rat, I think; now he throws his flexible body over it and gives it one or two bites. Now, Jack, run up and catch him. Ah! he is off like a shot; you must not think to "catch a weasel asleep." I often see these little animals in my rambles, and always stop to witness their extraordinary activity. Weasels will sometimes climb trees and surprise some unfortunate bird on her nest; they are fond of eggs, and a bird's young brood are very dainty morsels; they will also eat moles and are sometimes caught in mole-traps. An excellent observer mentions a case of a mole-trap having been found many years ago with two weasels in it; they had been hunting in the mole's runs, had come in opposite directions, and "by a curious coincidence, must have both sprung the trap at the same instant." Weasels are generally classed as vermin and killed on all possible occasions; I think it is often a mistake to destroy them; no doubt they will occasionally catch a young rabbit or a leveret or suck a few partridges' eggs, but the common food of the weasel consists of such small animals as mice, moles, rats, small birds. In wheat or other grain ricks,

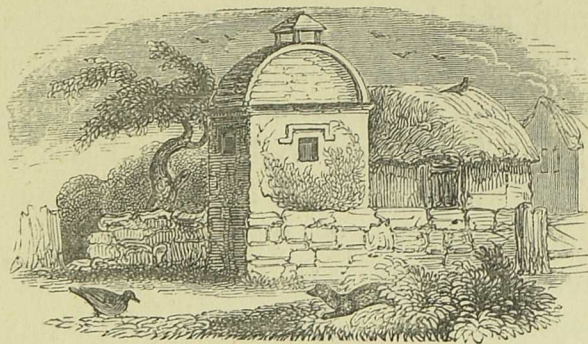
they ought to be encouraged, as they enter them for the sake of the rats and mice they find there. I have been told by a friend that in some parts of Wales the farmers look upon the weasel as a friend, in consideration of the destruction it causes to mice and rats. A gentleman living near Corwen killed a weasel, and expected to receive the thanks of the farmer on whose land it had been killed; he was surprised to find that the farmer was by no means grateful. In this respect I think the Welsh farmers are wiser than the English ones. Hawks sometimes prey upon weasels. Mr. Bell tells a story of a gentleman who was riding over his grounds, once



STOAT AND EGGS.


having seen a kite pounce upon some object on the ground and rise with it in his talons. "In a few moments the kite began to show signs of great uneasiness, rising rapidly in the air, or as quickly falling, and wheeling irregularly round, whilst it was evidently trying to force some hurtful thing from it with its feet." After a short but sharp contest the kite fell suddenly to the ground, not far from where the gentleman was watching the proceeding. On riding up to the spot "pop goes the weasel," none the worse for his aërial

journey, but the kite was dead, for the weasel had eaten a hole under the wing. The weasel makes its nest in a bank or in loosely-constructed stone walls; three or four young ones are generally produced. Some years ago I remember seeing a mother-weasel and three young playing about on a bank. It was a most interesting sight. The weasel is much smaller than the stoat, and you can tell it at once by its tail, which is entirely red; that of the stoat has a black tip. But it is getting late and we must hasten home.



WALK III.

MAY.

O-DAY we will go and hunt for sticklebacks' nests; as it is calm I think we shall have very little trouble in finding a few; a calm day should always be chosen, because to find the nests of these little fish it is necessary to have very sharp eyes, and to look very closely, and you know if there is much wind the water is ruffled, and then it is not easy to see objects in it. Let us start off, then, with bait-can, canvass-net, and two or three large-mouthed bottles, to that small, clear, shallow pond in Mr. Jervis's field, and see if we can bring home a few fish and eggs. "It will be great fun," said Willy, "and when we have caught the little fish we will bring them home and put them in my aquarium." There are three species of sticklebacks found in this country, the three-spined, the ten-spined, and the fifteen-spined—this last inhabits salt water. All three build nests, and show great care for their little brood. The nests of the three-spined species are those most generally known, though I dare say, if we search carefully in the drains on the moors, we shall be successful in finding a nest of the ten-spined fellow, or tinker, as he is sometimes called. Here we are at the pond, how clear



THREE-SPINED STICKLEBACK AND NEST.

it is, and how beautifully green are the few patches of star-wort in the water! As the grass is quite dry we can all sit down so as to get our eyes as near to the water as possible; never mind a few crawling ants. May; if they bite you, I shall not feel it. Ah! do you see that little fellow with crimson breast and eyes like emeralds? He sees us, for look how disturbed he seems; now he darts away and hides under a weed, but soon returns to the same spot; it is pretty certain he has a nest close by. I will put my walking-stick into the water near him. Well, actually, the brave little fellow is not the least frightened; see, he bunts his nose against the stick, and is very angry; he is afraid of some danger to his nest—this makes him so bold. Now I have made out where the nest is, it is close under him; do you see a few small holes in the mud at the bottom of the water? No, you don't see anything; well, then, give me my stick and I will point them out. There now, do you see what I mean? Yes, you do; that is all right. "Let us get the nest out of the water," said Jack. Have patience; let us watch what the fish is doing; see, he is busy fanning away with his tiny fins directly over the nest. "What is he doing that for?" said Willy. The quick movements of his fins bring fresh currents of water to the eggs or little fry that may be within. Ah! did you see that? another fish came near the nest; how furiously our brave "soldier" charged him; how quickly the intruder retired! I do not think he will dare to approach so near again for a long time, for those sharp spines on the under side of the soldier are

like a couple of bayonets and can inflict serious wounds. Let us leave this nest for a time and try to find some more. Now that you have once seen a nest, you will not have much difficulty in finding others. Willy soon found another nest; "just look," he said, "there are a lot of the tiniest little things close to the nest." Yes, indeed, so there are; the eggs have hatched, and these are the little fry; there is Father Stickle quite proud of his numerous family, and quite ready to fight for them should any enemy be rash enough to intrude, for you must know that sticklebacks, like many other fish, do not object to eat the young fry of their neighbours, and if the parent there—it is the male only that is the protector—were to be removed, a hungry pack of other sticklebacks would crowd around and make sad havoc amongst that happy little family. I remember some years ago having once taken a father stickleback away from his nest, and, after putting him in my collecting bottle, I sat down to watch the result. Soon an invading army of other sticklebacks approached and attacked the nest for the purpose of getting at the clusters of eggs it contained. They pulled it about sadly, till I began to be sorry for what I had done. I returned the captive-parent to the water; at first he hardly knew where he was, and seemed confused, the result, no doubt, of his confinement in the bottle; but he was not long in coming to himself—he remembered his nest and the treasures it contained; he saw that devastating army all around it, and, summoning all his courage, the soldier-parent began an attack, now rushing at one and now at another enemy, till he was left

alone on the battle-field, having thus gained, single-handed, a glorious victory indeed.

Well, we will take this one home, with nest and eggs it contains. You see the nest is a mass of tangled grass roots and other weeds; now that it is out of the water it is a shapeless mass. However, here is a cluster of pinkish eggs, and if you look closely you will see two little specks in each egg; so that the fish is being formed, for these are the little thing's eyes. You can see, too, the tiny things jerking their tails about every now and then. It is most interesting to watch the care the parent takes of his little ones when hatched. Some few years ago I put a male stickleback in a basin of water in charge of his nest. When the young ones were hatched it was most curious to notice his anxiety for their welfare. Of course young sticklebacks, like young children, are of an inquisitive turn of mind, and apt to play truant too occasionally; but should some little fellow wander too far from the nest, Father Stickle hurries after him, takes the little truant in his mouth, and spits him out right over the nest. This I repeatedly witnessed myself, and I have no doubt you will be able to see the same thing yourselves.

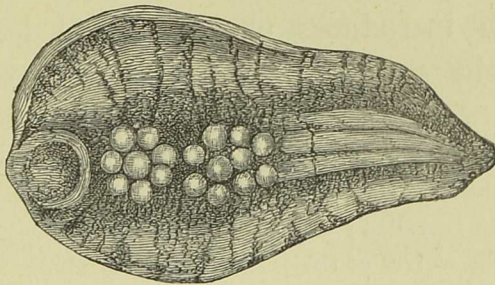
"Are not sticklebacks quarrelsome little fish?" asked Willy. Yes, they are very fond of fighting, and they are so bold that they do not fear any enemy, whatever his size. I once kept a small pike, about ten inches long, in an aquarium, into which I also introduced five or six sticklebacks. I suppose the pike did not much like the look of the prickles or spines, for he did not eat the fish. Once I saw him make the attempt,

but after getting Master Stickles into his mouth, he quickly threw him out again, not relishing, I suppose, the *sauce piquante* of the spines. The sticklebacks were really masters; they tormented Mr. Pike dreadfully; first one would take a bite at his tail, and then another, till the tail had a woful expression indeed; so I turned the pike into a pool of water, and I dare say the *retail* business has long ere this been completed.

“Are there any other kinds of fish,” asked Willy, “that make nests and take care of their young ones like the three species of sticklebacks?” Yes, there are several kinds of fish which do so, but no other British fresh-water kinds, I believe. There is the salt-water *Lumpsucker*, a fish of strange form and brilliant colour—you know the pickled specimen in my study—whose young soon after birth fix themselves to the sides and on the back of their male parent, who sails, thus loaded, away to deeper and more safe retreats. There are the long pipe-fishes, the males of which possess each a singular pouch on the tail; in this the eggs of the female are deposited and matured; the young ones occasionally leave their strange abode, and after swimming about for a time return to it again, reminding us in this respect of the kangaroos and opossums amongst mammalia. There are also fish which inhabit the rivers of Demerara which make nests and show great attachment to their young ones, and I dare say several other fish will be found to do the same.

“Oh! papa, do look here; as I was turning over this bit of flat tile I saw in the water I found a creature something like a leech, and on raising it up I saw what

looks like a quantity of the animal's eggs, and she seems to be sitting upon them as a hen upon her eggs." All right, Jack ; let me look, I dare say it is one of the snail-leeches. Yes, to be sure it is, and here are the eggs which the creature carefully covers with her body, and upon which she will sit till the young ones are formed ; the small brood, sometimes one hundred and fifty or more in number, then attach themselves to the under surface of the parent, and are carried about



SNAIL LEECH.

wherever she goes. There are various species of this interesting family ; all are inhabitants of fresh water ; some incubate or sit upon their eggs, others carry them about in a hollow formed by the contraction of the sides. They have a long tubular proboscis, by means of which they suck out the juices of pond-snails and other water creatures. These snail-leeches move along in the same way as the common horse-leech and the medicinal leech, namely, by fixing the head-part on to the surface of some substance in the water and then drawing the hinder part up to it ; they then extend the head-portion and fix it upon another spot, again drawing up the other extremity. But the leeches, properly

so called, have all red blood; that of the snail-leeches is colourless.

“Is the leech used to bleed people when they are ill ever found in the ponds of this country?” asked Willy. I believe it is rarely met with now-a-days; most of the leeches used in medicine are imported from Spain, Hungary, the south of France, and Algeria; many millions are brought every year to this country. The medicinal leech was, however, once pretty common in the lakes and pools of the north of England. The poet Wordsworth introduces us to an old leech-gatherer lamenting the scarcity of the animals in the following lines:

“He with a smile did then his words repeat
 And said that gathering leeches far and wide
 He travelled; stirring thus about his feet
 The waters of the pool where they abide.
 Once I could meet with them on every side;
 But they have dwindled long by slow decay;
 Yet still I persevere and find them where I may.”

This sonnet was written in 1807, and when we consider the immense numbers used in medicine, and the utter neglect of leech culture in this country, we shall cease to wonder that native leeches are very scarce. It is said that four only of the principal dealers in London import every year more than seven million leeches. The annual demand in France was estimated in 1846 to be from twenty to thirty millions; Paris requiring three millions a year. “I should be very sorry, papa,” said Jack, “to walk about like the old man in the lines you quoted just now, with bare legs in the water, making them a bait for leeches. Ugh!

it is horrible to think of; they must suck a good deal of blood from the man's legs." There is nothing like being used to a thing, and when you remember that many people derive their whole support from the leeches they gather, you will not wonder that they do not fear a few leech bites. I do not suppose they lose much blood; no doubt the gatherers pick them up pretty quickly and put them into their collecting cases; besides the chief flow of blood from a leech-bite occurs after the leech has been removed; the flow is encouraged by the application of warm fomentations, but the cold water of a pool would stop the flow of blood in the case of the man's legs. We ought to be thankful for the existence of an animal which is of such immense service to mankind. I suppose it was the appreciation of their value in medicine that induced French ladies, about forty-five years ago, to regard leeches with especial favour. Many people remember the Cochin-China *mania* and the sea-anemone *mania*, but, May, what will young ladies say to the fact that in 1824 there existed in France a *mania* for leeches? The most enthusiastic admirer of Cochin fowls or sea-anemones would never have thought of carrying her admiration of her pets so high as to wear on her dress figures of these animals; but we learn from a French writer that there might have been seen at that period elegant ladies wearing dresses *à la Broussais* on the trimming of which were imitations of leeches! Broussais, you must know, was a physician, no doubt a fashionable ladies' doctor, and a great patron of leeches. "What," asked Willy, "are the leeches I often find in

the drains on the moors and in other places?" I have no doubt you often find these kinds; there is a small leech, the commonest of all, called *Nepheles*, whose little oval cocoons are so frequent on the under sides of stones in the water and on water plants. I will soon find a few cocoons; look here, under this bit of brick tile are five or six; they now contain eggs, as I will show you, by slitting open the case with my penknife. These gradually change to young leeches, which find their way out of the cocoon through one or other of the two openings at either end. Then there is the horse leech, and another very similar to it, called *Aulastoma*, which means having "a mouth as wide as a hall;" it has no English name, but we may give it one if you like, and call it "the hall-mouthed leech." Its mouth is capable of great stretching, and can readily take in huge earthworms nearly the size of itself. I once witnessed a curious sight—I put a couple of "hall-mouths" into a glass vessel of water, and introduced also a great fat lob-worm; each leech seized the worm, the one took the head, the other the tail. As the worm got gradually swallowed the two leeches came to very close quarters, and at last touched. What was to happen? would they twist and writhe about and break the worm, and so share the "grub" between them? No; the one fellow quickly proceeded to swallow his antagonist. I watched him carefully, and he succeeded in getting down the red lane about an inch of his companion; but whether he did not like the taste, or whether he had qualms of conscience for taking such unfair advantage of a near relation, I

know not; after a few minutes the partly swallowed leech made his appearance again, apparently none the worse for his temporary sojourn in the throat of his companion. This leech may be seen sometimes on damp earth in search of its favorite earthworms. I should mention also that another worm-devouring leech has lately been found in this country; it is known by the name of *Trocheta*, called after a French naturalist, Du Trochet, who first described it. I dare say if we look carefully we shall find it in this neighbourhood. All these leeches lay cocoons in which the young are developed. Let us leave the pool and take our little fish with us, taking care not to shake the can more than we can help. We are now in the fields; the grass is beautifully green after the late rain. Look at that crab tree in the hedge; did you ever see such a magnificent mass of blossom? The hawthorn hedges are loaded with May-buds; what a show of May there will be in a fortnight's time. Let us gather a sprig of crab blossom and a few bits of May-bud, and see if we cannot gather a pretty handful of wild flowers for May to take home to mamma. Here are a few cowslips with their drooping golden bells and delicious scent; I am afraid we shall not find enough to make a cowslip ball. Here is cuckoo-flower, which, as old Gerarde says, "doth flower in April and Maie, when the cuckoo doth begin her pleasant notes without stammering." Old Gerarde, by the way, ought to have said "*his* pleasant notes," for it is the male bird alone that cries "cuckoo." Its flowers are of a delicate pale purple when at the height of its beauty; they become nearly white when

on the wane. "Ladies' smock" is another name for this harbinger of Spring; Shakespeare speaks of it—

"The daisies pied and violets blue,
And lady-smocks all silver white."

Here is blue speedwell and the delicately pencilled stitchwort with its pure snow-white blossoms and delicate green leaves. It is a lovely Spring flower and very common amongst the grass of every hedgerow. We will pluck a few bits; how brittle the stem is. What curious ideas our ancestors must have had; fancy calling this plant "all-bones!" Its name, stitchwort, no doubt alludes to the plant's supposed virtue in cases of "stitches" in the side. The following lines of Calder Campbell on Spring flowers I am sure you will think very pretty:

"The buds are green on the Linden tree,
And flowers are bursting on the lea;
There is the daisy, so prim and white,
With its golden eye and its fringes bright;
And here is the golden buttercup,
Like a miser's chest with the gold heap'd up;
And the stitchwort with its pearly star,
Seen on the hedgebank from afar;
And there is the primrose, sweet, though wan,
And the cowslip dear to the ortolan,
That sucks its morning draught of dew
From the drooping curls of the harebell blue."

Here is more "May-flower" or marsh marigold; let us take some; it will make a bright show in our wild-flower cluster. We will put a sprig or two of copper beech, with its rich brown leaves, which we can get from the garden, two bits of lilac, purple and white;

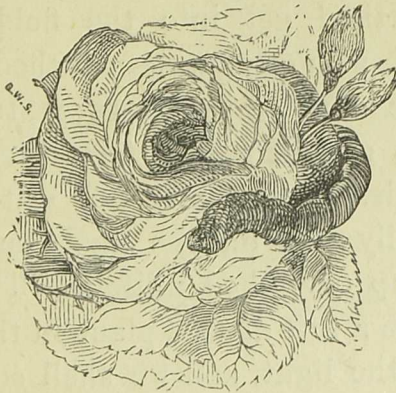
and though the nosegay is common, it is still very beautiful, and mamma will put it in her best vase and give it a place in the drawing-room for those to admire who have hearts to admire the wild gifts of Nature.

Why, Jacko, what are you grubbing up in that ditch? "I am not grubbing up anything," said Jacko, "but here are a lot of black creatures, lively enough when you stir them up; I suppose they must be tadpoles." Tadpoles, Jack, unquestionably, but are they the young of the toad or the frog? Let me see. Well, it is not easy to say which in their present stage, a tadpole is so like a tadpole, whether the young of frog or toad. If you had found the eggs, which you might have done earlier in the year, there would have been no difficulty in saying whether they belonged to a toad or a frog; for the toad lays its black eggs imbedded in a long clear jelly-like line, whereas the frog's eggs are imbedded in a shapeless mass of jelly. Look at some of these little black fellows, as black as niggers; there is a delicate fringe on each side of the head; these are the creature's gills and answer the same purpose as the gills in a fish; the blood circulates through them, and is made fresh and pure by the action of the air contained in the water. In this state the tadpole is more of a fish than a reptile; in a short time, however, these gills will be lost and then the tadpole can no longer breathe the air of the water, but must come to the surface to take in air from the atmosphere. By-and-by we should see two small tubercles appear near the root of the tail; these are the first indications of hind-legs. Meanwhile the fore-legs are budding forth, and in time would assume their

distinct forms. The changes of the tadpole, when it is a fish, to a frog, when it becomes a reptile, are most curious and instructive. If you have never seen the circulation of blood in a tadpole's tail, you have something to look forward to, and I will promise to show it you some day under the microscope. "What kind of frog," Willy asked, "do they eat in France? because you know the French eat frogs." The frog which the French eat is a different species from our common frog, though I dare say our common frog would be quite as good. The edible frog has been several times found in this country, and Mr. Eyton says that during the time a detachment of the French were prisoners at Wellington, they were highly delighted to find their old friend the edible frog in the wild moors here. I have never myself seen any other than the common frog in this neighbourhood. You may think a frog would make a curious sort of pet, but a gentleman once kept a frog for several years quite domesticated. It made its appearance in an underground kitchen at Kingston on the banks of the Thames. The servants, wonderful to say, showed him kindness and gave him food; one would rather have expected that they would have uttered loud shrieks of terror and fainted away at the unexpected sight. Curiously enough, during the winter seasons, when frogs as a rule are lying asleep at the bottom of a pool, this frog used to come out of his hole and seek a snug place near the kitchen fire, where he would continue to bask and enjoy himself till the servants retired to rest. And more curious still, this frog got remarkably fond of a favourite old cat, and used to nestle under


the warm fur of Mrs. Pussy, she in the mean time showing she did not in the least object to Mr. Frog's presence.

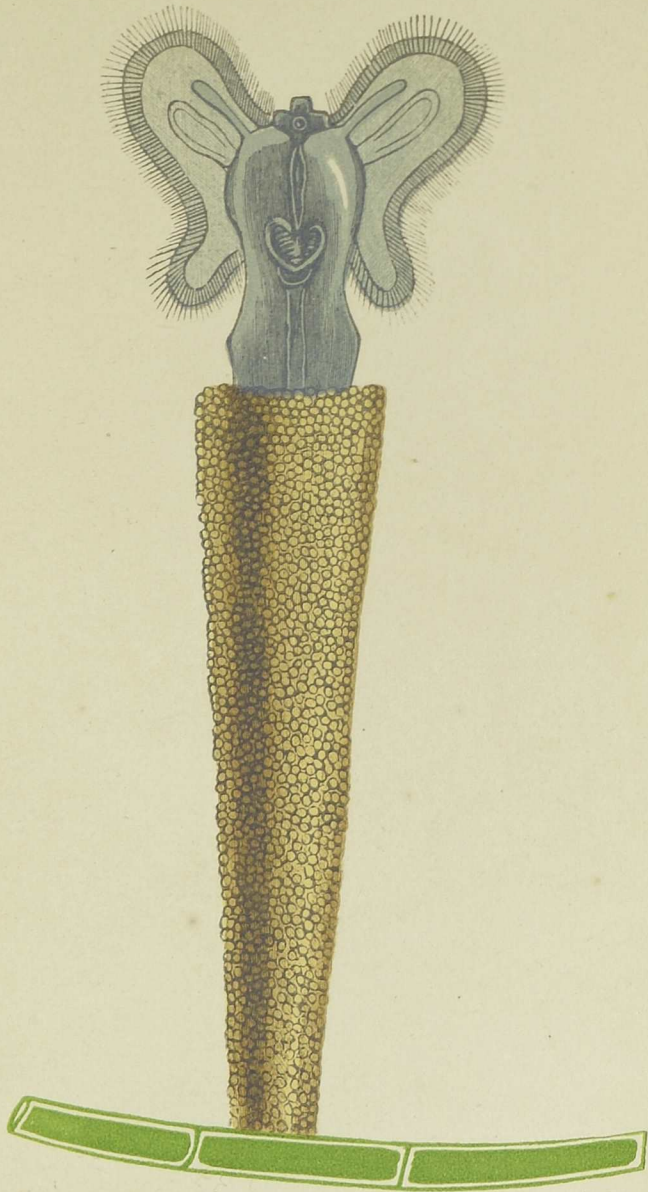
Both frogs and toads do a great deal of good by destroying quantities of slugs and injurious insects; they are, moreover, perfectly harmless. Some ignorant people, who love to destroy everything, insist on killing frogs and toads; they say they eat the strawberries in their gardens. Did you ever examine a frog's or a toad's tongue, Willy? You never did; then I hope the next frog you catch you will carefully open his mouth—treat him as if you loved him, as honest Isaac Walton says—and give me some short account of the structure of a frog's tongue. "All right, papa," said Willy, "I will bear the matter in mind. It makes me laugh, though, to think of my examining a frog's tongue; still I wonder what it is like, and I wish I could at once catch a frog to see; but we are now again near home, and I must wait for another walk."



WALK IV.

MAY.

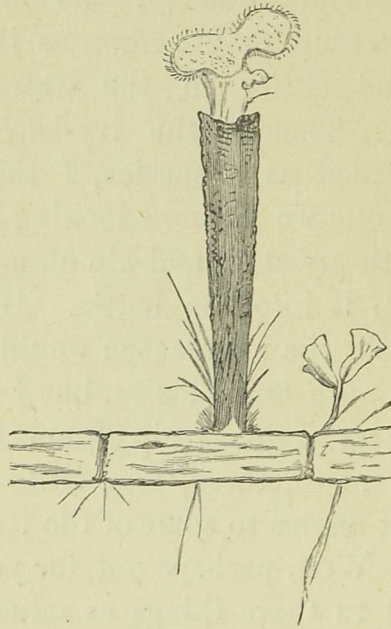
“APA,” said Willy, “you once told me of a very beautiful little creature, almost too small to be seen by the naked eye, that lives in water, and builds its house out of the small particles of clay or mud that float therein. The bricks are not of the shape of house bricks, but quite round. Do you not think we can find some of these animals in the course of to-day’s walk? I forget the name of the creature.” I know what you mean; you are speaking of a microscopic animal called *Melicerta*. “Oh, yes, that is its name, now I remember.” I have no doubt we shall be able to obtain specimens from the canal; so we will walk along the bank for a short distance and then get into the fields again. We must take with us a clear wide-mouthed bottle, and we shall soon see whether we have captured any specimens. These exquisite little creatures attach themselves to the leaves and stems of water-plants; they are most readily seen on the finely cut leaves of the water-buttercup or spiked milfoil. The way to proceed is to place a tuft of this plant in the bottle and to hold it up to the light, and we shall soon see whether any *Melicertæ* are there. Here is plenty of water-



MELICERTA ON WEED.

buttercup—a very interesting plant by-the-bye, and one which is subject to much variation; for when it grows in swiftly flowing water all the leaves are very long and hair-like, but in still water there are flattened leaves as well, and the hair-like leaves are not nearly so long. You see it is now in flower; a beautiful white mass it forms in small still ponds. “Well, but, papa,” said May, “the flowers are white, and I thought all buttercups were yellow.” Nearly all the buttercups have yellow flowers, but there are two British species which have white blossoms, namely, this one and the little ivy-leaved buttercup, or crowfoot, as it is often called, which is found either in the water or near the water’s edge. Though the ivy-leaved crowfoot is generally regarded as a species, I think it is only a variety of the one we are now looking at. Now I fish a plant out with my stick and nip off a tuft of hair-like leaves and pop it into the bottle. Have I anything here? No doubt the microscope would show countless numbers of minute animalcules, but I detect no *Meliceræ*. Let us try again. I nip off another tuft. There! do you see one, two, three, four little things sticking almost at right angles to some of the leaves? No, you see nothing? Well, perhaps not, for your eyes are not so accustomed to these things as mine are, but I will take out my pocket lens; there, surely you see that one close to the side of the bottle, do you not? Oh yes, you see what I mean; well, that is the case or house of a *Melicerta*, which animal I will describe to you, and when we get home we will look at it under the microscope. The case is about the twelfth part of an inch

long and about the thickness of a horsehair, and of a reddish colour generally, though the colour depends on the nature of the material out of which the case is made. Let us sit down and put the bottle on this large stone, and I dare say some of the creatures will soon show their heads at the top of the tubes, for they are all indoors now; the disturbance caused in breaking off the bit of weed and putting it in the bottle has alarmed the Melicertæ, and very quickly they sunk within their houses of clay. Now I see one fellow slowly appearing



MELICERTA, ON WEED, MAGNIFIED.

at the top, after the manner of a chimney-sweeper, but certainly in a much more elegant form. There! it has unfolded four flower-like expansions, of which the uppermost are much the largest. The animal shows only

the upper part of its body, and I can see with my pocket lens that it is somewhat transparent and whitish. But my lens has not sufficient magnifying power to reveal more, so I must tell you what I have seen of *Melicerta* under my compound microscope. Each of these four leaf-like lobes or expansions is surrounded with very minute hairs, which can move with great rapidity in all directions; these you will remember are called "cilia," from the resemblance to *eyelashes*, for which cilia is the Latin word. The motion caused by these numerous cilia lashing the water brings currents containing particles of food for the *Melicerta*, and materials for his house. Mr. *Melicerta* "is at once brick-maker, mason, and architect, and fabricates as pretty a tower as it is easy to conceive." The mouth is situated between the two large leaflets, and leads to a narrow throat, in which are the curious jaws and teeth of the animal. Below the jaws are the stomach and intestine; so you see the *Melicerta*, though so minute a creature, has a complex structure. "You said, papa," remarked May, "that the little creature makes its own tube; how does it do that?" Upon the upper part of the head there is a small hollow cup, which is lined with cilia, and probably also secretes some sticky fluid to make the pellets of clay adhere together; the particles of clay and mud, having been brought to the space between the leaflets by the action of the cilia, are conveyed to this little cup-shaped cavity, and are then worked about by the cilia within, till a round pellet is formed which completely fits the cavity. The little creature then bends itself down upon

the tube and deposits the pellet upon it, then it raises itself up again and proceeds to form another brick, its jaws working all the time. "I wonder," said Jack, "how the little creature manages to set apart and put in its proper place the particles required for food and those required for brick-making; it would be funny if it sometimes made a mistake and put the clay in its stomach and the food in the brick machine!" It is curious, indeed, to know how the materials are put in the proper place; I suppose the *Melicerta* has the power to change the direction of the currents and thus to place the particles in their proper place. By rubbing a little paint, such as carmine or indigo, in some water and placing a drop upon the glass slide with the *Melicerta*, these currents may be readily seen; and I have more than once seen rows of coloured bricks, red or blue, which the animal moulded and then deposited on the tube! We will take the bottle home, and if you have patience I doubt not I shall be able to show you a good deal of what I have been describing; but you must have patience, for, as an excellent naturalist has said, "The *Melicerta* is an awkward object to undertake to show to our friends, for, as they knock at the door, she is apt to turn sulky, and when once in this mood it is impossible to say when her fair form will reappear. At times the head is wagged about in all directions with considerable vehemence, playing singular antics, and distorting her lobes so as to exhibit a Punch and Judy profile."*

Hark! what is that bird singing so sweetly and with

* 'Marvels of Pond Life,' by H. J. Slack, p. 92.

such animation in the hedge? Do you hear? It is the dear little sedge-warbler; often, indeed, heard, but not so often seen, for it is fond of hiding itself in bushes or sedges. The sedge-warbler, like the migratory warblers generally, comes to us in April and leaves us in September. How often have I listened with delight to its music when returning home quite late at night in summer months! If the bird stops its music for a few moments, you have only to throw a stone among the bushes and the singing commences again. I am not clever in describing musical sounds, and I cannot



NEST OF REED WARBLER.

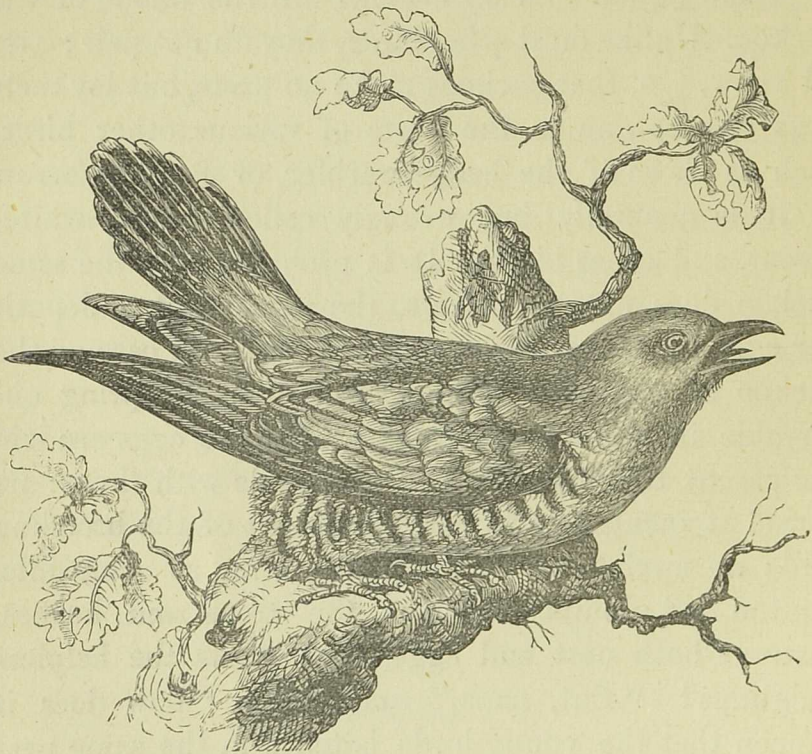
describe that of the sedge-warbler, nor can I always distinguish it from the song of its near relative the reed-warbler. Both imitate the songs of other birds, and their incessant warblings and babblings at night cause them to be often mistaken for nightingales. I have generally found the nest of the sedge-warbler on the ground, on a tuft of coarse grass or sedge; the nest of the reed-warbler is supported on four or five tall reeds, and is made of the seed-branches of the reeds and long grass wound round and round; it is made deep, so that the little eggs are not tossed out when the reeds are shaken by the high winds.

Hark! there is the cuckoo; how clearly he utters "cuckoo! cuckoo!" He is not far away. Some people can imitate the well-known note so well as to deceive the bird and bring it near the place where they are hiding. Your Uncle Philip only the other day made a cuckoo respond to him; had the day been calm instead of windy, he would, no doubt, have induced the bird to come close to us. There he goes with his long tail, flying something like a hawk. You should remember the rhyming lines about the cuckoo's visit to this country:

In April,
Come he will.
In May,
He sings all day.
In June,
He alters his tune.
In July,
He prepares to fly.
Come August,
Go he must.

“I think you said, papa,” said May, “that it is only the male bird that utters the cuckoo note; what kind of a voice has the female?” I have never heard the note of the female cuckoo. Mr. Jenyns says, “The note of the female cuckoo is so unlike that of the male, which is familiar to every one, that persons are sometimes with difficulty persuaded that it proceeds from that bird. It is a kind of chattering cry, consisting of a few notes uttered fast in succession, but remarkably clear and liquid.” Very curious are the habits of the cuckoo. Unlike most other birds, they do not pair; you all know, too, that cuckoos make no nests, but lay their eggs one by one in the nests of various other birds, such as those of the hedge-warbler, or hedge-sparrow as it is generally but wrongly called, robin, white-throat, and other birds. It is probable that the same cuckoo does not go twice to the same nest to deposit her egg. What a curious exception is the case of the cuckoo to the instinctive love of their offspring observable in almost all birds! After the eggs are laid the parent bird has no further trouble with them; no period of incubation to bare the breast of the brooding bird; no anxiety about her young ones, as some idle, wanton lad hunts amongst the trees and bushes, destroys both nest and eggs, or tortures the helpless fledglings! “But, papa,” said Willy, “how does it happen that the young birds hatched in the same nest with the young cuckoo always get turned out of it.” The cuckoo, being much the larger and heavier bird, fills up the greater part of the nest, consequently the smaller fledgling companions get placed on the sides of the nest,

and partially also on the back of the young cuckoo; when, therefore, the latter stands up in the nest he often lifts up on his back one of the small companions, who thus gets thrown headlong to the ground. This seems to me to be the mode in which the ejection sometimes takes place, till at last the young cuckoo is left sole possessor of the nest, and of course gets all the food; at the same time I ought to say that some



CUCKOO.

naturalists attribute a murderous disposition to the young cuckoo, and say that the other inmates of the nest are maliciously thrown out. Others, again, say

that the foster birds throw their own young ones out. It is certain that the young are sometimes treated thus, for they have been seen on the ground when the young cuckoo was too small to eject them itself. "But why do not cuckoos make nests and sit on their eggs like other birds?" said Jack. Such a question is more easily asked than answered; nevertheless I hope you will always try to discover reasons for things. "It is now," writes a celebrated naturalist, "commonly admitted that the more immediate and final cause of the cuckoo's instinct is, that she lays her eggs, not daily, but at intervals of two or three days; so that if she were to make her own nest and sit on her own eggs, those first laid would have to be left for some time unincubated, or there would be eggs and young birds of different ages in the same nest. If this were the case the process of laying and hatching might be inconveniently long, more especially as she has to migrate at a very early period, and the first hatched young would probably have to be fed by the male alone." The cuckoos come to this country about the middle of April; the male birds arrive before the females. Whether this arrangement is ungallant conduct on the part of the gentlemen birds, who prefer to come alone, or whether, just when the gentleman cuckoo is ready and almost impatient for a start, her ladyship has all at once discovered some important matter that ought to be finished before leaving the country, some adjustment of her dress, some tiresome feather that will ruffle itself up in spite of every effort to keep it smooth, I know not, but the fact remains, that my Lord and Lady

Cuckoo do not travel together. Let us suppose that both sexes have arrived in this country, we will say about the 23rd of April. It is natural they want a little time to look about them; at any rate, no egg is ready for being sat upon till some weeks after the arrival of the birds, say the 15th of May. The eggs require fourteen days' setting before they are hatched; this brings the date to the 29th of May. The young ones will require three weeks in the nest and constant feeding all the time; we now arrive at about the 20th of June, when the young ones would be ready to leave the nest. But they want five weeks' more feeding by the parents, after they leave the nest, before they are able to provide for themselves; this would bring the date to about the 25th of July, when there is hardly a parent bird in the country; they have left for other parts of the world. "Oh! but, papa," said Willy, "you said in the lines you told us to remember—

In July,
He prepares to fly.
Come August,
Go he must.

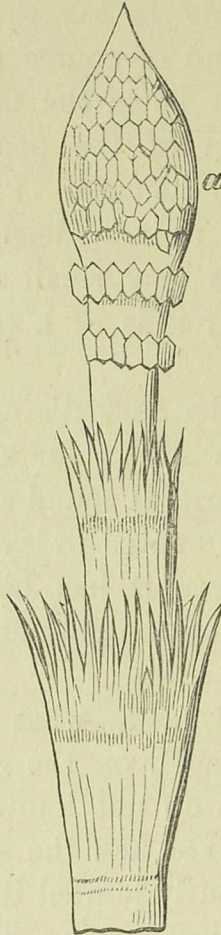
And now you say the cuckoos leave before the end of July. I think you must have made a mistake somehow." I am glad that you have found out the error, if it is one. Old rhymes are not always to be trusted; but I suspect that the couplet "Come August, go he must," means to imply that the cuckoo does never really stay so late with us. I must not, however, forget to tell you that it is the old parent birds that leave us early; young birds remain till Sep-

tember, and even October, but they have not by that time acquired the cuckoo note. If you ask why cannot the old cuckoos stay with us a little longer, and then all go away together as a family party, young and old, in September, instead of being in such a hurry, I have only to say that it is the fashion amongst cuckoos, and of course cuckoos, like certain other animals, must be in the fashion. This is Dr. Jenner's explanation of the peculiar habits of the cuckoo in respect of its eggs. I am not prepared to say whether or not it is sufficient to explain them. The cuckoo's egg is very small when compared with the size of the bird; it is of a pale grey tinged with red.

"But how does the cuckoo's egg get into some of the nests?" asked Willy; "for some of the nests in which the cuckoo's egg is found are too small to allow the cuckoo herself to enter to lay her egg." You are quite right; I believe it has been proved that the cuckoo lays her egg on the ground, and carries it in her bill into other birds' nests.

"Oh! papa," said Jack, what is this curious plant that grows so abundantly on the grass here? I know it well by sight, but do not know its name." It is a spike of horse-tail; see how the stem is marked with lines, and how curiously jointed it is, and quite hollow except where the joints occur. The fruit is borne at the top of the plant (*a*); see, as I shake it, what a quantity of dust comes from it; this dust is the fruit, or spores as they are called; each spore is of an oval form, with four elastic threads. If I were to put some of this

dust on a glass slide, and look at it under the microscope, I should see a curious sight. The four threads would be spread out, but if I were to breathe on the glass, these threads would coil themselves round the oval



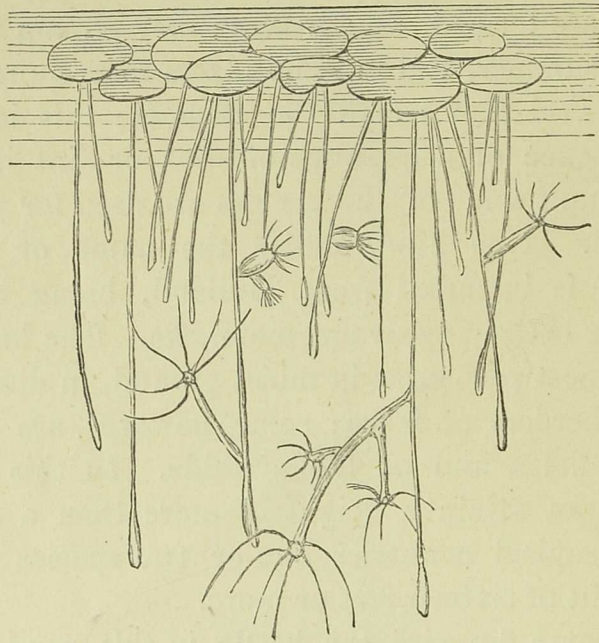
HORSE-TAIL.

body; but as soon as the effect of the moisture had passed away, the threads would shoot out again in the same position as they were at first, causing the spore

to leap as if it were alive. The stems are of two kinds, fertile and unfertile; the one you have in your hands is a fertile spike, and appears only in the spring; the unfertile ones have no dust-like fruit, and have numerous jointed branches growing in rows, or whorls as they are termed, round them; they remain throughout the summer, and in some places form quite a thick cover. Feel how rough the stem is; this is due to the presence of a quantity of silex or flint in it; on this account some of the species are used for polishing purposes. One kind, under the name of "Dutch rushes," is imported from Holland, being used for polishing mahogany, ivory, metal, &c. The horse-tails for the most part grow in moist ground, in ditches and on the borders of lakes; some, however, are common in corn fields and on the roadside. In this country they do not attain a height of more than a few feet, but in tropical countries one or two species grow to the height of sixteen feet or more.

Now for a dip with the bottle in this pond. I will try and catch a few *Hydræ*. Strange animals, indeed, they are, and strange is their history; but let us catch a few first. Nothing yet in my bottle like a hydra. Ah! now we have one or two. You see a small creature sticking to the stem of a bit of duckweed; around its mouth are five or six little projections. At present they are contracted; but the hydra is able to lengthen them out, when they appear as long, thin lines, which are used as the creature's fishing-lines; it is not much larger than a pin's head at present, but it can stretch its body out as it does its lines. I will take a handful

of duckweed, and put it, dripping wet, into this bag, and when we get home we will place the whole in a glass vessel full of water. In the course of half an hour or so, we shall, no doubt, see several hydræ, probably of

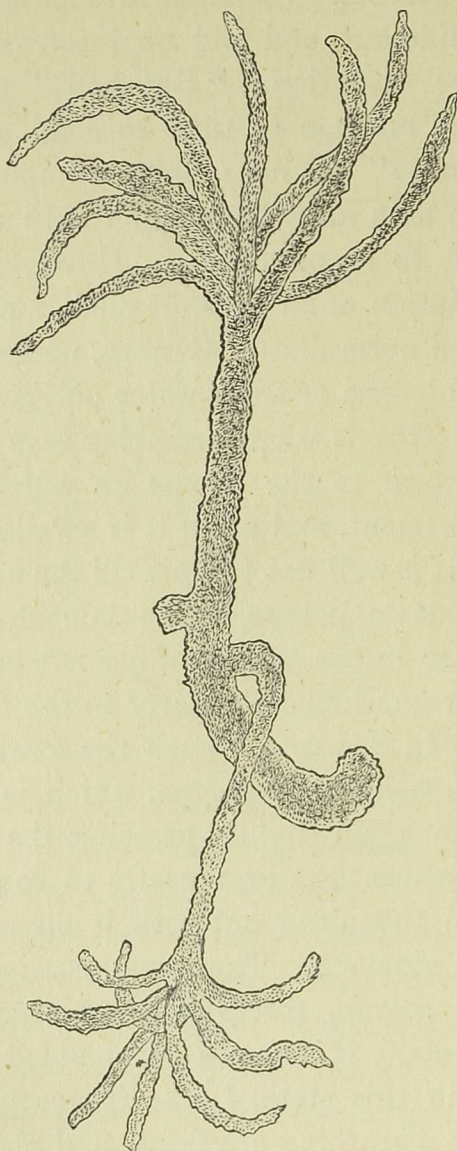


HYDRÆ, ON ROOTS OF DUCKWEED.

different species, in various attitudes—some hanging loosely down, others erecting themselves in graceful curves and throwing out their arms or tentacles many times longer than their bodies; others shooting up their arms right above their heads; others contracted, looking like miniature dabs of jelly; others attached head and tail to the side of the glass; others floating on the surface of the water, their tail-ends sticking out and serving to keep them from sinking; some of a beautiful grass-green colour, others light brown or flesh colour,

others almost white, others red. These creatures may be cut into several parts, yet each part will grow again into a perfect animal; young ones bud out of the sides of the parents. Some have said that they can be turned inside out, and find no inconvenience whatever from the operation. "But how," asked Willy, could anybody manage to turn so small a thing as a hydra inside out?" It does seem an impossible task, I confess, and a man must have much skill and patience to enable him to accomplish it. However, I will give you the description of an attempt made many years ago by a celebrated naturalist of Geneva, named Trembley, who made the hydræ or fresh-water polypes a study for many years. This is what Trembley says:—"I begin by giving a worm to the polype on which I wish to make an experiment, and when it is swallowed I begin operations. It is well not to wait till the worm is much digested. I put the polype, whose stomach is well filled, in a little water in the hollow of my left hand; I then press it with a small forceps nearer to the tail end than to the head. In this way I push the swallowed worm against the mouth of the polype, which is thus forced to open, and by again slightly pressing the polype with my forceps I cause the worm partly to come out from its mouth, and thus draw out with it an equal part of the end of its stomach. The worm, coming out of the mouth of the polype, forces it to enlarge itself considerably, especially if it comes out doubled up. When the polype is in this state, I take it gently out of the water, without disturbing anything, and place it on the edge of my hand, which is simply moistened, so that it

may not adhere too closely. I oblige it to contract more and more, and this also enlarges the stomach and mouth. The worm then is partly coming out of the



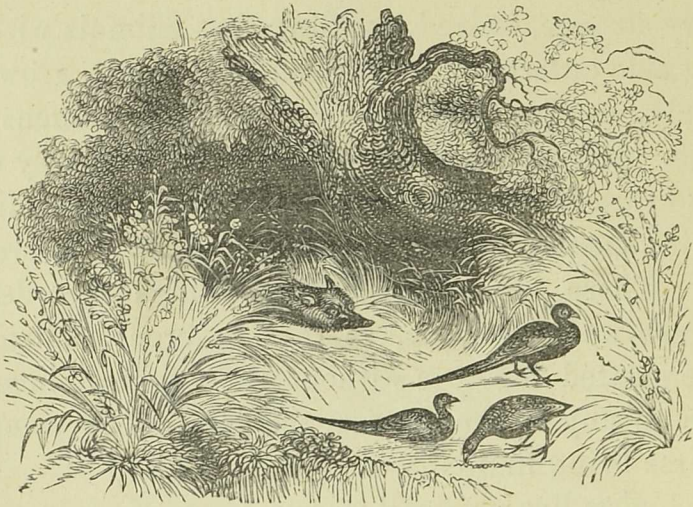
HYDRA, WITH YOUNG ONES BUDDING OUT FROM ITS SIDE.

mouth, and, keeping it open, I then take in my right hand a hog's bristle, rather thick and without a point, and I hold it as one holds a lancet for bleeding. I bring its thickest end to the hind end of the polype and push it, making it enter into its stomach, which is the more easily done as in that part it is empty and much enlarged. I push on the end of the hog's bristle, which continues to invest the polype. When it reaches the worm, which holds the mouth open, it either pushes the worm or passes by its side, and at last comes out by the mouth, the polype being thus completely turned inside out."

Very strange, indeed, to think that animals with the wrong side outermost should continue to eat, grow, and multiply, as Trembley assures us his specimens did, though, perhaps, we shall not wonder that they often tried to turn themselves back to their original condition, and with success, unless Trembley took steps to prevent them. There are other strange things recorded of the fresh-water polypes, as that different individuals can be grafted together without the slightest inconvenience to any of the parties, the joint-stock company of course being limited.

The hydræ live on small worms, larvæ of gnats, water-fleas, and other minute creatures; they catch them with their tentacles or fishing-lines, and draw them to the mouth. It is maintained by many observers, with good reason, that these arms have the power of paralysing, in an instant, the worms they wrap themselves round. There are at least three well-marked species of hydræ to be met with in the ponds and ditches of this country.

There is the green hydra, the light flesh-coloured or common hydra, and the long-armed hydra, the most interesting of all. See, there is the water-primrose, now in flower, with its delicate pink corolla and bright orange centre. Let us gather a few plants, and then return home.



WALK V.

MAY.

TO-DAY we will go to Shawbury and try our luck with the trout. If the fish will not rise there will be plenty to observe, and I have no doubt we shall enjoy the day thoroughly; the wind is in the south-west and the day is cloudy; the May-fly is well out, and I think we have every chance of good sport. Let us look out our fishing-tackle and drive off at once to the river. How delightful it is to stroll by the river side and hear the rippling of the water; delightful, too, is the sensation of feeling at the end of your line the tugs and jumps of a good lively trout. I cannot resist quoting some lines from 'The Angler's Song,' which I think you will say are very pretty:

Merry in the greenwood is the note of horn and hound,
And dull must be the heart of him that leaps not to their sound;
Merry from the stubble whirrs the partridge on her wing,
And blithely doth the hare from her shady cover spring;
But merrier than horn or hound, or stubble's rapid pride,
Is the sport that we court by the gentle river side.

Our art can tell the insect tribe that every month doth bring,
And with a curious wile we know to mock its gauzy wing;
We know what breeze will bid the trout through the curling waters leap,
And we can surely win him from shallow or from deep;
For every cunning fish can we a cunning bait provide,
In the sport that we court by the gentle river side.

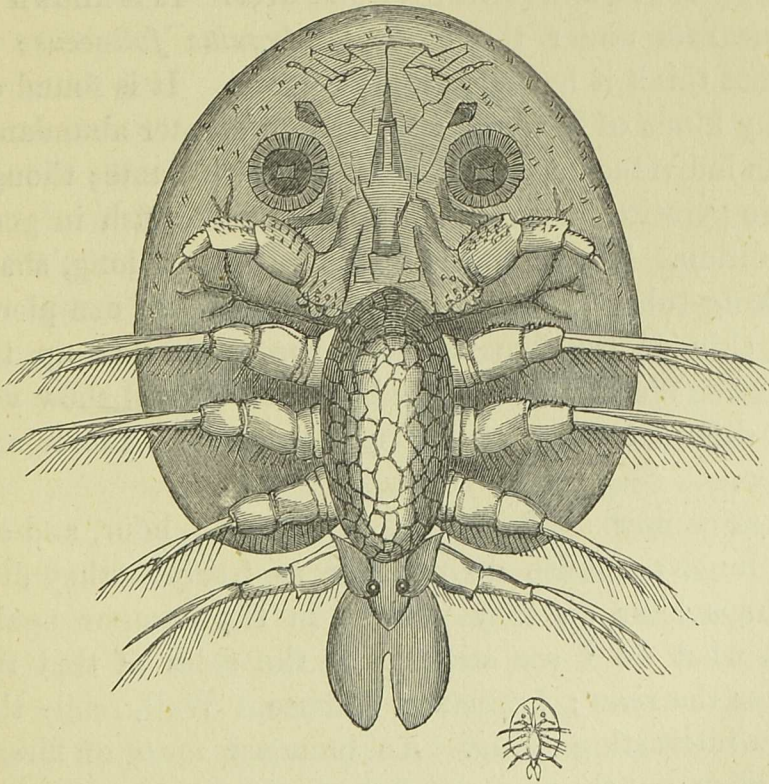
Where may we find the music like the music of the stream?
 What diamond like the glances of its ever-changing gleam?
 What couch so soft as mossy banks, where through the noontide hours
 Our dreamy heads are pillowed on a hundred simple flowers?
 While through the crystal stream beneath we mark the fishes glide,
 To the sport that we court by the gentle river side?

For as the lark with upland voice the early sun doth greet,
 And the nightingale from shadowy boughs her vesper hymn repeat;
 For as the pattering shower on the meadow doth descend,
 And far as the flitting clouds with the sudden sunbeams blend;
 All beauty, joy and harmony, from morn to eventide,
 Bless the sport that we court by the gentle river side.

Well, here we are once more at the charming little village of Shawbury. How often, both as a boy and a man, have I wandered by the banks of the river Roden. What changes have taken place since my early rambles! Long familiar forms, companions in my fishing expeditions, have vanished; the mind fondly cherishes their memory, and recalls past hours of cheerful intercourse. We will put up the horse and carriage at the Elephant and Castle Inn and stroll away to the river.

Ah! here is a capital place. Now, Master Willy, there is no tree to interfere with your throw, so cast in just near that spot, quietly, carefully, anxiously; if there is a fish there he cannot resist your green drake. I recommend him the artificial before the fat natural fly. As Christopher North says—"Devouring ephemerals! Can you not suffer the poor insects to sport out their day? They must be insipid eating—but here are some savoury exceedingly . . . they carry *sauce piquante* in their tails. Do try the taste of this bobber—but any of the three you please." There, hold

fast, Willy, for that's a good one. Bring him up carefully to the side; hold your rod erect; play him a little, for he is full of vigour. There! well done; I have got him in the landing net. Is not he a beauty? A pound weight, I'll be bound; and what condition! His flesh will be almost as pink as that of a salmon. Further down stream I managed to take a fish in very different condition; I took him where the river was rather muddy, and flowed very slowly. Just look at him, with a body lean and dark coloured, and an enormous head for so slender a body. "Oh! but, papa," said Willy, "what are these curious creatures crawlin'



PARASITE (*Argulus foliaceus*) ON TROUT, NAT. SIZE AND MAGNIFIED.

over him? Do look." Ah! I know them well; anglers call them trout lice. I will scrape off a specimen, and put him in the bottle. Now look at him. The body is nearly round, and almost transparent; colour rather green; it has four pairs of swimming feet, each pair beset with a fringe of hairs; a pair of foot-jaws; a small half-cleft tail; and a pair of fleshy circular suckers just in front of the foot-jaws, by means of which the little creature is able to attach itself, as a parasite, upon various fish. It is a graceful little creature, and, as you see, can swim with great activity in the water; now it swims in a straight line, now it suddenly turns quickly round and turns over and over. It is known to naturalists under the name of *Argulus foliaceus*; I do not think it has any English name. It is found on many kinds of fish, and generally in greater abundance upon individuals that are in an unhealthy state; though these parasites often attach themselves to fish in good condition. The mouth is furnished with a long, sharp sucking-tube, by means of which the animal can pierce the skin of the fish it lives upon, and suck up the juices. We will take a few home, and I will show you the different parts of the creature under the microscope.

Let us now sit down and rest for an hour, and eat our lunch; the fish do not rise as freely as they did; perhaps later on they will be in the humour again. But what do I see sticking to the sides of that rail across the river; I must go and see. Well, really this is an interesting thing. An immense mass of flies, a few alive, but the greater number quite dead; and, look!

a quantity of white eggs underneath them. Let us examine a fly; it is of a brown or tawny colour, and has rather long, diverging, colourless wings, marked with irregular brown spots. Why, there must be thousands of dead flies covering these eggs. What an odd idea! Presently up comes Mr. Collins from the farm near the bank of the stream. "Oh, sir, I know those flies quite well; they are oak-flies (*Leptis scolopacea*)."

Certainly not, I replied, though they do somewhat resemble them in colour and appearance; but the farmer stoutly asserted he was right, and I did not think it worth while discussing the matter further with him. Mr. Collins is a good fly-fisherman; and fly-fishermen, unless they are naturalists, are generally very positive. How often have I tried to teach anglers that the May-fly does not come from a caddis worm; how often have I failed! Well, the two-winged fly I have just found in such thousands, with their dead bodies brooding over this mass of eggs, is known to entomologists by the name of *Atherix Ibis*; the females are gregarious, and, as we have seen, attach their eggs to rails, boughs, or other objects overhanging streams; each female, having laid her eggs, remains there and dies; shortly after comes another and does the same, and so on till immense clusters are formed. The larva, when hatched, falls into the water, its future residence; it is said to have a forked tail about one third the length of its body, and to "have the power of raising itself in the water by an incessant undulating motion in a vertical plane." I am not, however, acquainted with either larva or pupa, but hope to become so this

summer. "It is very curious, papa," said Jack, "that the flies, after they have laid their eggs, should die there; why do not they fly away? Do any other animals do the same?" Yes, pretty much so. Some of the female insects of the genus called *Coccus*, scale insect, or mealy bug, common on the stems of various trees, to which they sometimes do incredible mischief, lay their eggs and die over them, the dead bodies of the parents forming coverings for the young. See how fast the green drake is appearing. Notice how it flies with head erect for a second or two, and then falls almost helplessly on the surface of the water.

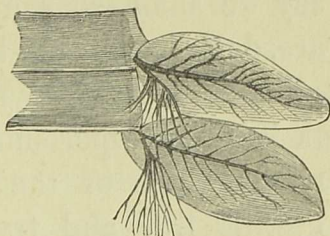
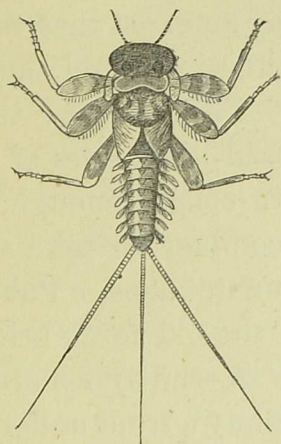
There! did you see that fish rise at him? He has escaped the hungry trout, and has reached a blade of grass, where he will probably rest for some hours. But give me my rod; perhaps the same trout will rise at my artificial fly. There! that throw was exactly over the spot. No; he won't have it. I'll try again and again. No. Objects to *sauce piquante*, I suppose. Well, I will tempt him again in an hour's time or so. The water is smooth here, and free from rapids; let us lie down on the grass and see the birth of *Ephemera*—for that is the May-fly's proper name. Here comes something floating down. It is within the reach of my hand, so I will secure it. What is it? As I thought. *Ephemera* is throwing off its swaddling clothes. See how it twirls and twists itself about. Now it is free; and the strange-looking worm has changed into a beautiful fly. But there is yet one other operation to go through ere it assumes its final and complete form; you see at present it is a heavy

flier, for the wings are scarcely dry, and the muscles as yet unequal to great exertion; so in their present imperfect form they are constantly dropping for a second or two in the water, and are often sucked down the throat of some roach, trout, or other fish on the look-out. You should remember that the *Ephemera*, or May-fly, in this its *sub-imago*, or imperfect winged state, represents the "green drake" of the angler. What have I here on this blade of grass? Do you see? What is the shadowy form that lifelessly clings to it? It is a delicate membrane, thin and light; see, I blow it away. You saw the split in the back, through which the former tenant left the abode. It is the cast-off skin of the green drake, now metamorphosed into a creature more active than harlequin or columbine, the male into a dark brown insect, with gauze-like wings, the female into a beautiful creature, with body marbled white and brown, and able to fly well and strongly, now high in the air, now sailing along close to the surface of the water, ever and anon dipping gently into it for the purpose of laying her eggs. The small oval eggs sink down to the bottom, and attach themselves to the weeds and stones that are found there. The flight of the male *Ephemera* is different; it is the males that practise together that peculiar up-and-down dance, with heads erect and bodies curving prettily upwards; of course, you can understand how countless multitudes fall victims to fish and bird, for dainty morsels they are. These flies, though voracious feeders both in the larval and nymphal state, never eat at all after they have assumed

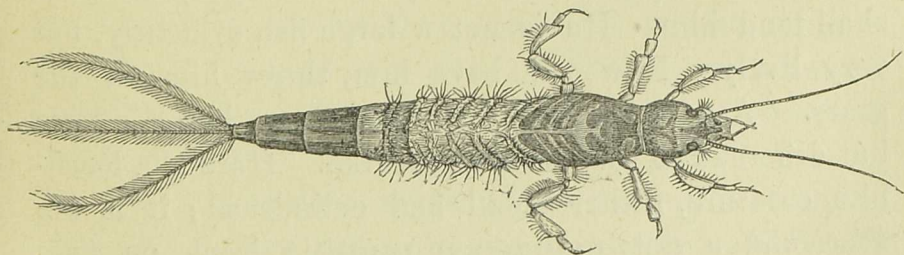
their perfect form. Indeed, they have no true mouth, only an imperfect or rudimentary one; and you would never find a particle of food in their stomachs, which are always more or less full of air-bubbles, which, no doubt, assist in buoying up the insect, and thus save the expenditure of muscular power. I'll catch one of those dancing males, and press him quickly in the middle. There! crack he goes! for the little air-bubbles in the stomach have burst by the pressure of my finger and thumb.

Abundant as are the May-flies at the latter end of May and the beginning of June in this country, in other countries they are sometimes more astonishingly numerous. In some parts of Holland, Switzerland, and France, their great numbers have been compared to pelting flakes of snow. "The myriads of *Ephemeræ* which filled the air," says Reaumur, "over the current of the river and over the bank on which I stood, are neither to be expressed nor conceived. When the snow falls, with the largest flakes and with the least interval between them, the air is not so full of them as that which surrounded the *Ephemeræ*." The occurrence of such prodigious numbers is, I believe, unknown in the British isles. In the perfect or *imago* state the May-fly lives but a short time. The word *ephemera* means "living only for a day;" and though individuals may live longer, yet the term is fairly correct as expressing their short existence. The May-flies (*Ephemeræ*) have all three long fine hairs at the end of the tail; some members of the same family, but belonging to a different genus, have only two hair-like appendages.

For instance, the fly known to fishermen as the "March-brown" belongs to the same family as the May-fly; it is smaller than it, and has only two hairs at the end of the tail; but with this exception, the natural March-brown and the May-fly are wonderfully alike; yet it is most curious to notice what a wonderful difference there is in the larvæ of these two insects. Significant facts, no doubt, lie at the bottom of such differences in the case of insects so evidently allied, but these I will not speak of. Here are the two forms of larvæ, the one being the larva of the common May-fly (*Ephe-*



LARVA OF BAËTIS, WITH BREATHING PADDLES, MAGNIFIED.



LARVA OF EPHEMERA, OR MAY-FLY, MAGNIFIED TWO DIAMETERS.

mera), the other that of the March-brown (*Baëtis*). Come, we have lunched, and rested, and watched the May-flies; let us try to catch a few more trout. It is very strange why sometimes the fish will not rise, though the weather is propitious and the water in first-rate order. Holloa! master Willy, what game are you after now? "Oh, papa," he exclaimed, "there are a lot of dace on this shallow, so I put the spinning hooks on, and, see, I have managed to hook a couple out, by simply throwing the tackle on the other side of the fish and then drawing it smartly through the water over them." Well, that looks like a bit of poaching, at all events; the fish are spawning amongst that water crow-foot, no doubt; just hook out some weed, and I dare say we shall see some eggs. To be sure; there they are, dotted over the long thread-like leaves of the plant, like little pearls. You have caught enough, for I think it is not sportsmanlike conduct to take such unfair advantage of the unfortunate dace. Put on your casting line and try under the old forge bridge. You think there is not much use? A true fly-fisherman should never say so. I have taken many a trout under the bridge, and I dare say you may be successful this time. There! I told you so. Keep your line tight, and Jack shall land him. He is not a large fish evidently, but very lively. Now you have him, throw him on the grass. Are there any parasites on him? Yes; but different to the last we observed. Here is a leech-like creature, rather small and cylindrical; it is the *Piscicola*, a not uncommon parasitic leech on fish. Well, put him into the bottle; we can take him home

and examine him at leisure. How many trout have we taken now? "We have got nine, papa, and, remember, I have caught three." Yes; but I suppose you include the poaching? "No; I have caught three trout with the fly, and I don't count the dace." Not a bad day's sport, after all; for I threw back again three small fish. What is this showy plant, with large, yellow, globe-like blossoms? How pretty it is, growing in abundance in a little spot near the river! It is the globe flower, so called from the rounded shape of the corolla; it is one of the buttercup family, as you will, perhaps, guess. In its wild state I believe it is found in mountain districts, so I suspect it has found its way here from some of the cottage gardens which are only a quarter of a mile distant. We will grub up a few roots; perhaps Mrs. Charlton would like them for her wild garden shrubbery. When you go a-fishing always be provided, if not inconvenient, with a trowel and a small basket, as well as with a few wide-mouthed bottles; they will be very useful, especially if the trout will not rise. The trowel and basket you can leave at a cottager's house, and the bottles are indispensable to every angler-naturalist. What are you running after, Jacko? Oh! I see; one of the most beautiful insects that are found in this country. Ah! he is too quick for you. It is the brilliant steel-blue dragon-fly. Let us sit down for a few minutes and watch its flight. How rapidly it flies, now pursuing the course of the river, now suddenly darting back again. It is the *Agrion virgo*, the most splendid of all the dragon-flies, even rivalling the gorgeously coloured

insects of tropical countries. All the dragon-flies proceed from water larvæ; strange creatures of unbecoming forms and ferocious dispositions. The mouth, or rather the lower lip of the larva is of very singular form. Two jaw-like organs are at the end of the lip, its basal portion being articulated to the head; this mask, as it has been called, is folded beneath the head when in repose, but it can be suddenly shot out in front of the head so as to seize any small creatures that may pass near it which the larva thinks good to eat. Imagine one of your arms being joined on to your chin, bend your elbow up till your hand covers your face—this will represent the dragon larva with the mask in repose; now shoot out your arm in a straight line from the head—this will represent the mask unfolded and in use; your fingers may be considered to represent the jaws of the creature. When the larva wishes to turn into an insect, it leaves the water and creeps up the stem of some water weed or other object out of the water, bursts its skin, and commences its new state of existence. If we look about us near the water side, we shall be sure to find some empty pupa skins. Here are two on this sedge; you see a slit on the back through which the dragon-fly has come out. The dragon-flies are the largest and most active of our British insects, and, to quote the descriptive words of Professor Rymer Jones, “are pre-eminently distinguished by the rapidity of their flight and the steadiness of their evolutions while ‘hawking’ for prey in the vicinity of ponds and marshy grounds, where in hot summer weather they are everywhere to be met with. Equally

conspicuous from their extreme activity, their gorgeous colours, and the exquisite structure of their wings, they might be regarded as the monarchs of the insect race. The very names selected for them by entomologists would testify the perfection of their attributes; their titles ranging from that of *Anax imperator*, indicative of imperial sway, to epithets expressive of feminine delicacy and ladylike grace, such as *virgo*, *puella*, *demoiselle*, and *damsel-fly*, which are appropriated to the sylph-like forms that many of them exhibit. In their habits, however, they by no means deserve the gentle appellations bestowed upon them. They are, in truth, the tigers of the insect world, and their whole lives are devoted to bloodshed and rapine. Indomitable in their strength of wing, furnished with tremendous jaws, and possessed of acuteness of sight and rapidity of motion scarcely to be paralleled, there seems to be no escape from their ferocity, and terrible is the slaughter they effect amongst the insect legions they are appointed to destroy." It must not, however, be supposed from the above description that the dragon-flies are creatures that deserve to be killed. On the contrary, they are most serviceable to men, and destroy countless numbers of injurious flies and butterflies whose larvæ do damage to vegetation. "Well, papa," said Jack, "the boys in the village always kill them if they can catch them, and say they sting horses." I know that this is a popular tradition, inherited by the rural folks of our day from their great-great-grandmothers' grandmothers. Dragon-flies are often called *horse stingers*; in America they are sometimes called *devil's darn-*

ing-needles; in Scotland, I believe, they are known by the name of *flying adders*. Where is my net? I will try and catch a demoiselle. There! I have her, or I should rather say *him*, for these dark spots on the wings disclose the sex; the female has unspotted wings, and is of a rich green colour. "How splendidly it shines in the sun," said Willy; "nothing can exceed the beauty of its wings." Well, now you have looked at him closely and admired him, I will let him go again. Off he flies, none the worse for his temporary captivity. Now for my friend the trout, who would not take my fly an hour ago. Ah! I have got him the first throw; see how he jumps. Now, Willy, for the landing-net. Bravo! all safe, and a good fish too. Our sport is over for the day, and we must get ready to drive home. To-morrow, Willy, you may learn these lines from Thomson's 'Seasons:'

"When with his lively ray the potent sun
 Has pierced the stream and roused the finny race,
 Then, issuing cheerful, to thy sport repair;
 Chief should the western breezes curling play,
 And light o'er ether bear the shadowy clouds.
 Just in the dubious point where with the pool
 Is mixed the trembling stream, or where it boils
 Around the stone, or from the hollowed bank
 Reverted plays in undulating flow,
 There throw, nice judging, the delusive fly;
 And as you lead it round in artful curve
 With eye attentive mark the springing game,
 Straight as above the surface of the flood
 They wanton rise, or urged by hunger leap,
 Then fix with gentle twitch, the barbed hook.
 Some lightly tossing to the grassy bank,
 And to the shelving shore slow-dragging some,
 With various hand proportioned to their force.

If yet too young and easily deceived,
A worthless prey scarce bends your pliant rod ;
Him, piteous of his youth, and the short space
He has enjoyed the vital light of heaven,
Soft disengage, and back into the stream
The speckled captive throw. But should you lure
From his dark haunt, beneath the tangled roots
Of pendent trees, the monarch of the brook,
Behoves you then to ply your finest art.
Long time he, following cautious, scans the fly ;
And oft attempts to seize it, but as oft
The dimpled water speaks his jealous fear.
At last, while haply o'er the shaded sun
Passes a cloud, he desperate takes the leap,
With sullen plunge. At once he darts along,
Deep struck, and runs out all the lengthened line ;
Then seeks the furthest ooze, the sheltering weed,
The caverned bank, his old secure abode,
And flies aloft, and flounces round the pool,
Indignant of the guile. With yielding hand,
That feels him still, yet to his furious course
Gives way, you, now retiring, following now
Across the stream, exhaust his idle rage ;
Till, floating broad upon his breathless side,
And to his fate abandoned, to the shore
You gaily drag your unresisting prize."


There is some good advice here worth remembering ;
at any rate, persevere, persevere, and no doubt you will
become in time



A MOST SUCCESSFUL ANGLER.

WALK VI.

JUNE.

“E had many pleasant rambles last autumn,” said Willy, “in search of fungi. How I wish the time was come when we could hunt for fungi again. Think of the woods at the bottom of the Wrekin, and those delightful fir plantations near Tibberton. Besides you know some kinds are so good broiled for breakfast. I often think of fungus-hunting. When shall we be able to go out hunting again?”

September and October are the best months, but we shall meet with fungi earlier. However, I will promise you a long day's ramble or two in search of fungi when the time comes. In the mean time let us keep our eyes open, and I dare say we shall even now, in the month of June, meet with a few interesting species. We will go into some of the meadows near home to-day, and I am much mistaken if we shall not be able to find St. George's mushroom. It is a very delicious fungus, and perfectly wholesome. I gathered a few specimens the other day, and now that the weather is warm, I doubt not we shall meet a good number; so, besides collecting bottles, we will take a basket, and Jack shall be the carrier. Now separate



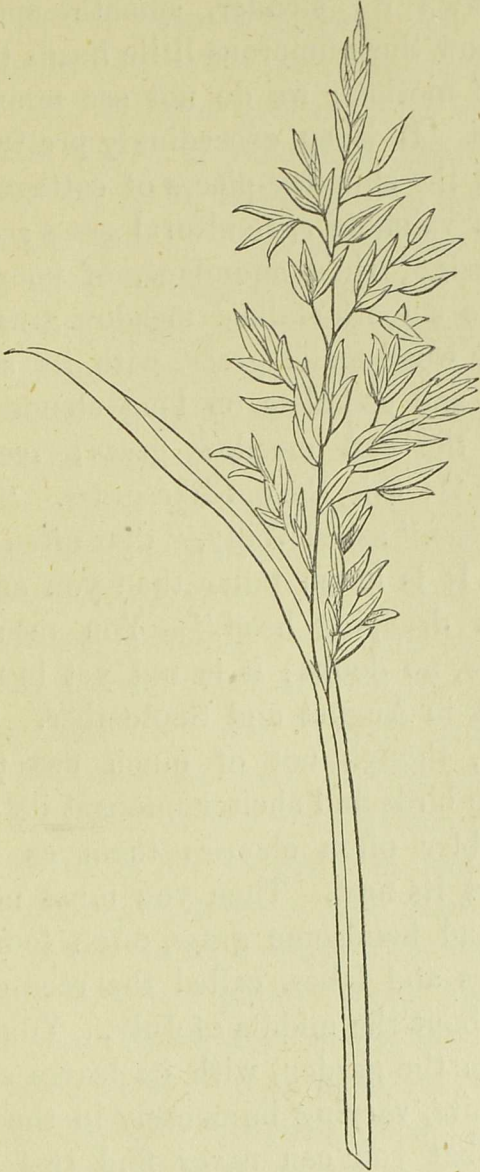
TREE-CREEPER AND YOUNG.

yourselves and search this pasture well. "Here are a lot of fungi growing in a ring," exclaimed May. Let me look. You have found what we wanted. This fungus is the *Agaricus gambosus*, or St. George's mushroom. See how closely the gills are set together; they are yellowish-white in colour; the top is thick and fleshy; the stem, too, is very thick. Few fungi, comparatively speaking, grow so early in the year, and you could not mistake *gambosus* for any other kind. What? You think the smell rather strong. Well, I confess this fungus has a strong and not a very pleasant odour. Put what you have collected into the basket; you will find that the taste is better than the smell. Here are some specimens with the top cracked and split; these are a little older, but they are very good. We will put them with the rest. "Oh, papa," exclaimed Jack, "I was looking at that ash tree in the hedge, and I thought I saw a mouse run up the trunk." I suspect it was not a mouse, but a bird, called, from its habit of running up trees, the tree-creeper. Let us get a little nearer. I see I am right; there the little bird is, running rapidly up the tree; now he stops, as if examining the bark; now he is off again. How very like a mouse, to be sure! It is one of the smallest of our British birds, and, though common enough, is not very often seen, except by those who, caring for such things, use their eyes well. Now he has gone to the opposite side of the tree; off he goes again and explores another trunk. By means of its long curved claws and stiff forked tail-feathers, this prettily marked bird is enabled to climb with great

rapidity. It remains in this country all the year, and is more abundant in plantations and parks where there are plenty of trees. It makes its nest in a hollow tree, or on the inner side of the bark of a decayed one. The little bird lays many eggs, from six to nine, in the month of April; they are nearly white, with a few pinkish spots, generally at the larger end of the egg. It utters a few pleasing but feeble notes. The young ones are, as you may suppose, tiny little things. You should notice the curved pointed beak of this bird, and the stiff tail-feathers it presses against the tree as a fulcrum to aid it in its ascent.

We will go into this adjoining field, which will soon be ready to mow. We will keep by the hedge—for it would not be right to trample down the tall grass—and gather a few grasses. Few people know more about grass than that it is good pasturage for cattle and sheep. Let us gather a lot, and take care, as far as we can, to gather only one kind each. How graceful and beautiful they are, and what difference there is amongst them; some have a stiff spike-like head of flowers, others have pretty drooping heads; some are harsh and rough to the touch, others soft as satin. Some, again, are of great value as pasturage and for making into hay; others are positively noxious weeds. You know the twitch or couch grass, that gives the farmer so much trouble; it is most rapid in its growth and difficult to kill; its underground creeping stems spread in all directions, and, if left to itself, would soon take sole possession of the whole soil. So the farmers are very careful to rake together all they can; they

then collect it in heaps and burn it. Here is the rough "cocksfoot grass," with its head or "panicle"



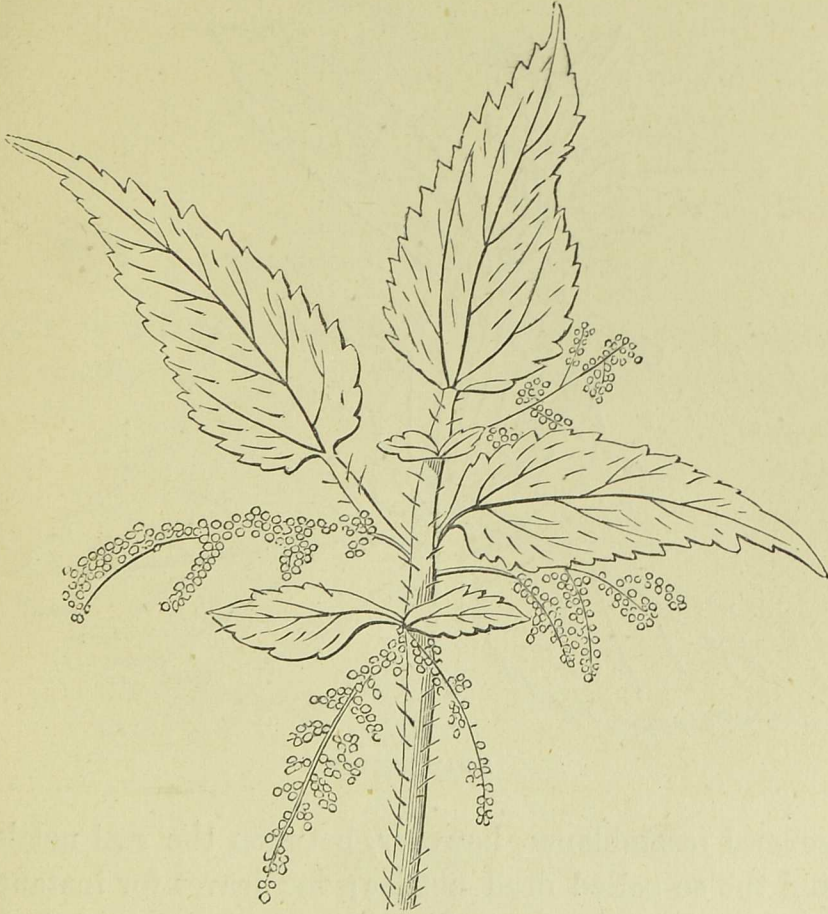
PANICLE OF GRASS.

as it is called, upright and tufted. Look at its large yellow stamens; it is a very productive species and enters largely into all hay-grass. Here is the common quaking grass, with its slender, smooth, spreading branches. See how the numerous little heads tremble with the slightest motion; we do not see much of it in these meadows. It is an exceedingly pretty grass, and often seen on the chimney-pieces of cottagers, but is by no means a valuable agricultural grass; on the contrary, it is a sign, when abundant, of poor land. Here we have the smooth-stalked meadow grass, and here is the hedge wood-melic grass, with its slightly drooping panicle, and spikelets on long slender foot-stalks. Here is the soft meadow grass; feel how smooth its panicle is; this, the oat-like grass. "What is that very tall grass," asked Willy, "that often grows near the water? It is much taller than you are, and has a rich brown drooping head." You mean the common reed-grass, no doubt; it is not yet in flower, but you will see it in August and September. It is a magnificent grass, though not of much use to the farmer. The little birds find shelter amongst its stems, and the reed-warbler often chooses them as pillars whereon to support its nest. Then you must not forget another tall and handsome grass, often found on the banks of rivers and lakes, called the reed-canary grass; it flowers about the middle of July. You know the ribbon-grass, in the garden, with its leaves striped with green and white, varying immensely in the width of its bands, so that you can never find two leaves exactly alike. "Yes, indeed, papa," said May, "I

know it well; you know we always put some with the flowers we gather for the drawing-room table." Well, this is only a cultivated variety of the reed-canary grass; and I have sometimes let a cluster of the ribbon-grass run wild as it were, and then the leaves turn to one uniform green. The reed-meadow grass is another tall and handsome kind; this cattle are very fond of; it is sweet to the taste and grows in damp situations. "You sometimes see," said May, "a very beautiful and curious grass, with long yellow feathery tails, amongst the ornaments in rooms." That is the "feather-grass;" it is a very rare grass, and has been seldom found wild in this country. The long yellow tails are the awns, which resemble delicate feathers. Here is the sweet-scented vernal grass; taste and see how pleasant it is; it is the grass which, perhaps more than any other, gives that charming odour to the hayfields. "There is a clear pond in yonder corner of the field, let us go there and see what we can find," said Willy. All right. It is a very likely pond for many interesting creatures; but let us first look at the plants that grow round or in it. There are a few sedges here and there—a pretty order of plants; at present you must be content with making yourselves acquainted with their general form. Take care how you gather them, for the leaves and stems of some kinds are very rough, and if you draw them quickly through your hand you may cut it rather sorely. "Oh! do come here, papa," said May; "here is quite a new flower to me; is it not a beauty?" Indeed, it is a lovely plant; it is the buckbean or marsh-

trefoil, and generally grows in some boggy spot, such as this. Look at the three green leaflets, like those of the common bean—hence one of the names of the plant. Look again at the clusters of blossoms; some are not fully out, and are of a lovely rose colour; others are quite out, and the flowers covered with a white silken fringe. Bite a bit, and taste how bitter it is; people often gather the roots and use them as a tonic medicine. I think in some countries, as in Norway and in Germany, the leaves have been used in the place of hops for brewing beer; about a couple of ounces being equal to a couple of pounds of hops. The late Sir William Hooker found the buckbean very plentiful in Iceland, and says that where it occurs it is of great use to travellers over the morasses, for they are aware that the thickly entangled roots make a safe bed under the soft morass for them to pass over. Here is hairy mint, nearly a foot high; do you dislike the smell? I think it pleasant myself; it is not yet in flower, but will be so in about six weeks' time. Holloa! Jack, what's the matter? "I have only tumbled down, papa, amongst these nasty nettles, and got stung rather sharply." That is interesting. Do you know how it is that nettles sting? "Oh, papa," said Jack, pitifully, "you are like the man in the fable who was giving a lecture to the drowning boy; the boy asked him to get him first of all out of the water, and to give him the lecture afterwards. Now, you should first tell me how to cure these nettle stings, and I would then be more inclined to learn how it is that nettles sting." The pain will soon pass off, and I do not know that

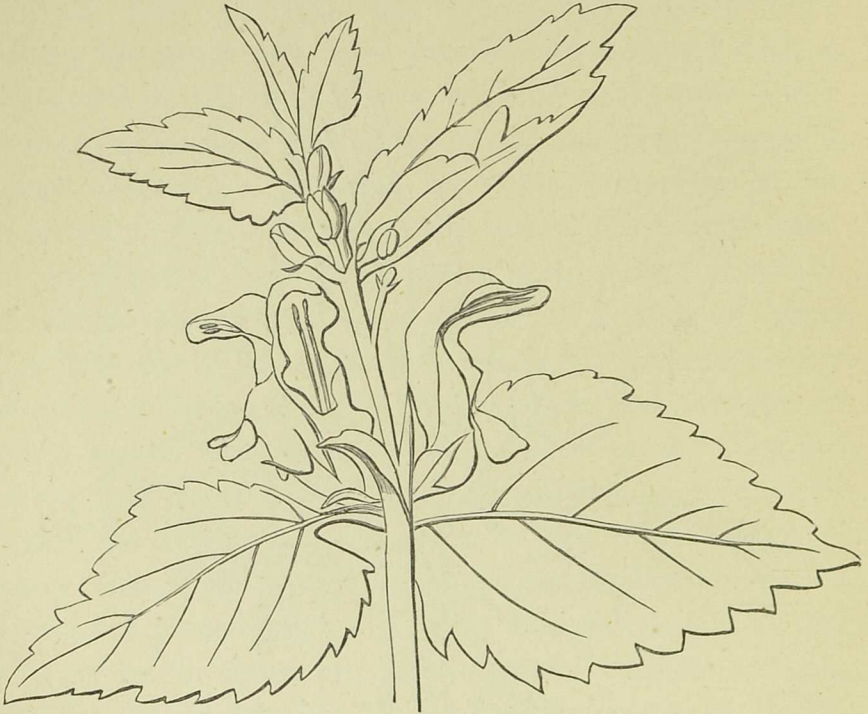
there is any remedy. When at school, I was told to rub the stung part over with a dock leaf, but I do not think this ever did it any good. Now, I want you to



NETTLE.

pay particular attention ; you know what we call “the dead nettle”—I mean what plant I allude to ; there is the red, white, and yellow so-called dead nettles ; you remember the shape of the flowers of these three kinds. Look at the flowers of the real stinging nettles ; are they

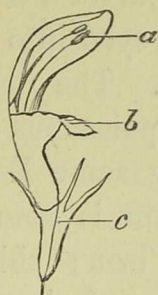
not extremely unlike? You see the small green flowers in long branched clusters; how different from the lip-shaped flower of the dead nettles. There is some



DEAD NETTLE.

general resemblance, however, between the real nettles and the so-called dead nettles; the leaves for instance of the white dead nettle are very like those of the stinger. The dead nettles, however, are not at all related to the true nettle, and belong to quite a different family called the Labiate tribe, from the Latin word *Labium*, "a lip," in allusion to the form of the corolla. Is the pain better, now, Jacko? "Yes, it is getting less severe; look what large white lumps have

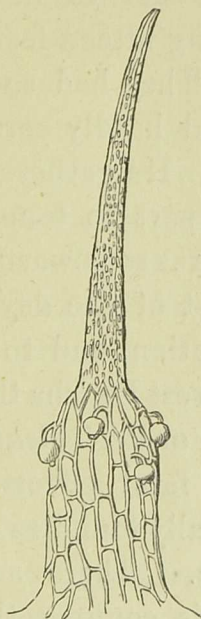
arisen on the back of my hand." The sting of the



LABIATE PLANT.

a. Stamens. *b.* Corolla. *c.* Calyx.

nettle is a very curious and interesting object under the microscope. It consists of a hollow tube with a



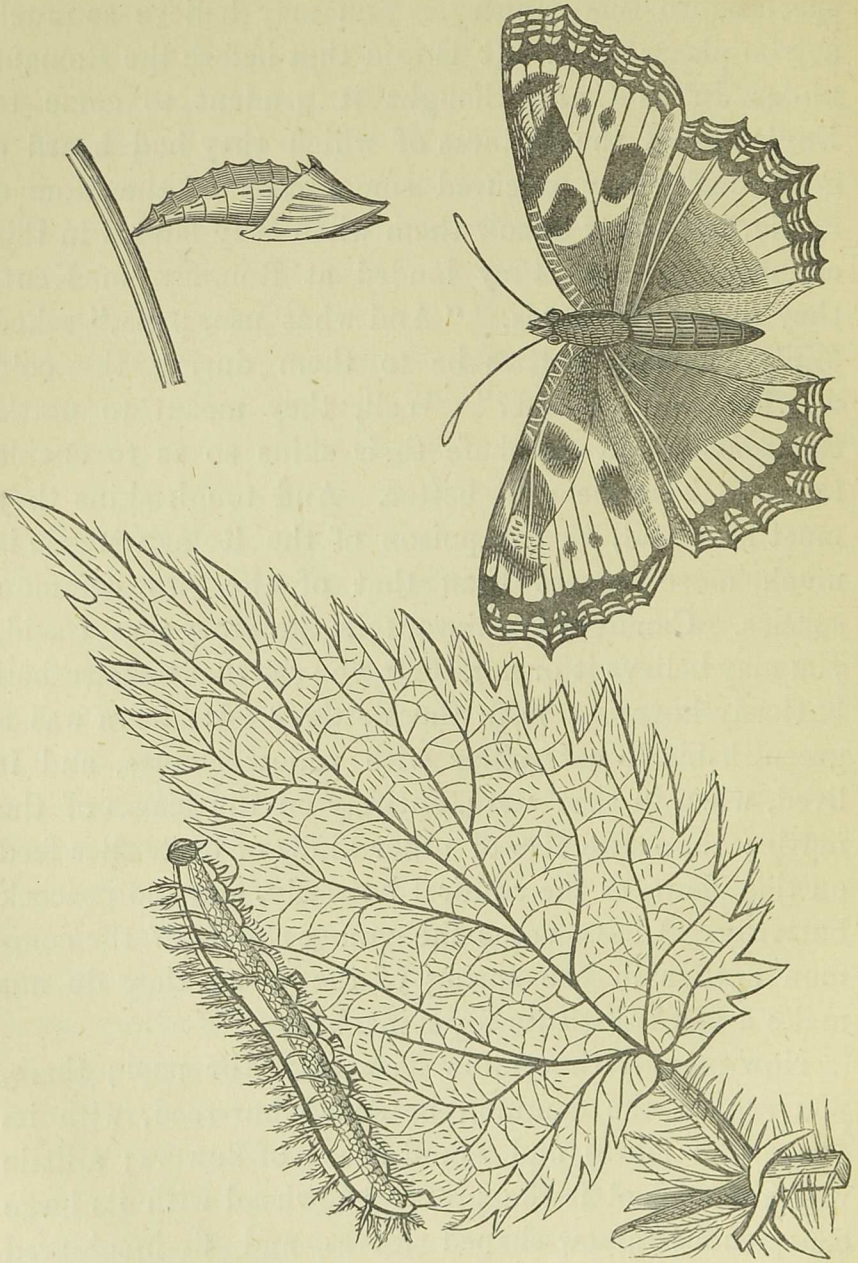
STING OF NETTLE, MAGNIFIED.

glandular organ at the bottom of it, in which is contained an acrid fluid very irritating to the skin;

the fine point of the sting or hair pierces the skin, and the pressure forces up the fluid from the bottom of the hair, which is then conveyed into the wound by a point at the top of the sting. The nettles of foreign countries have much greater poisonous properties. The effects of incautiously handling some East Indian species are terrible. The first pain is compared with the pain inflicted by a red-hot iron; this increases and continues for days. A French botanist was once stung by one of these nettles in the Botanical Gardens of Calcutta; he says the pain so affected the lower part of his face that he feared lock-jaw. He did not get rid of the pain till nine days had expired. Dr. Hooker saw gigantic nettles in Nepal, one was a shrubby species growing fifteen feet high, called by the natives *mealum-ma*. They had so great a dread of it that Dr. Hooker could hardly persuade them to help him to cut it down. He gathered several specimens without allowing any part to touch his skin, but the "scentless effluvium" was so powerful as to cause unpleasant effects for the rest of the day. "The sting produces violent inflammation, and to punish a child with *mealum-ma* is the severest Lepcha threat." Then there is the nettle of Timor, or *devils-leaf*, the sting of which sometimes produces fatal effects. Tree-nettles in Australia are occasionally found as much as twenty-five feet in circumference. There are three species of stinging nettles in this country, the great nettle, the small nettle, and the Roman nettle; the first two are very common, the last very rare indeed. There is a curious story told of the introduction of this last

species into this country. You may believe as much as you please of it. It is said that before the Romans under Julius Cæsar thought it prudent to come to England—of the coldness of which they had heard a good deal—they procured some seeds of the Roman nettle, intending to sow them when they landed in this country; so when they landed at Romney, in Kent, they sowed the seeds. “And what use, papa,” asked Willy, “would nettles be to them during the cold weather in England?” Well, they meant to nettle themselves, and so chafe their skins so as to enable them to bear the cold better. And tough skins they must have had, for the poison of the Roman nettle is much more severe than that of the two common species. Camden, I believe, tells the story; as I said, you may believe it or not. Do you see that tortoiseshell butterfly hovering near the nettles? Its larva was a greenish-black caterpillar with yellow stripes, and it lived, when in that state, entirely on the leaves of the nettle; the larvæ also of other kinds of butterflies feed on this plant, as the admiral butterfly, and the peacock butterfly. I have eaten the young shoots of the common nettles in the spring of the year; they do not make a bad substitute for spinach.

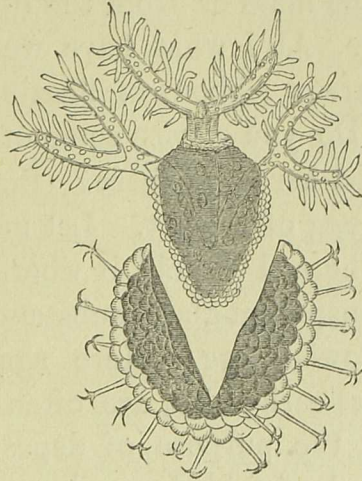
How prettily the yellow flags skirt the pool; there, you see, is the common branched bur-reed, with its sword-like leaves and round heads of flowers; a little way in the pool is the pretty arrowhead with its large conspicuous arrow-shaped leaves and flesh-coloured flowers, both leaves and flowers standing several inches out of the water. In the water, too, I see the brown



LARVA, CHRYSALIS, AND INSECT OF THE SMALL TORTOISE-SHELL
BUTTERFLY. (*Vanessa urticae*.)

leaves of the perfoliate pondweed; they are almost transparent, and look when dry something like gold-beater's skin. I see also the cylindrical tufts of the horn-wort with its bristle-like leaves often several times forked. It grows entirely under the water. See also a few rose-coloured spikes of the amphibious persicaria.

Such are some of the most conspicuous plants near our pond. It looks likely to contain some fresh-water polyzoa, than which there are few more beautiful tenants of the water. Here is a young one on this leaf of persicaria; do you see it? I put it into my bottle. Now look, it has lately been hatched from that round egg with curious hooks around its margin. It is called *Cristatella*. At present there are only three individuals in the outer



YOUNG CRISTATELLA, MAGNIFIED.

heart-shaped covering, but additional ones will bud out of these three, and others from these last, till the whole colony may number as many as sixty individuals, being then fully an inch long; the mouth of each is placed between the tentacles, which have upon them,

running down each side, a great number of very minute hairs or *cilia*, to which, you may remember, I have alluded before. The colour of the colony is yellowish white, sometimes brownish white. It is a most exquisite little animal, or rather colony of animals; for, though there are several creatures in one house, as it were, each is separate and independent of its neighbour. You will often find other forms of polyzoa in clear ponds and mill-pools; sometimes you would suppose you were looking at a mass of sponge, as in the case of *Alcyonella*, or the creeping root of some weed, as in *Plumatella* and *Fredericella*; but when the sponge-like mass or rootlets are placed in water you will observe numbers of little animals to show their heads and tentacles above the mass or from the little holes in the creeping rootlets. Ah! what have we here? Do you see those long narrow ribbons of floating grass about a yard from us? Do you notice some of the ribbons to be bent and folded here and there? Between each fold we shall find an egg of a newt. Let me get this bit of grass ribbon. There, I unfold it where it is creased, and you see a transparent glairy substance, within which is a round yellowish egg. Here again is another. The leaves of *persicaria*, also, are often selected by the female newt for the purpose of depositing her eggs. Here you see is a leaf folded up; between the folds is another newt's egg. I have never seen the newt in the act of laying her eggs, but, I believe, it may readily be observed by placing a female newt any time during the months of May and June in a vessel of water with some leaves of *persicaria*. Mr. Bell says, "The manner in

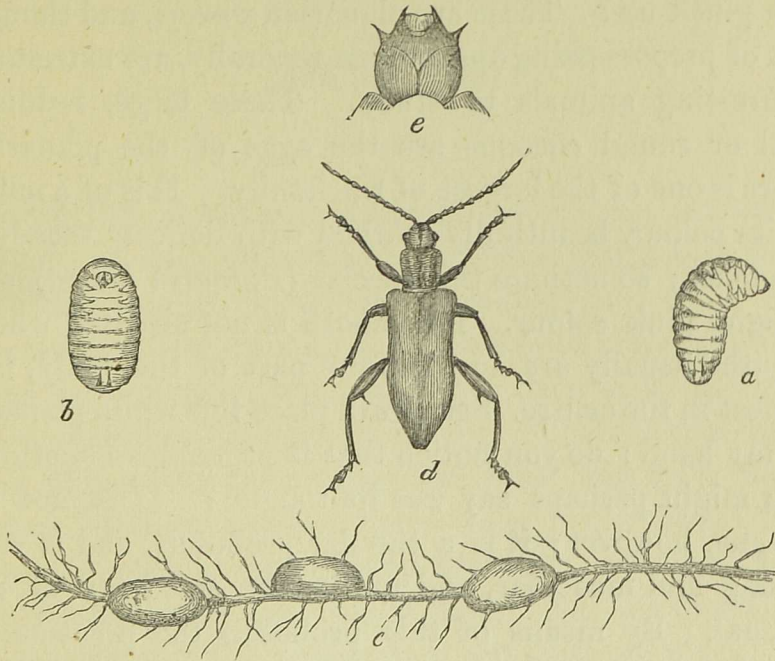
which the eggs are deposited is very interesting and curious. The female, selecting some leaf of an aquatic plant, sits as it were upon its edge, and folding it by means of her two hind feet, deposits a single egg in the duplicature of the folded part of the leaf, which is thereby glued most securely together, and the egg is thus effectually protected from injury. As soon as the female has in this way deposited a single egg, she quits the leaf, and after the lapse of a short time seeks another, there to place another egg." The eggs undergo various changes, and the animal, at an early part of its life, has a pair of delicate organs on each side of the neck; these are rudimentary gills, by means of which the little creature breathes. In its very early condition these gills are simple lobes; I ought to say that the first pair of lobes serve the purpose of holders by which the little creature attaches itself to leaves and other things. But when it is about three weeks old the gills have many leaf-like divisions, and look like beautiful feathered fringes. The circulation of blood in these gills may be readily seen under the microscope, and will be surveyed with the greatest delight. By-and-bye the animal buds out its four legs and looses the gills; they do not drop off, but become absorbed; hitherto it has carried on its respiration or breathing by means of these gills, but how does it breathe now that it has lost them? The lungs in the inside of the body have been gradually growing larger and fit for breathing the atmospheric air; for newts, when arrived at their full or perfect state, are, you know, chiefly terrestrial creatures, and breathe by means of their

lungs. When young they are in a fish state, and breathe the air contained in the water exactly as fish do. If you will look at a pond where newts abound, you will see the old ones constantly coming to the top of the water, gulping down a mouthful of air and then returning to the bottom. Full-grown newts do not frequent the water excepting for the sake of laying their eggs. The young ones are ready for leaving the water in the autumn, but I have often obtained young newts with their gills fully developed in the depth of winter. Probably these had been hatched late in the summer and had not time to grow their lungs, so had to keep to their gills and lead the life of a fish during the winter.

“People often call newts ‘askers,’ papa,” said Willy, “and the lads of the village always kill them when they catch them; they say their bite is poisonous.” I am sorry to say they do; but it is an error to suppose their bite is poisonous. You have yourself handled many specimens, and I am sure you never saw one attempt to bite. I do not believe their small teeth and weak jaws could pierce the skin. Four species of newts have been described as occurring in this country—the two common kinds are the smooth newt and the warty newt. I think I once found the palmated newt near Eyton; the male of this species is distinguished from other newts by having the hind legs webbed and by a thin filament or thread at the end of the tail.

“What is this, papa,” said Jack, “that I have found sticking to the roots of this water-weed; they look like the eggs of some creature?” They are not eggs, but the cocoons of a very common but pretty beetle called

Donacia. See, I will slit one open with my penknife. There is the little animal inside, a white, fat, maggoty thing; it has two curious hooks at the end of the tail,



DONACIA.


a, b. Larvæ, nat. size. *c.* Cocoons on root, nat. size. *d.* Beetle, slightly magnified. *e.* Head of larva.

it has only just framed its cell, and is about to change from the larval to the pupal state. Here you see are other maggots among the roots; they have not yet made a cocoon. I will open some more; here is one in its pupal condition. Here is another almost ready to come out as a beetle. The *Donacia* have all a metallic appearance and very beautiful they are, whether blue, red, copper, or purple; the under side is covered with a fine silky down. They are found in great numbers on water-weeds, and being very sluggish are

readily caught or picked off the plants they frequent with the hand. Do you notice those small, flat, brown or black dabs so common on almost any water-weed you pluck up? These are planarian worms, and though not of prepossessing appearance generally, are extremely interesting animals to study. These large, reddish, oval or round cocoons are the eggs of the planariæ. Here is one of the largest of the family. It is of a milk-white colour, beautifully marked with delicate tree-like branches; sometimes this species (*Planaria lactea*) is of a light pink colour. The mouth is not situated where mouths usually are, in the fore part of the body, but almost in the centre. See, I will place this white planaria on my hand; do you notice that it protrudes something you might perhaps say was its tongue? It is not its tongue, however; it is a tubular proboscis, and is very strong and muscular, and unlike the soft body of the animal. By means of this proboscis the creature is enabled to pierce the bodies of other creatures and to suck out their juices. I have kept planariæ under observation, and seen them drive this proboscis through each other. These black and brown dabs often feed upon the milky planariæ. They are something like the hydræ in their power of producing lost portions of their bodies. Cut them in two or more pieces, each piece will grow into a perfect planaria again. These you see do not swim but crawl, or glide over the surface of plants in the water. Some kinds, however, different from these, are able to swim well. We have had a long and successful hunt to-day. Let us go.

WALK VII.

JUNE.

 HIS morning, before we started for our walk, we went to look at a hedgehog which had been brought to us the preceding day. We discovered that the animal, in the course of the night, had crept into a bag with a quantity of bran in it, and that there were four little ones with her. There they were as snug as possible, the mother and little urchins! Very curious little animals too these young hedgehogs. The spines or prickles were nearly white and soft, and were not spread over the whole body, but arranged in rows down it. The appearance was that of a plucked duckling when it is what is called "penny." They were perfectly blind, and the passage of the ear was quite closed; they uttered faint, puppy-like cries. I was desirous to try and rear them; but I had grave doubts about the old one, for those who have attempted to rear young hedgehogs have generally found that the mother ate her offspring. We removed her, young and all, to another place, giving them plenty of straw and supplying bread and milk for the old one. Buffon, amongst others, relates "that he had repeatedly placed the mother with the young in a place of confinement; but that, instead of suckling them, she invariably killed

and devoured them, notwithstanding that she was provided with plenty of food."

However, we determined to give our young urchins a chance, and hoped the mother hedgehog would be favorably disposed towards her offspring; so we now left her undisturbed. Willy wished to know whether hedgehogs were injurious creatures, for "you know, papa," he said, "that country lads and gamekeepers always kill them whenever they have a chance." I am convinced that hedgehogs do much more good than harm, by the destruction they cause to insects, slugs, snails, field-mice, and other pests of the farm. There is a foolish idea in the minds of the uneducated that these animals suck cows. You have only to laugh at such an absurdity; but I doubt you will scarcely ever succeed in persuading such people that the idea is a ridiculous one, and utterly unsupported by fact. Hedgehogs will undoubtedly destroy eggs, and one can understand why gamekeepers wage war against them, fearing for the safety of the eggs or young birds of their favorite partridges or pheasants. This is natural. I suspect, however, that hedgehogs seldom molest the nests, and that the injury they do in this respect is very small. "But you know, papa," said Jack, "that they will eat young birds. Do you not remember the dead sparrow we once gave to a hedgehog, and how furiously he went at it, and how soon he ate it all up except the feathers." "Yes," added Willy, "and do you not also remember our putting a toad in the same box with a hedgehog? Oh! how angry he seemed, and how savagely he shook the unfortunate toad! He did not,

however, seem to like the flavour, and soon gave up the fight." Hedgehogs will certainly destroy young birds; but we must remember to set the good any animal does against the harm, and strike the balance; and, as I said, I suspect in this case the good will largely preponderate. Hedgehogs are extremely fond of beetles; they seize on them with great earnestness, and crack them with as much delight as you lads crack nuts. Hedgehogs are sometimes kept in houses for the purpose of eating the cockroaches so often abounding in kitchens. Snakes are also devoured by hedgehogs. The late Professor Buckland, having occasion to suspect that hedgehogs sometimes preyed on snakes, "procured a common snake and also a hedgehog, and put them in a box together. Whether or not the latter recognised its enemy was not apparent; it did not dart from the hedgehog, but kept creeping gently round the box. The hedgehog was rolled up, and did not appear to see the snake. The professor then laid the hedgehog on the snake, with that part of the ball where the head and tail meet downwards, and touching it. The snake proceeded to crawl; the hedgehog started, opened slightly, and seeing what was under it gave the snake a hard bite, and instantly rolled itself up again. It soon opened a second, and again a third time, repeating the bite. This done, the hedgehog stood by the snake's side, and passed the whole body of the snake successively through its jaws, cracking it, and breaking the bones at intervals of half an inch or more, by which operation the snake was rendered motionless. The hedgehog then placed itself at the tip of the snake's

tail, and began to eat upwards, as one would eat a radish, without intermission, but slowly, till half of the snake was devoured. The following morning the remaining half was also completely eaten up." When rather young these animals make very interesting pets; they soon become tame, and will allow you to stroke their cheeks. You remember our placing a hedgehog on the study table, and seeing how it got off on to the ground. It came to the edge, and threw itself off, coiling up its body partly as it fell; the elastic nature of its prickly covering enabling it to bear the shock of the fall without the slightest inconvenience.

Let us go on the moors again, and watch the coots and water-hens in the reedy pools near the aqueduct. Do you see that great tit on a branch of this poplar? He is actually at work doing a bit of butchery on a small warbler. See how he is beating the poor little fellow on the head; he wants to get at his brains. "Are there not birds called butcher-birds?" asked Willy, "that fix their victims on thorns, and then peck off their flesh? Shall we see any of them?" There are three kinds of butcher-birds that have been known to come to this country. Two kinds are very uncommon, and we are not likely to meet with any of them in our walks. I may as well, however, tell you something about them; but, as I have no personal knowledge of the habits of any of the species, I must get my information from other sources. The great grey shrike, the red-backed shrike, and the woodchat shrike, are the three species of the family occurring in Great Britain; the red-backed shrike is the only tolerably common one,



GREAT GREY SHRIKE, OR BUTCHER BIRD, WITH ITS
VICTIMS—SHREWS AND BLUE TITMOUSE.

arriving in this country late in April, and quitting it in September. Mr. John Shaw tells me this bird visits the quarry grounds at Shrewsbury every spring, and an early riser, if he goes there, can see these birds readily. Mr. Yarrell says that the great grey shrike is only an occasional visitor to this country, and is generally obtained between autumn and spring. Its food consists of mice, shrews, small birds, frogs, lizards, and large insects. "After having killed its prey, it fixes the body in a forked branch, or upon a sharp thorn, the more readily to pull off small pieces from it." The following remarks are by a gentleman who had one of these birds in confinement:—"An old bird of this species," he says, taken near Norwich in October, 1835, lived in my possession twelve months. It became very tame, and would readily take its food from my hands. When a bird was given it, it invariably broke the skull, and generally ate the head first. It sometimes held the bird in its claws, and pulled it to pieces in the manner of hawks, but seemed to prefer forcing part of it through the wires, then pulling at it. It always hung what it could not eat up on the sides of the cage. It would often eat three small birds in a day. In the spring it was very noisy, one of its notes a little resembling the cry of the kestrel." It is a cunning as well as a bold bird. It is said that by imitating the notes of some of the smaller birds it calls them near it, and then pounces upon some deluded victim. The shrike is used by falconers abroad for trapping falcons; "it is fastened to the ground, and by screaming loudly gives notice to the falconer, who is concealed, of the approach of a

hawk." You will notice in any picture of a shrike how admirably adapted is its curved beak for butchering purposes. The red-backed shrike "frequents the sides of woods and high hedgerows, generally in pairs, and may frequently be seen perched on the uppermost branch of an isolated bush, on the look out for prey. The males occasionally make a chirping noise, not unlike the note of the sparrow." It also imitates the voice of small birds. Mr. Yarrell says "the food of the red-backed shrike is mice, and probably shrews, small birds, and various insects, particularly the common May-chaffer. Its inclination to attack and its power to destroy little birds has been doubted; but it has been seen to kill a bird as large as a finch, and is not unfrequently caught in the clap-nets of London bird-catchers, having struck at their decoy-birds;" and Mr. Hewitson says—"Seeing a red-backed shrike busy in a hedge, I found, upon approaching it, a small bird, upon which it had been operating, firmly fixed upon a blunt thorn; its head was torn off, and the body entirely plucked."

"What an amazing quantity of little lady-bird beetles there are on this hedge-bank," said May. "The ground is almost red with them." Yes, it is a very common, but very pretty species. You see there are seven black spots on its red wing-covers, three on each, arranged triangularly, and one at the top of the wing-covers, just at the point where they meet. "Are these insects injurious, papa?" asked Willy; "you say there are so many insects that are. I do hope the little lady-birds do no mischief." I am happy, then,

to tell you that they are as useful as they are pretty. You all know what are called plant-lice, those nasty green or black flies called Aphides, which cover the leaves or branches of so many trees and flowers, and do most terrible mischief. Well, the lady-birds, both when they are larvæ and when they are beetles, eat these pests, and help to keep their devastating swarms in check. I have frequently seen an aphid in the mouth of a lady-bird; and the larva, a curious six-footed grub, about the third of an inch long, which you may often see late in the summer and the autumn, is still more fond of aphid food. Mr. Curtis says two lady-birds cleared two geranium plants of aphides in twenty-four hours. The species we are looking at is the "seven-spotted lady-bird;" there is another very common kind, whose scarlet wing-cases have one black spot on the centre of each. This species is subject to considerable variety; it is called the "two-spotted lady-bird." There is another you may often find; it is small and yellow, with eleven spots on each wing-cover. This is called the "twenty-two-spotted lady-bird;" it is an elegant little creature. It is interesting to note how the observation of some particular animal has led naturalists to the choice of their favorite study. Mr. Gould tells us that his first inclination to the study of birds arose from his father having once lifted him up to peep into a hedge-warbler's nest. His admiration for the beautiful blue eggs led him to devote his time to ornithology, or the study of birds. If I remember rightly, Kirby's mind was directed to the study of insects by noticing the wonderful vitality shown by a

little lady-bird beetle, which, after having been immersed twenty-four hours in spirits of wine, on being taken out actually flew away. "What is the meaning," asked Mary, "of the nursery rhyme about the lady-bird?"

Lady-bird, lady-bird, fly away home,
Your house is on fire, and your children will burn?"

Indeed, I cannot tell you. There are different versions of the old song. One runs thus:

Lady-bird, lady-bird, fly away home;
Your house is on fire, your children at home,
All but one that lives under the stone,—
Ply thee home, lady-bird, ere it be gone.

In Yorkshire and Lancashire it is—

Lady-bird, lady-bird, fly thy way home,
Thy house is on fire, thy children all roam,
Except little Nan, who sits in her pan,
Weaving gold laces as fast as she can.

The names of Lady-bird, Lady-cow, no doubt originated from the general reverence for this insect and its dedication to the Virgin Mary. In Scandinavia this little beetle is called "Our Lady's Key-maid;" in Sweden "The Virgin Mary's Golden Hen." Similar reverence is paid in Germany, France, England, and Scotland. In Norfolk it is called Bishop Barnabee, and the young girls have the following rhyme, which they continue to recite to it placed on the palm of the hand, till it takes wing and flies away.

"Bishop, Bishop Barnabee,
Tell me when my wedding be;

If it be to-morrow day,
Take your wings and fly away !
Fly to the East, fly to the West,
Fly to him that I love best."

The word barnabee or burnabee, or, as Southey writes it, burnie-bee, no doubt has reference to the burnished or polished wing cases of the insect.

Let us now look out for the coots and water-hens, which love to dabble amongst the weeds of these pools, and to hide amongst the hedges and bulrushes that so thickly skirt them. See how rapidly the swifts or "Jack-squealers," as the country folks call them, are gliding by; you remember when we were noticing the swallows and martins that we thought of the swifts. Look at the beautiful scythe-like form of the wings; the tail, you see, is slightly forked; but the bird has the power of bringing the feathers together, so that sometimes you cannot see its cleft form. I generally notice swifts in the neighbourhood about the 5th of May; this year Mr. John Shaw tells me he saw some in Shrewsbury as early as the 23rd of April. Although they come to us the last of the swallow family, they leave us the soonest. By the middle of August most of the swifts will have left us.

This bird has remarkably short legs; and I remember more than once taking one off the ground when I was a boy at school, for unless it is raised a little above the level of the ground, it finds it very difficult to mount upwards by reason of its extremely short legs and long wings. If we had a swift in our hands, I could point out how it differed from the rest of the swallow family

in the structure of its feet ; in the other members the four toes are arranged three before and one behind ; in the swift all the four toes are directed forwards. There is another kind of swift, the "white-bellied swift," which has, on a few occasions, been noticed in this country. It is rather larger than the common swift, and has wings of greater length, and can fly even more rapidly. Hark ! I hear the noise of a coot proceeding from the reeds of a pond. I dare say if we keep quite still we shall get a glimpse of her. There she comes ; and do look, a lot of young ones with her ; little black downy things they are, as we should see were we near enough to examine them. The old birds have a naked white patch on the forehead, and are therefore called bald-coots. You can see the white patch now she faces us and the sun is shining ; the body is a dingy black tinged with dark grey ; you notice a little white about the wings. The feet of the coot are curiously formed, each of the four toes is partly webbed, having a membrane forming rounded lobes ; the claws are very sharp, and the bird does not hesitate to make use of them if you catch hold of it carelessly ; so Col. Hawker gives the following caution to young sportsmen—"Beware of a winged coot, or he will scratch you like a cat."

I never saw a coot dive, and think it seldom does ; water-hens, every one knows, are frequent divers.

The old bird is pulling up some of the weeds of the pool for the young ones ; how carefully she attends to them ; the heads of the little ones are nearly naked, and of a bright orange colour mixed with blue ; but this brilliant colouring lasts only a few days. The nest

is made of broken reeds and flags, and hidden amongst the tall rushes and edges in the water.

Bewick mentions the case of a coot having built her nest among some rushes, which were afterwards loosened by the wind, and of course the nest was driven about and floated upon the surface of the water in every direction; notwithstanding which, the female continued to sit as usual, and brought out her young upon her movable habitation. See, now they have all gone away to hide amongst the reeds; they like to come out into the open water late in the evening, and it is not often easy to observe them in the day-time. There are plenty of moor-hens or water-hens in these reedy pools. They are not so peaceful as the coots, for they have been known to attack young ducklings. There one swims, jerking up its tail, which is whitish underneath, and nodding its head; the moor-hen is a smaller bird than the coot, though resembling it both in form and habits. The feet, however, are very different, for, instead of the toes being furnished with a lobed membrane, they have a continuous narrow one down each. Moor-hens have been known to remove their eggs from the nest, in order to add to it, and to replace them again. Mr. Selby relates the following interesting account:

“ During the early part of the summer of 1835 a pair of water-hens built their nest by the margin of the ornamental pond at Bell’s Hill, a piece of water of considerable extent, and ordinarily fed by a spring from the height above, but into which the contents of another large pond can occasionally be admitted. This

was done while the female was sitting ; and as the nest had been built when the water-level stood low, the sudden influx of this large body of water from the second pond caused a rise of several inches, so as to threaten the speedy immersion and consequent destruction of the eggs. This the birds seem to have been aware of, and immediately took precaution against so imminent a danger ; for when the gardener, upon whose veracity I can safely rely, seeing the sudden rise of the water, went to look after the nest, expecting to find it covered and the eggs destroyed, or at least forsaken by the hen, he observed, while at a distance, both birds busily engaged about the brink where the nest was placed ; and when near enough, he clearly perceived that they were adding, with all possible dispatch, fresh materials to raise the fabric beyond the level of the increased contents of the pond, and that the eggs had by some means been removed from the nest by the birds, and were then deposited upon the grass, about a foot or more from the margin of the water. He watched them for some time, and saw the nest rapidly increase in height ; but I regret to add that he did not remain long enough, fearing he might create alarm, to witness the interesting act of the replacing of the eggs, which must have been effected shortly afterwards ; for upon his return in less than an hour, he found the hen quietly sitting upon them in the newly raised nest. In a few days afterwards the young were hatched, and, as usual, soon quitted the nest and took to the water with the parent. The nest was shown to me *in situ* very soon afterwards, and I could

then plainly discern the formation of the new with the old part of the fabric."

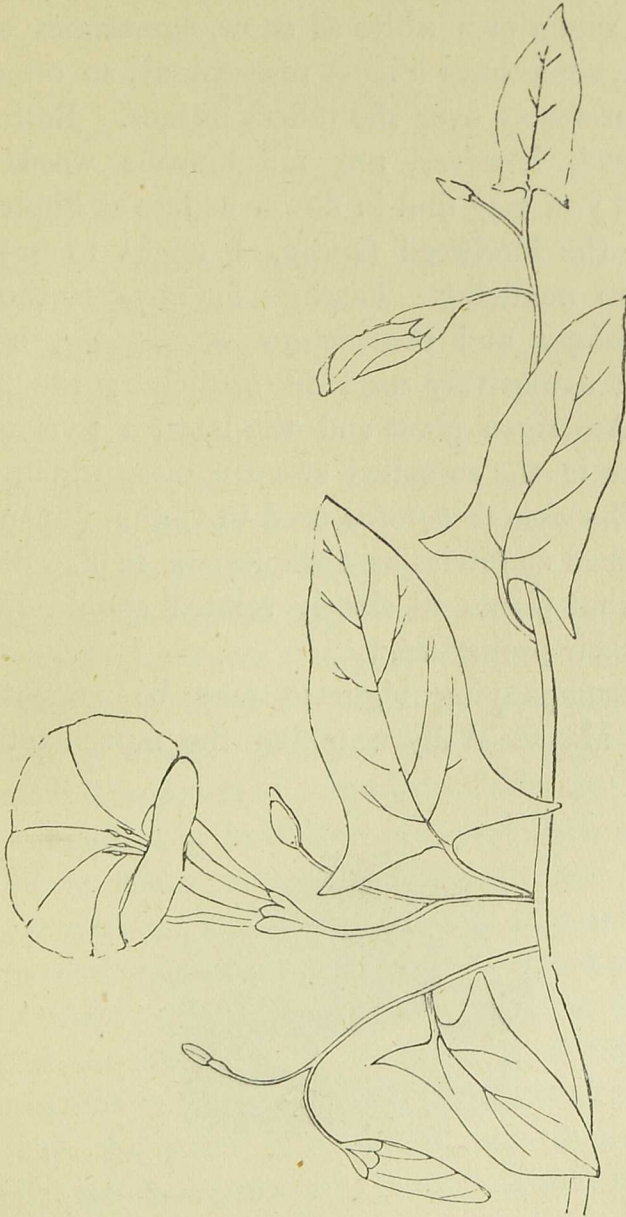
"What is that little bird in the water?" asked Jack. "Oh! he is suddenly gone; do you see the curl in the water where it dived?" It was no doubt a dabchick, then, from your description, though I was not in time to see it before it dived; if we keep quite still and silent I dare say it will appear again. There it is, dabbling in the water in search of water insects that are found amongst the weeds. Another name of this bird is the little grebe; several species of grebes have been found in this county; the great-crested grebe is a very handsome bird and frequents lakes and rivers; but of the five British grebes, the little dabchick is by far the most common. The feet of these birds are peculiar, the toes are not connected together by a web, as you see in ducks and geese; they are, however, united at the base, and each of the three front toes is surrounded by a broad continuous membrane; the lower part of the leg is also very flat; the legs are placed very far backwards, so that these birds stand almost upright; the wings are short and seldom used for flight; however, they are admirable swimmers and divers, and pretty, lively little birds. The plumage of this little grebe varies according to the time of year. Now, in the summer weather, the head, neck and back are a very dark brown; the cheeks and front of the neck a rich chestnut; chin jet black; in the winter they lose this chestnut colour, and are then of a light olive-grey colour and white underneath. Formerly the two different states of the plumage were thought to mark two different species.

The nest, as Mr. Gould tells us, is a raft of weeds and aquatic plants carefully heaped together in a rounded form. The young ones have delicate rose-coloured bills and harlequin-like markings on the body, and rosy-white breasts. "So active and truly aquatic is the dabchick, even when only one or two days old, that it is almost impossible to see it in a state of nature; for immediately after the young birds are hatched, they either take to the water of their own accord, or cling when not more than an hour old to the backs of their parents, who dive away with them out of harm's way." Mr. Gould mentions that a friend of his, when out on a fishing excursion with him, once shot a dabchick as it dived across a shallow stream; on emerging wounded, on the surface, two young ones clinging to the back were caught by Mr. Gould in his landing net.

So rapid is their diving that they can often avoid the charge of a gun; they then rise again "with only the tips of their bill above water, and even these generally concealed amongst some patch of weeds or grass." The grebes have a peculiar habit of plucking off the soft feathers from the under side of the body and swallowing them. Why they do so is not known.

"What is this pretty pink flower," asked May, "with long trailing stems and leaves broadly arrow-shaped? From its resemblance to that beautiful convolvulus in the garden I should think it must be a smaller kind of that plant." You are quite right, it is a convolvulus, and its English name of Field Bindweed is expressive of the clinging habits of this plant; see how tightly it

has wrapped itself round this tall blade of grass. Although a very pretty plant, with its pink flowers and



CONVOLVULUS.


darker plaits, its arrow-shaped leaves, and its fragrant smell, it is a troublesome weed to the farmer. Then there is the greater bind-weed, with its large bell-blossoms sometimes white as snow, sometimes striped with pink, sometimes almost rose-colour, so often seen growing profusely over the tallest bushes. Both kinds of bindweed, however, are mischievous weeds; the large kind you may find in flower as late as September. Some of the bindweed family, I ought to say, are valuable in medicine. There is for instance the *Convolvulus jalapa* and *Convolvulus scammonia*, both of which are extensively used in medicine; the former a South American plant and the latter a Syrian one. Then there is the so-called sweet-potato, which is the root of *Convolvulus batatas* used in China, Japan, and other tropical countries as a wholesome food. Strange it seems that plants so closely related should differ so much in their properties.

The accompanying vignette may be supposed to represent Master Willy watching the movements of a snail.



WALK VIII.

JULY.

ET us have another stroll on the moors. We pass over a small brook on our way, and of course stop on the bridge and gaze into the little rivulet. What do I see about four yards off in the shade? A number of small dark-coloured patches which I recognise at once as one of our most beautiful fresh-water algæ. We will gather some from the bottom. There! the little tufts are attached to the upper sides of stones. When taken out of the water, the plant looks and feels like a mass of very dark jelly. I will float a piece out in this bottle of water. Did you ever see anything more beautiful? It consists of a number of delicate branches, each arranged in a bead-like row, and from a certain resemblance which these beaded rows bear to frog-spawn, as well as from their jelly-like consistency, this alga has received the name of *Batrachospermum*, which means "frogs' spawn." If we take a bit home and spread it out carefully on a piece of drying paper, separating the numerous beaded branches one from the other with the point of a needle, and leave it to dry gradually, we shall get a very pretty object indeed. As you may suppose, the plant is a most charming object

for the microscope. "Do you think," asked Willy, "it would do in my aquarium?" I have several times tried it in an aquarium; it would live for a few days, then gradually lose colour and break to pieces. The fact is that, as Dr. Hassall says, these plants "inhabit mostly pure and running waters, being usually met with in fountains, wells, and streams, the force of which is not considerable." The frog-spawn alga, therefore, will not thrive in any but the purest water, and a gentle flow is necessary to its growth and health. "These plants are so exceedingly flexible," Dr. Hassall continues, "that they obey the slightest motion of the fluid which surrounds them, and would seem almost to be endowed with vitality; nothing can surpass the ease and grace of their movements. When removed from the water they lose all form, and appear like pieces of jelly without trace of organization. On immersion, however, the branches again quickly resume their former disposition. They adhere strongly to paper, and in drying frequently change to some other tint usually much deeper; on being moistened after long intervals they recover much of their original freshness; and it is even asserted that, after having lain in the herbarium for some years, when they are replaced in water in a suitable locality, they will vegetate as before." This last assertion I must say I do not credit. I shall never forget the delight I felt when I first made the acquaintance of this curious and graceful alga. From the eyes of how many people are its charms hidden! It is only those that look closely that would notice the little jelly-like tufts growing modestly in shaded places for the most part.

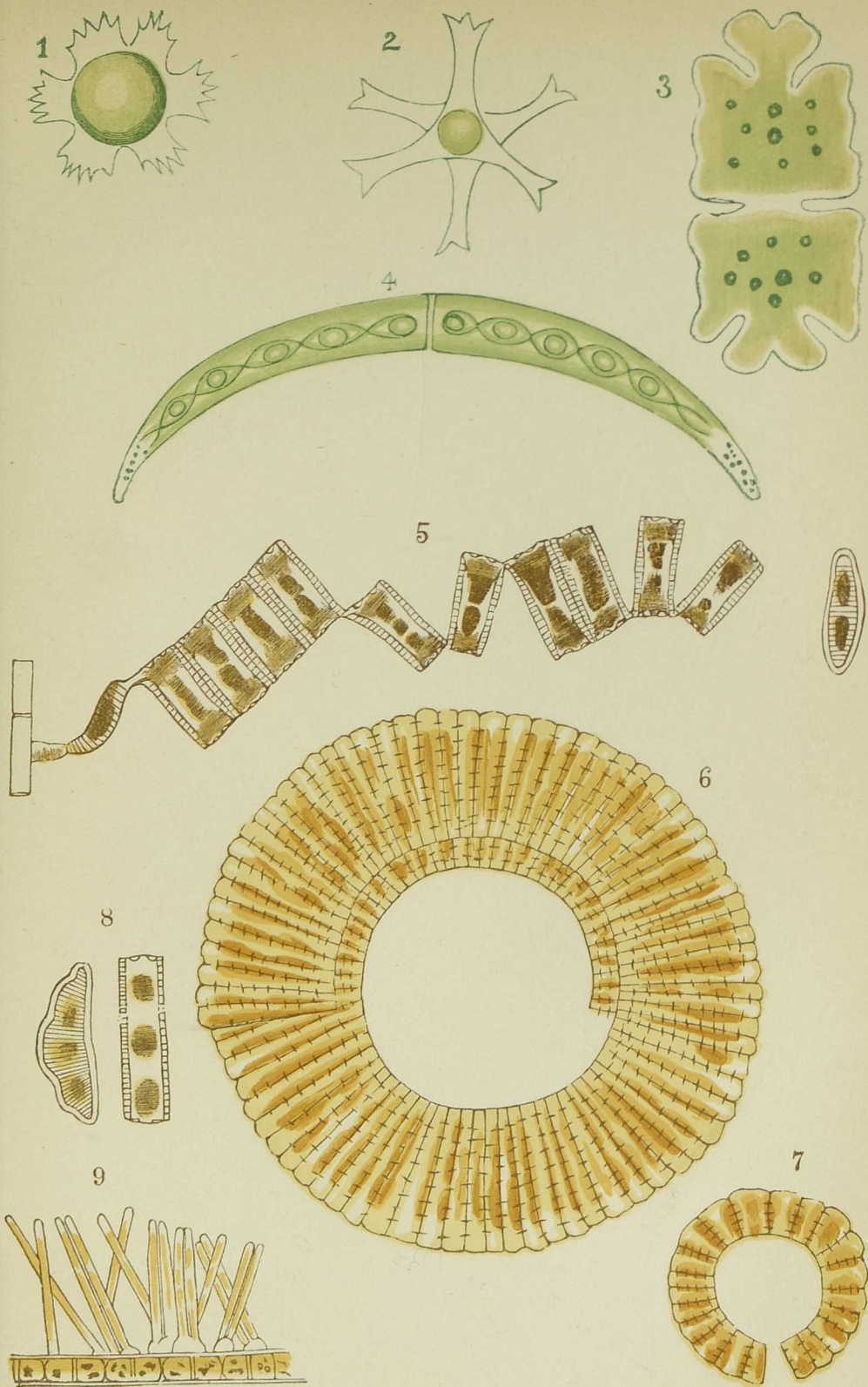
This species, however, is common enough in gently flowing and shallow streams, and we may often come across it in our rambles if we take the trouble to use our eyes. There are other extremely beautiful forms of fresh-water algæ.

Here in this same stream are the long green threads of *Cladophora glomerata*. I use as few hard words as possible, but I cannot help using them sometimes, as many objects have no English names. This alga is also attached to stones and floats out with the current sometimes two feet in length; and, like the frog-spawn alga, is fond of pure water, but I have often kept the *Cladophora* alive in perfect health in an aquarium for weeks together. Its deep refreshing green colour and graceful form make it a very desirable acquisition for the aquarium. I break off a small bit. Now see its beautifully branched form. Do you remember a round green ball about the size of a small apple which I have at home? Well, that ball, which came from Ellesmere, is nothing else than a mass of this same *Cladophora*. Dr. Hassall is no doubt correct in his explanation of the formation of these balls. He says, "This state of *Cladophora glomerata* I believe to be formed as follows: A specimen by the force of some mountain stream swollen by recent rains becomes forced from its attachment; as it is carried along by the current, it is made to revolve repeatedly upon itself, until at last a compact ball is formed of it, which finally becomes deposited in some basin or reservoir in which the stream loses itself, and in which these balls are usually found." Here are some specimens in the water of a rich brown

colour instead of green. This is caused by the growth of other algæ over its long branches. See! I shake a bit in my bottle, and you see a quantity of brown deposit comes off, showing the green threads of the *Cladophora* underneath. This brown deposit looks to you, I dare say, very uninteresting. I will show you some under the microscope when we get home, and you will see many extremely beautiful forms. These are known by the name of *Diatomaceæ* and *Desmidiæ*. I will not tell you more of them at present; but a picture which I will show you will give you the forms of some of these microscopic plants.

Here we are once more on the wild moors. There is really nothing very "wild" about them now; cultivation has turned them into excellent pasturage; the epithet, too, is a corruption of weald, signifying a wood. But this whole district, extending from Longdon-upon-Tern to Aqualate, was once, there can be no doubt, covered with water. Perhaps it was the bed of a large lake a great many years ago; the soil, you see, is composed of peat varying in thickness in different parts, and below the peat is often found sand and pebbles, which looks as if it was once the bottom of a vast lake ten miles or more long, and three broad. The village of Kinnersly was evidently once an island, and you can now see the moors extending all around it. Once, then, the whole district was covered with water, but about 200 years ago it was covered with wood.

"Oh! papa, did you see that?" said Jack. "A hawk pounced upon a small bird and has taken him to that fir tree, where he is eating him." It is a kestrel;

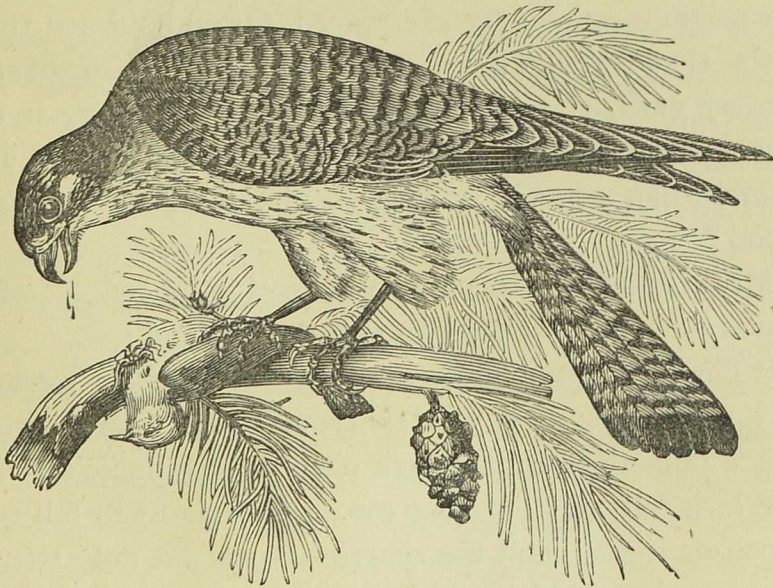


FRESH-WATER ALGÆ, DESMIDÆ, AND DIATOMACEÆ.
All highly magnified.

- 1.—Staurastrum.
- 2.—Trigonocystis.
- 3.—Euastrum.
- 4.—Closterium.

- 5.—Diatoma.
- 6, 7.—Meridion.
- 8.—Eunotia.
- 9.—Exilaria.

one of the commonest of the British hawks, and which we may often see in this district; though I am afraid those destructive animals called gamekeepers will in time succeed in destroying every hawk in the neighbourhood. "Well, but, papa," said Willy, "do they not do a great deal of harm to young partridges and pheasants, and of course the gamekeeper will not stand



KESTRIL.

that?" I dare say; indeed I have no doubt that a kestrel will occasionally seize upon a young partridge, but it is also certain that mice form the principal part of its food. Remains of mice, shrews, beetles, lizards, have been found in the kestrel's stomach, and I am sure it would be a great pity to seek to exterminate this handsome and attractive bird. "Is this the hawk that you very often see hovering steadily in

the air over one spot?" asked May. Yes, it is, and from this habit it has got the name of windhover; the outspread tail is suspended and the head always points in the direction of the wind. The sparrow-hawk I occasionally see, and now and then the merlin, a beautiful little fellow and of great courage; the sparrow-hawk is a much greater enemy to young birds than the kestrel, and ought not to be allowed to increase where game or poultry are reared, for so bold are these birds that they will not unfrequently skim over a poultry yard, seize a young chicken and carry it off. Have you never heard the cry of terror an old hen utters when a hawk is seen in the air near her little brood?

Mr. Gould gives us the following anecdote of a sparrow-hawk as related to him by a friend:—

“Three or four years since I was driving towards Dover, when suddenly a sparrow-hawk, with a stoop like a falcon’s, struck a lark close to my horse’s head. The lark fell as a grouse or a partridge will fall to a falcon or tiercel, and the sparrow-hawk did not attempt to carry, but held on his way. I jumped down and picked up the body of the lark and the head; the two being entirely disunited. The velocity and force of the stoop must have been tremendous. I have often seen grouse and partridges ripped up the back and neck, and the skull laid bare, but I never saw a head taken clean off before.” A sparrow-hawk has been known to pursue a finch between the legs of a man, and to dash through a window-pane with the intention of seizing some cage-bird.

“What was that very large bird, papa,” said Willy, “that you noticed near Eyton last November? It was one of the hawk family, was it not?” Yes; I have no doubt it was the common buzzard, though it would not allow me to get very near it; but I watched it at a distance for some time. It would remain on a tree for some time, and then take a slow flight away, returning again to some tree. Buzzards are not nearly such active fliers and bold birds as the smaller kinds of hawks. Though I said it was the common buzzard, you must not suppose that this bird is really common; it is called common as being the species most frequently seen in this country. Mr. Yarrell, in his book on ‘British Birds,’ has given the figure of a buzzard nursing and feeding a brood of young chickens. Is not that a curious thing?

He says, “The extreme partiality of the common buzzard to the seasonal task of incubation and rearing young birds has been exemplified in various instances. A few years back, a female buzzard, kept in the garden of the Chequers Inn, at Uxbridge, showed an inclination to sit by collecting and bending all the loose sticks she could gain possession of. Her owner, noticing her actions, supplied her with materials. She completed her nest and sat on two hens’ eggs, which she hatched, and afterwards reared the young. Since then she has hatched and brought up a brood of chickens every year.

She indicates her desire to sit by scratching holes in the ground, and breaking and tearing everything within her reach. One summer, in order to save her the fatigue of sitting, some young chickens just hatched

were put down to her, but she destroyed the whole. Her family, in June, 1839, consisted of nine, the original number was ten, but one had been lost. When flesh was given to her, she was very assiduous in tearing and offering it as food to her nurselings, and appeared uneasy if, after taking small portions from her, they turned away to pick up grain."

What is this little mouse-like thing in the grass? how quickly it runs. Now I have got him. No! off again; burrowing under the grass-roots. Now I have him safe enough; he cannot bite me with this glove on. Look at the little rogue, with his soft short silky fur and long nose. See how flexible that pointed nose is; how useful in grubbing amongst the closest herbage, or under the surface of the soil. How sharp are the little creature's teeth. With them he eats worms and the larvæ of various kinds of insects. Well, what is its name? It is the common shrew, and though the form of the body is mouse-shaped, it is, properly speaking, not a mouse at all, being much more nearly related to the mole. It is said that shrews are very fond of fighting, and that if two be confined together in a box, the stronger will conquer the weaker and then eat him. Moles are said to eat their small relatives, but I have never had any evidence of the fact, though it is probable enough. May wanted to know whether cats eat shrews. I have often tried cats with dead shrews, and have always found they will not touch them. I dare say, however, they would kill them. The smell of the shrew is certainly unpleasant, as you may find out from this little fellow I hold in my hand.

Mind he does not bite your nose. Now we have examined him I shall let him go. It is no pleasure to take an animal's life, and as this little shrew does no harm but good by destroying insect larvæ, it would be a shame to hurt him. Where injurious creatures must be killed, let us always be careful to take away life so as to cause the least possible pain. Now, would any of you have ever thought that the little shrew I have just released had ever been supposed to be one of the most dangerous enemies to cattle? This was really once believed by our ancestors, who thought that a shrew, by running over the backs of cattle, made them weak in the loins, and that its bite made a beast swell at the heart and die. Absurd as was the belief, the supposed cure for the injury was, if possible, still more ridiculous. It consisted in passing over the cow's back the twigs of a shrew ash. "Now a shrew ash," says Gilbert White, "is an ash whose twigs or branches when applied to the limbs of cattle will immediately relieve the pains which a beast suffers from the running of a shrew-mouse over the part affected, for it is supposed that a shrew-mouse is of so baneful and deleterious a nature, that wherever it creeps over a beast, be it horse, cow, or sheep, the suffering animal is afflicted with cruel anguish and threatened with the loss of the use of the limb. Against this accident, to which they were continually liable, our provident forefathers always kept a shrew ash at hand which, when once medicated, would maintain its virtue for ever. A shrew ash was made thus: into the body of the tree a deep hole was bored with an auger, and a poor devoted shrew-mouse

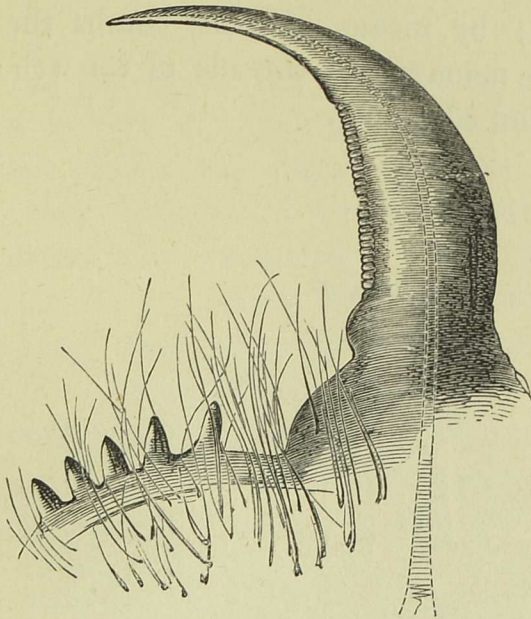
was thrust in alive, and plugged in, no doubt with several quaint incantations long since forgotten." It is marvellous how people could ever have believed such stuff; but equal absurdities are still accepted by many people to this very day; so strong a hold on men's minds have the kindred vices of superstition and ignorance.

Look at these spiders' webs on this hawthorn hedge, they are formed of delicate silken threads, and are of a long funnel shape; the spider occupies the bottom part and soon rushes up should any insect get into the trap, and quickly rushes down and escapes at the back door if your hand enters the front. The top of the funnel is spread out into large broad sheets, and the whole snare is attached by silken cords to the twigs of the bushes. This is the snare and residence of a good-sized species, the *Agelena labyrinthica*. Such webs are common on hedges, on grass, heath, and gorse. Now you must distinguish between spiders' nests and spiders' snares. The very common wheel-like webs, which you see abundantly on hedges, are snares or traps for insects, and beautiful they look on a dewy morning all strung with liquid pearls. Here under this oak are a number of old acorn-cups of last autumn's produce; the acorns have fallen out and the black cups remain. Do you see a delicate spider's web filling this cup; inside are a quantity of tiny round eggs, and a small spider is keeping guard within; this is a spider's nest. Many spiders spin cocoons for their little round eggs, place them in various situations, and leave them; others show the greatest care for them and carry them

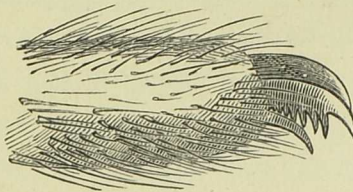
about wherever they go. The cocoons of the species whose web or trap we are now looking at are made of strong white silk, each cocoon containing perhaps 100 round eggs, rather yellowish in colour. They are fastened to the inside of a web the spider spins by means of silken pillars formed by a number of threads closely glued together. The sac containing the cocoons is fastened to stems of grass or other objects, and partially hidden by a few withered leaves. "For the purpose of securing their prey," says Mr. Blackwall, the author of a splendid work on 'British Spiders,' "spiders have recourse to divers expedients. Numerous species run rapidly about in quest of those objects which constitute their food; others, approaching their victims with great circumspection, spring upon them from a distance; some lie concealed in flowers or among leaves, seizing such insects as come within their reach; and many species procure a supply of nutriment by means of complicated snares of their own fabrication." Of these snares the most beautiful, as I said, are the "wheel within wheel" nets of the various species of the family *Epëiridæ*. "What are those spider-like things," asked Willy, "with long thin bodies, you often see skating along the water? they are something like the spiders." They are not spiders at all, but insects called "water-measurers," from their peculiar habit of taking a short skate on the surface of the water and then stopping; having measured that distance, off they go again. However, many spiders do run along on the surface of the water, and you know there is one, the great water-spider, that

lives habitually in it. Some years ago I had one of these water-spiders in a glass vessel of water, and saw it spin its curious dome-shaped web which it attached to the sides of the glass and some weeds. These domes are formed of closely woven white silk, in the form of a diving bell or half a pigeon's egg, as De Geer has said, with the opening below. It looks like a half-ball of silver; this appearance is due to a quantity of air. It is, in fact, a huge air-bubble surrounded by a covering of white silk, and, as you may suppose, a very interesting and pretty object. Within this silver dome the spider places her eggs, perhaps a hundred or more in number, which are enveloped in a cocoon, this being attached to the inner side of the dome. "But how," said Jack, "is the bubble formed? Where does the air come from?" You have asked a very interesting question, and one which can be answered; for the question was set at rest by Mr. Bell, an excellent observer and well-known naturalist, about twelve years ago, if I remember rightly. He found that the old spider actually took the air down with her from the surface of the water, and deposited it in her domed house. I shall now quote Mr. Bell's words: "The manner in which the animal possesses itself of the bubble of air is very curious, and, as far as I know, has never been exactly described. It ascends to the surface slowly, assisted by a thread attached to a leaf or other support below and to the surface of the water. As soon as it comes near the surface it turns with the extremity of the abdomen upwards, and exposes a portion of the body to the air for an instant, then with

a jerk it snatches, as it were, a bubble of air, which is not only attached to the hairs which cover the abdomen, but is held on by the two hinder legs, which are crossed at an acute angle near their extremity; this crossing of the legs taking place at the instant the bubble is seized. The little creature then descends



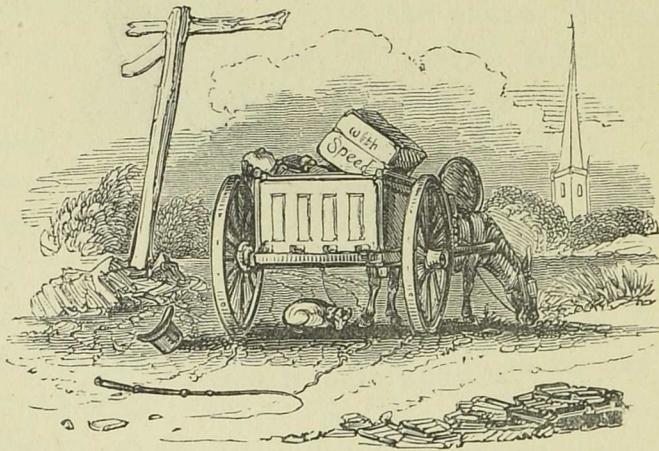
SPIDER'S FANG, MAGNIFIED.



SPIDER'S FOOT, MAGNIFIED.

more rapidly and regains its cell, always by the same route, turns the abdomen within it, and disengages the

bubble." Spiders have strong jaws; at the bottom of each hooked jaw there is a small sac which contains a poisonous fluid; this fluid is conveyed by a narrow channel from the sac along the jaw, and is pressed out at an opening or slit at the tip of the fang into the wound inflicted on its victim. The feet of spiders are generally terminated by two or more claws furnished with teeth; by means of these combs the animal is enabled to manage the threads of its web with great dexterity and efficiency.



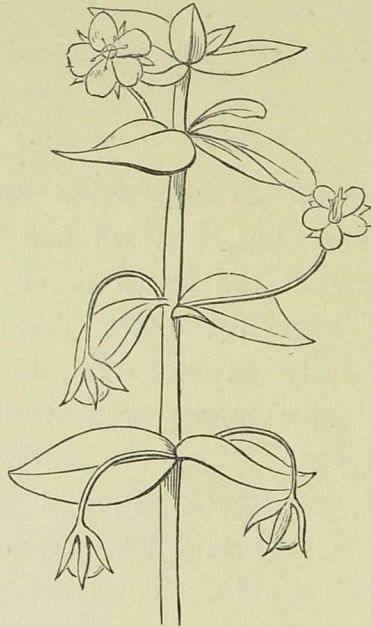
WALK IX.

JULY.



LET us be off to the fields once more; the sun is very hot, but we can find refreshing shade under the trees when we are tired. What is this beautiful little plant with bright scarlet flowers fully expanded? It is the scarlet pimpernel, or "poor man's weather-glass;" for on rainy days, and even before the showers are coming, the little plant, conscious of their approach, closes up its flowers. Other wild flowers, such as the convolvulus, close before rain. The little pimpernel, however, is supposed to be the best barometer. There is another thing about the pimpernel; you will not often see its blossoms expanded after three o'clock in the afternoon. In other countries, also, the regular closing of the flowers has been noticed. Dr. Seeman, who went as naturalist on one of the Arctic Expeditions, noticed the flowers to close during the long day of an arctic summer. "Although," he says, "the sun never sets while it lasts, the plants make no mistake about the time, when if it be not night it ought to be, but regularly as the evening hours approach, and when a midnight sun is several degrees above the horizon, they droop their leaves, and sleep even as they

do at sunset in more favoured climes." Look at the bright scarlet flower, with its small purple eye. Excepting poppies, with their dazzling brightness,



SCARLET PIMPERNEL.

I do not think there is another wild flower that has scarlet petals. However, the blossoms are not always scarlet; there is a white variety with a purple eye, and another having a dark blue blossom.

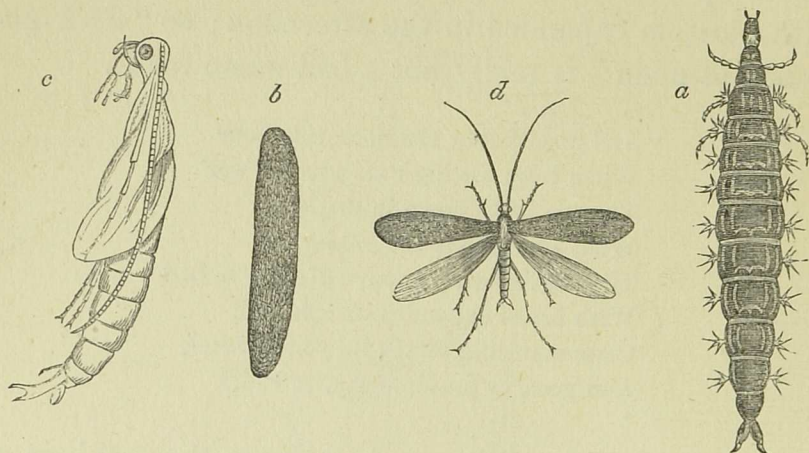
Well, Jack, you have found something, have you? Ah! this is a queer plant, it has queer habits, and a queer name; it is called "Jack-go-to-bed at noon." We sometimes call you after the name of another plant, "Jack-by-the-hedge." May, of course, is "May," or hawthorn blossom, and Robin at home, from his often tearing his clothes, is "Ragged Robin." Another name for the

plant you hold in your hand is goat's beard; the leaves are long and grass-like, the flowers bright yellow; it is not yet quite eleven o'clock, and the blossoms are expanded; they generally close about noon. Look at the colour of the stem, it has a kind of sea-green bloom upon it. Well, you would never find this plant with blossom expanded in the afternoon; so "Jack-go-to-bed at noon" is really not a bad name for it.

“And goodly now the noon-tide hour
When from his high meridian tower
The sun looks down in majesty.
What time about the grassy lea
The goat's-beard prompt his rise to hail
With broad expanded disc, in veil
Close mantling wraps its yellow head,
And goes, as peasants say, to bed.”

Here we are at a stream; do you see those things at the bottom slowly moving? They seem to be bits of stick. "I know what they are," said Jack, "there is a good fat maggot in each of these cases; they are caddis-worms." Quite right, and in time they will change to insects. Here is another kind; the house is made of small bits of gravel, and it is attached to this smooth stone. I will break open the case; do you see inside is a long cylindrical case, with a thin covering; I slit this open with my penknife, and now you see the creature inside. There are a great variety of these caddis-worms, and most interesting it is to notice the different kind of houses they build. Some of the larvæ live in movable cases, as we have seen, some in fixed habitations; the materials, too, out of

which the different cases are constructed, are different, sometimes they are bits of gravel, or sand, wood, leaves, grass, the empty shells of various fresh-water molluscs. The fragments of stick and the small bits of gravel are held together by a kind of cement which the



a, b, c, d. Larva, cocoon, nymph, and insect of Caddis-fly.

larva spins from his mouth. Sometimes we may meet with cases made of sand, having on either side long slender bits of rush or stick. A lady once took a number of the larvæ out of their cases, and placed them in a vessel of water with various materials, such as coloured glass, cornelian, agate, onyx, brass filings, coralline, tortoiseshell; and these little maggoty things made use of and built their houses out of them. The perfect insect has four wings; and from these being closely covered with hairs, the order to which they belong has received the name of *Trichoptera*, which means "having hairy wings." You must know many of these insects; they are very common near ponds and

streams; generally they fly in a zig-zag fashion, and have the appearance of moths.

Ah! here is a splendid bed of the forget-me-not growing on this bank near the stream. Look at the blue enamel-like flowers, each with a yellow centre-eye; the leaves are bright green and rather rough. There are other species very much resembling this one you may often see in hedgerows and fields; but they are generally smaller plants; this one is the true forget-me-not. There are several stories about the origin of the name. Here is one:—Many years ago, a lady and knight were wandering by a river; the lady espied these bright blue flowers, on a small islet I suppose, in the deep river, and wished to possess them. Her lover immediately plunged in and plucked the plants, but the strength of the stream was too much for him on his return. With a great effort, however, he threw the flowers on the bank, exclaiming “Forget-me-not,” and sank!

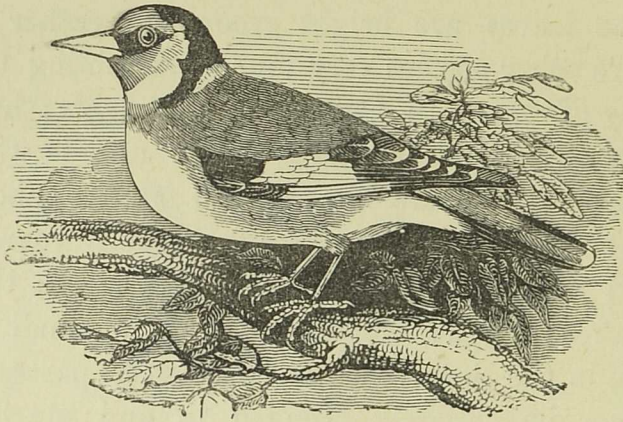
“But the lady fair of the knight so true
Still remember’d his hapless lot;
And she cherish’d the flower of brilliant hue
And she braided her hair with the blossoms blue,
And she call’d it ‘Forget-me-not.’”

We must proceed on our walk and not linger too long here, though, I must own, it is hard to tear oneself away from the banks of a gently-flowing river. So good-by to

“That blue and bright-eyed flowret of the brook,
Hope’s gentle gem, the sweet ‘Forget-me-not.’”

As we crossed the road we met two men with cage-

traps, and a slender twig covered thickly with bird-lime. In each cage-trap was a tame goldfinch, which were the decoy birds. The men had only succeeded in taking one goldfinch—for which they asked half a



GOLDFINCH.

crown. The decoy birds attract other goldfinches by their call-note; these sometimes alight on the trap, which instantly closes upon them; sometimes they alight on the twig smeared with bird-lime, which is so sticky that they cannot free themselves from it. "Gay plumage, lively habits, an agreeable form and song, with a disposition to become attached to those who feed them, are such strong recommendations, that the goldfinch has been, and will probably continue to be, one of the most general cage favourites. So well also do the birds of this species bear confinement, that they have been known to live ten years in captivity, continuing in song the greater part of each year. This tendency to sing and call make them valuable as brace-birds, decoy-birds, and call-birds, to be used by the

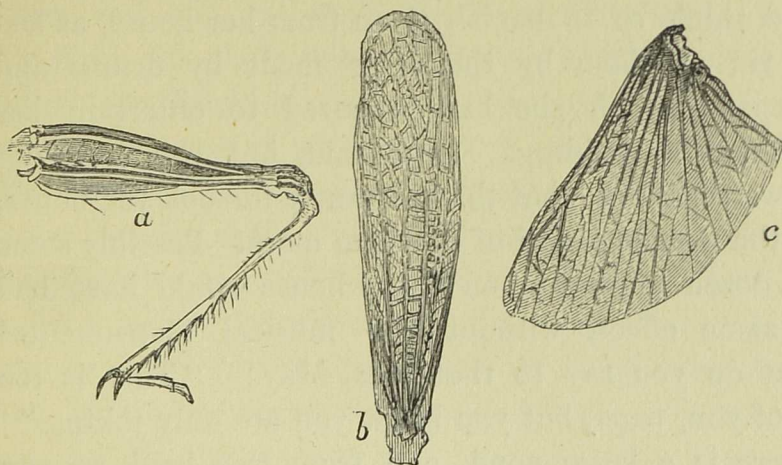
birdcatcher with his ground nets, while the facility with which others are captured, the numbers to be obtained, and the constant demand for them by the public, render the goldfinch one of the most important species included within the bird-dealer's traffic."

Mr. Mayhew says that a goldfinch has been known to exist twenty-three years in a cage. The same person tells us that goldfinches are sold in the streets of London from sixpence to a shilling each, and when there is an extra catch, and the shops are fully stocked, at threepence and fourpence each. Only think, it is computed that as many as 70,000 song birds are captured every year about London; the street sale of the goldfinch being about a tenth of the whole. Goldfinches may be taught to perform many amusing tricks, to draw up water for themselves by a small thimble-sized bucket, or to raise the lid of a small box to obtain the seed within. A goldfinch has been trained to appear dead; it could be held up by the tail or claw without exhibiting any signs of life, or to stand on its head with its claws in the air, or to imitate a Dutch milk-maid going to market with pails on its shoulders, or to appear as a soldier, keeping guard as sentinel. One was once trained to act as a cannoneer with a cap on its head, a firelock on its shoulder, and a match in its claw; it would then discharge a small cannon. "The same bird also acted as if it had been wounded. It was wheeled in a barrow, to convey it, as it were, to the hospital; after which it flew away before the company." Another turned a kind of windmill; another stood in

the midst of some fireworks, which were discharged all around it, without showing any fear. When we consider how docile and affectionate many birds become; when we think of their beauty and the sweet music they pour from their little throats; when we consider also of what immense use a great number of species are to man in helping to check injurious insects and caterpillars; does it not seem strange that they meet with so little protection? How often, as you know, we have met lads and great strong men with helpless fledglings in their hands, which they intend to torture in some way or other; perhaps they will tie strings to their legs and drag them about, or place them on a large stone and throw at them. To expostulate with them on the wickedness of such barbarous conduct is hopeless; one might as well quote Hebrew to a tadpole!

How noisy the grasshoppers are, with their incessant shrill chirpings; how thoroughly they enjoy the heat and sun! Just catch me one or two, Willy; there, one has hopped just before you; now he is on that blade of grass. Have you got him? No? Well, take this gauze net. Now you have him. "How does the grasshopper make that peculiar sound?" asked May. If you will get near one of these insects while he is making the noise you will see how he does it. There, one stands on that plantain stem. Do you see how briskly he rubs his legs against the wing-covers? Now he is quiet, and his legs are still; so it is evident that the friction or rubbing of the legs against the wings causes the sound. I rub the thigh of this

specimen I hold in my hands against the wing. You distinctly hear the shrill sound. It is the males only who make the noise; the females are mute. Some



a, b, c. Leg, wing-cover, and wing of Grasshopper, magnified.

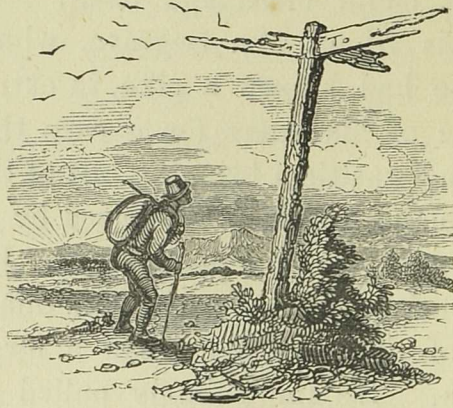
people have described another organ which seems to increase the sound. I have sometimes placed both field-cricket and grasshoppers under a tumbler, and supplied them with moist blades of grass; it is curious to see how fast they eat them. You should remember that the grasshopper is a relative of the locust, to which, indeed, it bears a close resemblance; only the locust is a much larger insect. There are several species of locusts, and all are extremely injurious. You have read in the Bible of the fearful damage they are able to cause to the trees and various crops. It is seldom that locusts visit this country, happily, for there is not a greater insect scourge in existence. Our green grasshopper is also related to the cricket, so merrily noisy in dwelling-houses. Crickets are difficult to get rid of

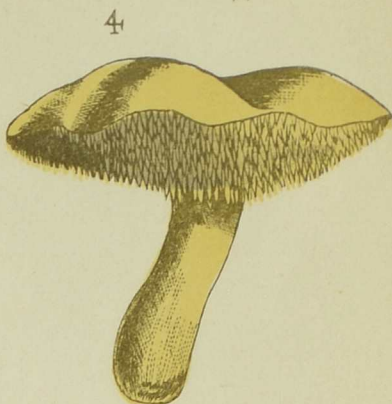
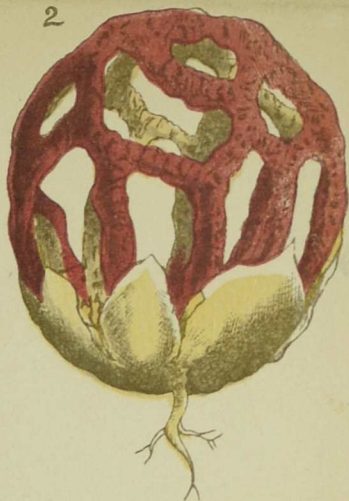
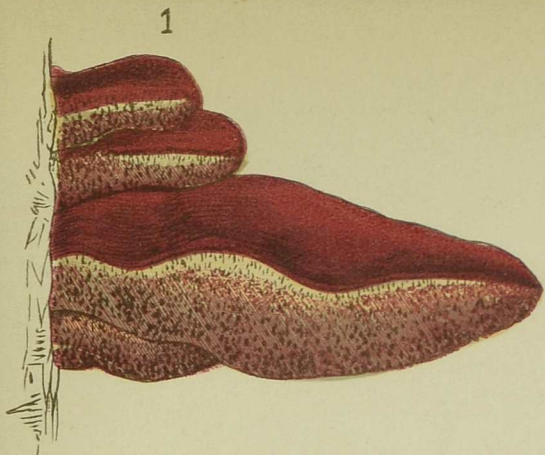
when they have thoroughly established themselves in a house. Like many noisy persons, crickets like to hear nobody louder than themselves; and some one relates that a woman who had tried in vain every method she could think of to banish them from her house, at last got rid of them by the noise made by drums and trumpets, which she had procured to entertain her guests at a wedding. It is said, but you need not believe the story, that they instantly forsook the house, and the woman heard of them no more. Possibly some half dozen more women in the house would have had the same effect, without the musical instruments! What do you say to that idea, May? "That is too bad of you, papa, but you know you are only joking."

Here is a large pond, and from this bank we can look down into the water. There are some yellow water-lilies with their broad expanded leaves. I have noticed that the blossoms are often attacked by the larvæ of some two-winged flies. These flies lay their eggs within the petals, "lily-cradled" literally; the eggs hatch and the larvæ eat the cradle. I do not know more of these flies; I have often meant to trace their history, but have somehow forgotten to do so. Do you see that pike basking on the top of the water; how still and motionless he lies. He is a good-sized fish, at least I should say he was four pounds weight. "I wish we could catch him," said Willy. We have no tackle with us; besides, when pike are sunning themselves in that way on the top of the water, they are seldom inclined to take a bait. "What is the largest pike," asked Jack, "you ever saw caught?" The

largest I ever saw alive was caught in the canal about five years ago; it weighed twenty-one pounds, and was really a splendid fish. What voracious fish they are; they will often take young ducks, water-hens and coots, and will sometimes try to swallow a fish much too large for their throats. It is said that a pike once seized the head of a swan as she was feeding under water, and gorged so much of it as killed them both. The servants perceiving the swan with its head under water for a longer time than usual, took the boat and found both swan and pike dead. "Gesner relates that a pike in the Rhone seized on the lips of a mule that was brought to water, and that the beast drew the fish out before it could disengage itself. Walton was assured by his friend Mr. Segrave, who kept tame otters, that he had known a pike, in extreme hunger, fight with one of his otters for a carp that the otter had caught and was then bringing out of the water. A woman in Poland had her foot seized by a pike as she was washing clothes in a pond." Mr. Jesse tells the story of a gentleman, who, as he was one day walking by the side of the river Wey, saw a large pike in a shallow creek. He immediately pulled off his coat, tucked up his shirt sleeves, and went into the water to intercept the return of the fish to the river, and to endeavour to throw it out upon the bank by getting his hands under it. During this attempt the pike, finding he could not make his escape, seized one of the arms of the gentleman, and lacerated it so much that the marks of the wound were visible for a long time afterwards. Pike will live to a great age, ninety years

or more. In the year 1497, according to old Gesner, a pike was taken at Halibrun in Suabia with a brazen ring attached to it, on which was the following inscription in Greek :—“ I am the fish which was put into the lake by the hands of the governor of the universe, Frederick the Second, the 5th of October, 1230.” This pike, therefore, would be two hundred and sixty-seven years old ; people said it weighed three hundred and fifty pounds, and that its skeleton was nineteen feet long. I will show you a picture of this ring in Gesner’s book when we get home.





FUNCI.

- 1.—Beef-steak Fungus.
 2.—Latticed Stinkhorn, (very rare.)
 3.—Boletus.
 4.—Hedgehog Mushroom.

- 5.—Fly Agaric.
 6.—Clavaria.
 7.—Bird's-nest Fungus; b, Sporangium
 of ditto, magnified.

WALK X.

OCTOBER.

HOW pleasant is the season of autumn, with its yellow fields of ripe corn, and its orchards laden with the fruits of the apple and the pear. But now the golden grain is safely stored. The birds, too, have done singing, with the exception of the robin and the hedge-warbler, which even in the winter occasionally cheer us with their welcome notes. There are yet, however, a few wild flowers to interest us, and the ferns are still beautiful. The various kinds of fungi are springing up in the fields and woodlands; it is a charming day for a stroll; we will drive to the Wrekin and explore the woods at its base. I am sure we shall be able to meet with many pretty forms. The woods are rendered extremely beautiful by the rich autumnal tints of the foliage. We will go through this wicket and follow the path in the direction of Ten-Tree Hill. Now, who will be the first to find the bright scarlet fly agaric? It is a poisonous species, though so beautiful. We will put the wholesome fungi in one basket and the suspected ones in another.

Here you see is the elegant parasol fungus, with its tall stem and top spotted with brown flakes; it is a most delicious one to eat, and in my opinion is superior to

the common mushroom. "Shall we find the beefsteak fungus, papa?" said Willy. I have never seen it growing here; the beefsteak fungus prefers to grow on very old oak trees, and it is, moreover, by no means common. It is so called from its resemblance to a beefsteak when cut through; a reddish gravy-like juice flows from the wound, and I think the whole fungus when young very inviting. I have on three or four occasions eaten this species, but I do not think it a very palatable one, though perfectly wholesome and doubtless nutritious.

Here is a quantity of *Amanita phalloides*, very beautiful with its green tints and white stem; but I should not like to eat any of this kind. Do you notice what a very unpleasant smell it has?

What a number of animals are nailed to that beech-tree! Let us see what they are: two cats, three weasels, two stoats, four jays, two magpies, two kestrels, an owl, and a sparrow-hawk. The keeper has trapped or shot these as enemies to the game, and no doubt, with the exception of the weasels, owl, and kestrels, the other animals often destroy young pheasants or suck their eggs. Still I should not like to see all wild animals destroyed that occasionally harm game preserves. Gamekeepers have strong affection for their hares, partridges, and pheasants, and consider all other wild animals as either enemies or beneath notice. Indeed, a gamekeeper's zoology is confined to five things—pheasants, partridges, hares, rabbits, and ants' eggs. Ah! I do think I espy about twenty yards ahead the fly agaric (*Amanita muscaria*). To be sure, here

is a fine lot; some just appearing above ground in the form of scarlet balls; others fully expanded. How splendid they are! You notice many white patches on their tops; let us see how these patches are formed. Here is a specimen hardly showing itself. I will dig it up. There, now you see; the whole fungus is wrapped up in a thin white envelope; this is called a *volva*, from the Latin word *volvo*—"I roll up." When the *volva* breaks, it leaves scattered patches on the top. The gills are white or yellowish and the stem is bulbous. This is not a very common fungus; it is, however, frequent enough in the woods about the Wrekin. The effects of this fungus on a person who has eaten it are of an intoxicating nature. Dr. Badham, who used to eat various kinds of fungi and has written a very good book on wholesome kinds, once gathered some specimens of the fly agaric. He sent them to two lady friends, intending to call soon afterwards and explain that he had sent them on account of their extreme beauty solely. Dr. Badham did not come, but these two ladies said, "Oh, of course Dr. Badham would never send us anything unwholesome; let us have some cooked for tea." So they had some cooked and ate thereof, and were taken very ill. The bad effects, however, soon passed away. Look at that little squirrel, see how nimbly he climbs the tree; now he hides on a forked branch and thinks we do not see him. Well, I must not forget to tell you that this fungus, growing in this spot so plentifully, is called fly agaric because a decoction of it was once used to destroy flies. The people in Siberia swallow portions of it to produce intoxication. Here

is another species closely related to the one we have been considering, and not unlike it in form; this is the blushing agaric (*Amanita rubescens*); you see its top also is covered with whitish flakes or warts; and persons who are not in the habit of noticing differences might confuse this species with the other. Now look; I will cut this specimen through with my knife, and bruise it slightly; do you see how it changes to a reddish hue, thus at once distinguishing itself from its unwholesome relative? This quality gives the name to the fungus. The blushing agaric is perfectly wholesome. You remember how often we had it cooked last autumn, and how delicious it was both for breakfast and dinner. I would never, however, advise persons who have not paid attention to the study of fungi to gather and eat them without asking the opinion of some one who had knowledge of the subject; and I am sure that you, children, will never think of eating any kind that you have not first brought to me. There sits the squirrel. Let us make him show us how he can leap from one bough to another. I clap my hands and Jack throws a stone, and off the little fellow goes, taking wonderful leaps. As the winter approaches the squirrel will be busy laying up stores for consumption during that season, such as nuts, acorns, and beech-mast. For the greater part of the winter the squirrel is dormant; on fine warm days, however, he ventures out of his retreat in the hole of a tree, visits his cupboard, cracks a few nuts, and then goes to sleep again. The nest of the squirrel is made of moss, leaves, and twigs curiously intertwined, and is generally placed

between the forked branches; the young ones, two or three in number, are born in the month of June. A gentleman, in a letter to Mr. Jenyns, says "a pair which frequented a tree opposite the window of one of the rooms, evinced great enmity to a couple of magpies with whom they kept up a perpetual warfare, pursuing them from branch to branch, and from tree to tree with untiring agility. Whether this persecution arose from natural antipathy between the combatants, or from jealousy of interference with their nests, is not known."

What are those black circular spots some four or five yards in diameter, so common in the woods of the Wrekin? They are places where wood has been burnt for charcoal. Always examine such spots, as you may find rare plants growing upon them which scarcely grow anywhere else. Here, for instance, is *Flammula carbonaria* abundant. On these charcoal spots this fungus delights to grow, and I do not think you will find it elsewhere. Mr. Worthington Smith tells us it is a very rare British fungus; it is not mentioned in Mr. Berkley's 'Outlines of Fungology.' Here is a beautifully marked variety of *Polyporus perennis*, also very rare; it is tinted with rich sienna, chocolate, and black; it is found only in these charcoal rings. Let us go farther on. Look at that splendid bright, orange-yellow fungus growing amongst the moss in large tufts as it were. Each plant has a tender stem with short branches; what a number are growing together with roots or lower portions of the stem closely intertwined! This is *Clavaria fastigiata*. Here we meet with the sticky *Gomphidius viscidus*, and here with the handsome

Tricholoma scalpturatus, and the lovely *T. rutilans*. I am obliged to use Latin names as there are no English ones. The ground here is covered with the small *Clitocyle fragrans*; it smells like newly-mown hay. And now we meet with various *Boleti*. Look at the under surface; you see it is riddled with numerous small holes, very unlike the gills of the mushroom and all agarics. We shall find *Boletus luteus*, *B. flavus*, *B. edulis*, *B. scaber*, the handsome but poisonous *B. luridus*. *Boletus edulis* is, as its name imports, very good to eat and perfectly wholesome; so, too, is *B. scaber* and *B. luteus*. Holloa! what bird has just fled before us? it is a woodcock evidently, and has probably lately arrived in this country from the south of Europe, though woodcocks occasionally reside here all through the year. The woodcock is a very handsome bird with its dark mottled brown plumage, long bill, and large, full, black eyes. "What do these birds feed upon?" asked Willy. You often hear people say "they live upon suction," and "do not eat any food." That I fancy is a common belief amongst sportsmen. It is, however, altogether a mistake; for these birds eat quantities of earthworms, as has frequently been witnessed. I will give an instance of this in the case of a woodcock kept in an aviary somewhere in Spain. "There was a fountain perpetually flowing to keep the ground moist and trees planted for the same purpose; fresh sod was brought to it, the richest in worms that could be found. In vain did the worms seek concealment; when the woodcock was hungry it discovered them by the smell, stuck its beak into the

ground, but never higher than the nostrils, drew them out singly, and raising its bill into the air, it extended upon it the whole length of the worm, and in this way swallowed it smoothly without any action of the jaws. This whole operation was performed in an instant, and the action of the woodcock was so equal and imperceptible that it seemed doing nothing; it never missed its aim; for this reason, and because it never plunged its bill beyond the orifice of the nostrils, it was concluded that the bird was directed to its food by smell." There is one very interesting point in the natural history of the woodcock which I must not forget to mention. The old birds sometimes carry their little ones from the place where they are hatched down to soft marshy places to feed on the worms and insect larvæ found there; they take them in the evening and return with them in the morning. "But how do they carry them?" asked May. Some observers have said they are carried in the claws, but Mr. St. John maintains that the little birds are clasped tightly between the thighs.

"Is it not a difficult thing to tell the difference between the male and female woodcock?" asked Willy. Yes, I do not think it is possible in every case to tell the difference; the male bird is smaller than the female of the same age, and there are slight differences in the colour of the plumage, but as you may meet with birds of different ages, and as woodcocks are much subject to variation of plumage, it is difficult to pronounce whether this woodcock is a male and that a female.

"Oh, papa, what are these ring-marks on the end

of this bit of timber upon which we are sitting?" said Willy. These rings or zones represent the various growths made every year by the tree when it was growing, each zone being the produce of one year. As the wood ceases to grow for some months in the winter, a distinction in appearance between the last wood of a former and the first wood of the succeeding year is occasioned; so that, in our own country at least, the age of a tree can be ascertained within some limit by counting the number of zones; there is, however, great difference in the size of the same species of trees, even of the same age, and great difference too in the width of the zones; indeed, you can see this in the case of the wood we have been sitting upon. See how the zones differ, how broad some are, how narrow are others; nay, even in one year you see how the zone varies. The subject of the growth of trees is very interesting, and I would advise you, when you get older, to pay some attention to it.

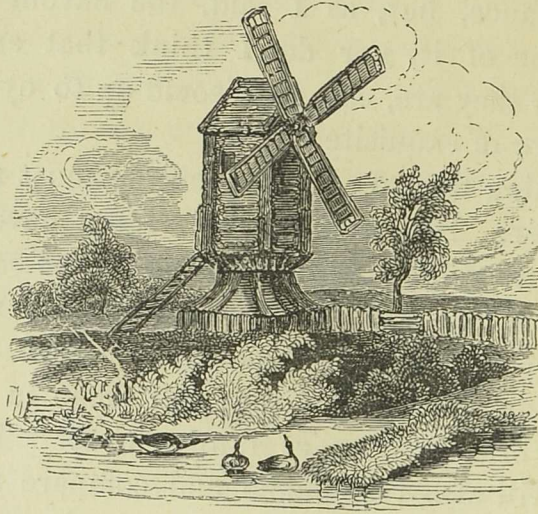
Here is another fungus, and a species which I am very glad to find in the Wrekin woods, though it grows but sparingly. Take it up; turn it over. How curious! the under side is not a series of gills, as in *Agaricus*, nor a substance perforated by a number of little holes, as in *Boletus*. It is formed of a quantity of delicate white teeth or spines; see how beautiful they are and how easily broken. The spines are exactly like miniature awls. It is called from the prickly appearance of the under surface, or *hymenium*, the hedgehog mushroom (*Hydnum repandum*). "Is it

good to eat?" asked Jack. It is, in my opinion, one of the most exquisite fungi that grows, and the most curious thing about it is that its flavour very strongly resembles oysters. Last year we had some of these fellows cut up in bits about the size of a bean and stewed in white sauce; the sauce we ate with a beefsteak at dinner, and I do think that as far as flavour is concerned one might almost pass it off as oyster sauce without any one finding it out. Not that the hedgehog-mushroom-sauce is really as good as oyster sauce, but, as I said, the flavour strongly reminds one of it, nor do I think that any fungi, delicious as they are, can ever come up to oysters, the *ne-plus-ultra* of exquisite food.

It is getting towards evening and we must not linger much longer. How many eatable fungi have we got? let me count. *Lepiota procera*, *Amanita rubescens*, *Hydnum repandum*, and *Marasmius oreades* which we gathered in the meadow before we entered the wood. We will take them home, they will come in very well either at breakfast or at dinner time. The other fungi we will also take home and compare them with the descriptions and drawings in my books.

And now our rambles are ended; we have seen there is much to notice, much to admire. Let us never forget our great Creator who has made all the beautiful things we see around us; let us learn this lesson from the contemplation of the works of the Almighty—that as all created things are fulfilling their appointed

work, so we too should fulfil ours, and by obedience, diligence, kindness, and patience show our love of Him for whose "pleasure all things are, and were created."



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SEA-SIDE WALKS OF A NATURALIST

WITH

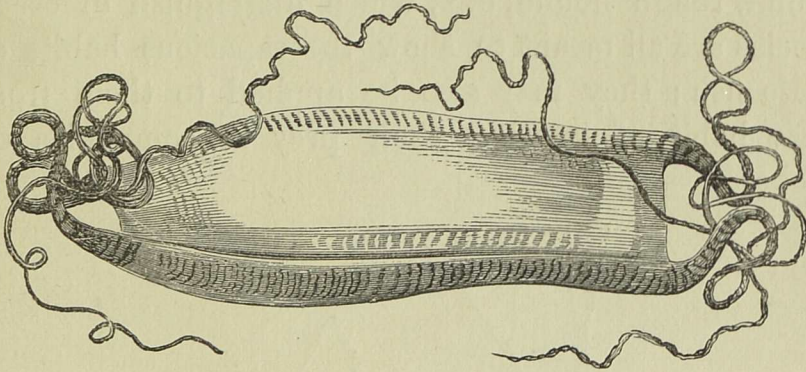
HIS CHILDREN.

WALK I.

HERE we are at the sea-side! How I do rejoice in a sea-side holiday! It is the month of July, and we have left the hot lanes and dusty roads, and parched fields of the country to breathe the fresh invigorating sea breezes. How many curious forms of animals and plants we shall meet with in our daily rambles on the shore! how delightful it will be to take Willy and Jack for a bathe every now and then, as the tide suits! We are at the little village of Pensarn, close to the town of Abergele, on the Chester and Holyhead Railway; we can easily visit Rhyl, Conway, or Llandudno, stay at either place for a few hours, and home again at night. "Indeed," said Willy, "it will be very pleasant. I shall look out for the sea anemones, so beautifully drawn in some of your books at home, and for sea-side shells, and worms and other

creatures ; and May will collect sea-weeds to dry and take home for examination ; and Jacko is sure to find something curious ; and little Arthur and Robin can make sand-tarts on the shore." Yes, we are quite certain to find lots of things to interest us, and from which we may all gain delight and instruction, so we will be off on the sands at once. I will take my fishing-basket and a few wide-mouthed bottles, and my vasculum for plants ; and you, May and Jack, must each have a strong muslin net for catching fish, and small crustacea in the pools left by the tide. On the shore then we soon find ourselves, the tide is already half way out, and grown-up people and children are strolling on the shore ; some of the latter digging in the sand or throwing stones into the retiring waves. Now let us look out for what the tide has left at high-water level. You observe how far the water has reached and that it has left various refuse behind it—bits of sea-weed, stick and rotten wood, cinders which have been cast overboard from steam-boats, entangled masses of stringy stuff, and I can't tell you what besides. "Aha!" said Jack, "here is a very curious thing entangled in a heap of what I suppose must be sea-weed, what can it be, papa? it is not alive, is it?" Let me look ; what you call sea-weed, and what, no doubt, most sea-side visitors look upon as mere dirty rubbish, contains multitudes of beautiful and instructive objects. But let us first see what has attracted Jacko's attention. Ah! I know it well ; similar forms are very common on every coast ; the leathery oblong thing you hold in your hand is the

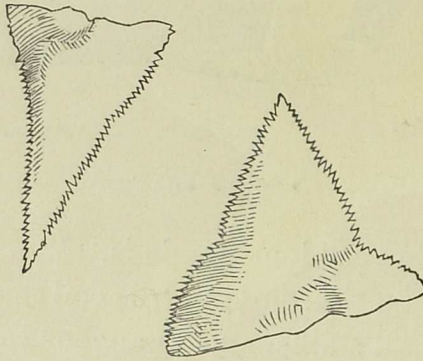
empty case of a shark's egg. "A shark's egg!" exclaimed May; "well, I did not suppose that any creature's eggs were of such curious form." Most sharks do not lay these horny eggs but produce their young alive; some, however, lay these strange-looking eggs, in each of which a young one has been developed. This one which Jack holds in his hands is about three inches long, with two handles at each end, which extend



EGG OF SHARK.

themselves into very long tendrils. You see how tough and leathery it is; the long tendrils coil themselves round sea-weed or coral stalks, and so anchor the egg securely against the tossing of the waves, until the enclosed young one is ready to be hatched. "Papa," said Willy, "I am sure I have seen pictures of these things in some of your books, and I think the people of the coasts sometimes call them *mermaid's purses*." You are quite right, my boy; and somewhat similar things, which are the horny eggs of some of the skate or ray fishes, are often called skate barrows, from a sort of resemblance to a barrow. "But, papa!" said May, "is

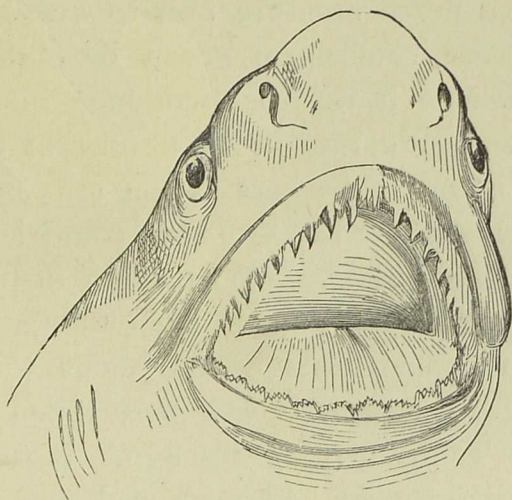
this the egg-covering of that fierce shark we read of that so often kills men when they fall overboard?" No it is not. That which you are looking at is the egg-covering of the lesser spotted dog-fish. "I thought you said it was a shark's egg," said Jacko. Dog-fish belong to the shark family, and in general form and structure all the members of that family resemble each other. The names dog-fish, smooth hound, rough hound, etc., which distinguish different species are all meant to show the rapacious habits of these fish; they may also be applied to them from their habit of hunting their prey in companies or packs.



TEETH OF WHITE SHARK.

The chief difference between sharks and other fish with which you are all familiar, consists in the former having five slits on each side of the neck; these are the branchial openings, or gills. In most other fish, the gills are protected by an operculum, or gill-cover. At each end of this horny egg membrane is a long slit or fissure; these slits allow for the

admission of sea-water, without which the egg could not be developed into a young fish; from the one near the head the young one escapes. When the young are hatched, they have each a round membrane containing the yelk attached to their under surfaces as in other fishes, by means of which nourishment is conveyed into their bodies, till the mouths of the young fish become capable of seizing their prey. "Are not sharks' teeth very formidable things," asked Willy, "and capable of inflicting severe in-



HEAD AND JAWS OF SHARK.

juries?" Yes, the teeth of all the shark family are very sharp and pointed, though they differ considerably in form according to the species; the jaws are furnished with several rows of teeth. You will laugh when I tell you that some years ago sharks' teeth, under the name of serpents' teeth, used to be set in

silver, and given to children cutting their teeth, it being supposed that they had some peculiar charming property.

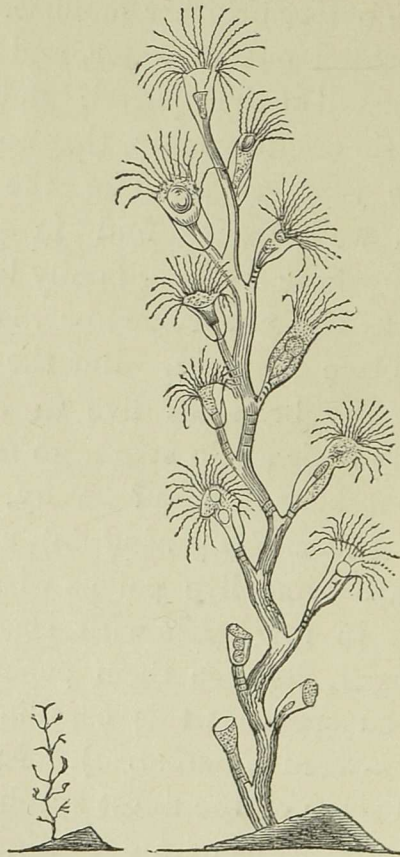
May wished to know whether I had ever seen a Hammer-headed Shark, and whether the fierce shark, the terror to sailors in warm seas, ever approached our coasts? and Jack asked me what was the largest shark I had ever seen at any sea-side place? I have never seen a specimen of the strange Hammer-headed Shark, and believe it does not often visit our shores. I only know of it from drawings and descriptions; it is said to be a fierce creature and to attack bathers, and to measure sometimes seven or eight feet in length. I believe it is not uncommon in the Mediterranean Sea. We may be thankful that the White Shark, that dread of bathers in the seas around the West Indies and other tropical countries, is not found near our coasts. One or two instances are recorded of specimens having been taken, but there seems to be considerable doubt about the matter. The largest shark I ever saw was taken by some fishermen at Tenby many years ago. It was a specimen of the Blue Shark, and measured about six feet in length.

“But what,” asked May, “is this entangled mass?” You said it was not sea-weed. Well, look through this hand-magnifier, and you will see the object more clearly. I break a bit of the thread-like stuff, and now you see it is branched like a miniature tree; you notice that each branch buds out on each side a number of little cups; they are empty now, but were once

occupied by a number of little jelly-like creatures, called polyps. Here is a larger piece; see how beautiful it is; it is called the sea-fir coralline (*Sertularia abietina*). Let us examine the entangled mass again. Here is a very fine specimen of the squirrel's-tail coralline (*S. argentea*), that has been washed off the shell of some oyster or other mollusc. It is very graceful when floated out in water, and bears some resemblance to the tail of the squirrel. But what, asked Willy, are the little creatures like, that once inhabited these cells; are they at all like the fresh-water polyp or hydra we used to find in our country walks?* Yes, they bear a strong family likeness; but the fresh-water hydra, you remember, is naked, and can move from place to place. But the animals that inhabit these horny branches live in colonies, and cannot, at least in their adult stage, go from place to place. Ah! what have I here? Why, the knotted-thread coralline (*Laomedea geniculata*), and actually I do think there are some live polyps within the cells. I will put a bit in my bottle with clear salt-water; there, as I thought, you see them pushing out their little heads. You see that this coralline is attached to a piece of sea-weed (*Laminaria*). Mr. Couch tells us he has found some of the finest specimens growing on the back and tail-fins of a dog-fish. The cells of this species are bell-shaped; the polyps are like the fresh-water hydra in form; you observe their numerous tentacles expanded outside of each horny cell. "But what kind of animals do you call those which

* "Country Walks," p. 64.

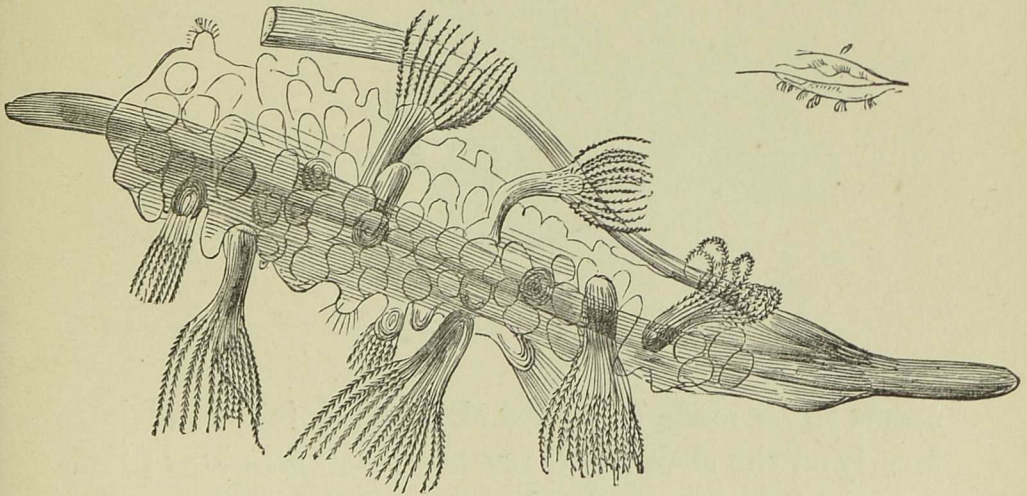
“dwell in these little homes?” asked Willy. They belong to the class called *Hydrozoa*, a word meaning water-animals, very indefinite certainly, but when naturalists use the term, they mean by it small jelly-like animals, with a body that can contract, a mouth



with numerous tentacles around it which bring it food, and a stomach. This is enough for you to remember at present. The hydrozoa contain many families, and a great number of species. They are

very interesting microscopic objects ; so we will collect a lot of this stuff, which people would, perhaps, call "rubbish," and try to name the species, by the help of the microscope, when we get home.

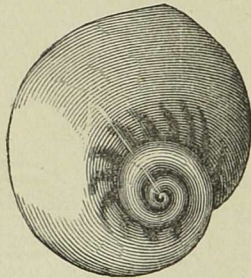
Here is another curious thing ; it is merely a dirty white substance, like a bit of gristle, surrounding a branch of coralline for the length of about half an inch. By the aid of my lens I notice it is covered



with small blunt conical excrescences, but not a symptom of either cells or polyps. If put in water for a time and examined under the microscope, we should see coming out of the various parts of the mass a bunch of long tentacles. At first sight we should suppose that this encrusting animated mass was closely related to the *Sertularia* and *Laomedea* we found just now but we should be wrong : you would find that the animals of this colony are much more highly deve-

loped and of more complex structure than the hydrozoa. The name of this little specimen is *Cycloum papillosum*; it is one of the class *Polyzoa*, fresh-water species of which, you may remember, we found last summer in our country walks.*

Holloa! Master Jacko, what have you got now? "Oh, papa, I really don't know," said Jack; "it is a broad band in the shape of a horse-shoe, and

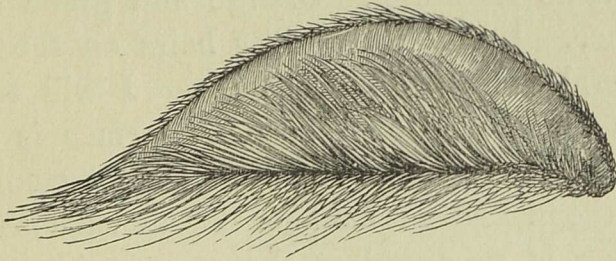


NATICA MONILIFERA.

seems to be made of jelly and sand; I found it lying loosely on the shore." "Let me look," said May; "if you hold it up to the light, you see it is nearly transparent, and the surface is marked with numerous angular spaces. What is it, papa?" It is an egg-cluster laid by a mollusc, with an elegantly-marked shell. You may often pick up these shells on the shore; they are very common. Keep the curved egg-cluster in your hand, and I have no doubt I can soon find you a specimen. "But what is it like?" said Willy; "univalve or a bivalve?" It is a univalve, pretty polished, of light brown colour, but marked

* "Country Walks," p. 97.

with dark stripes and spots. "Oh!" said Jacko, "this is the fellow then? it exactly answers your description." Quite right, my boy. This is the shell, the animal belonging to which lays these curious egg-bands. Its name is *Natica monilifera*. There is no animal inside it now; but if we were to dig in the sand I dare say we should find some shells with animals inside; they are said to be voracious, and to drill holes in the shells of other molluscs in order to



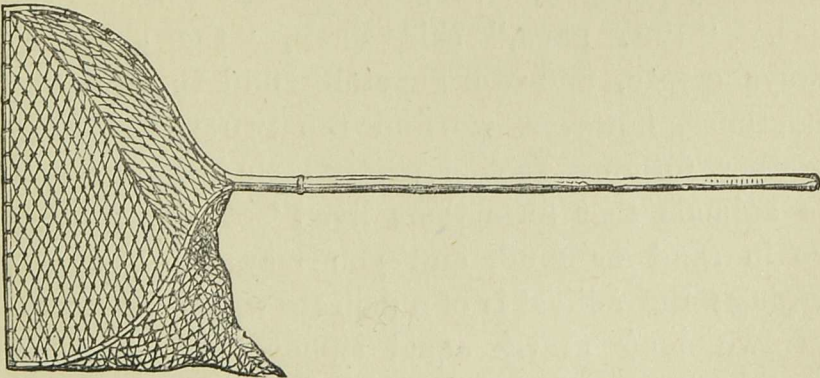
SEA-MOUSE.

get at the dainty meat inside. Let us take this strap-shaped band of eggs to our lodgings, and see whether we can succeed in hatching some little naticas.


"Oh! papa," cried May, "I do think here is a sea-mouse lying on the shore. Bah! I don't much like to touch it." You are quite right, May; the creature you see on the sand is the sea-mouse. I need not tell you it is no more a mouse than you are; it is an animal much lower in the scale of creation than an active, warm-blooded, four-legged mouse; it is, in fact, a worm. "I do not think, papa," said Jack, "that it looks much like a worm; how different it is from the worm we use in fishing." No doubt, Jack, it is very different in outward form; but in its

inward structure—and you must wait till you are a little older, when you will be able, I hope, to examine for yourself—it is clearly a worm. Let us look at it. It has an oval body, three or four inches long, dullish grey in colour, with a quantity of fine silky hairs down the back; on the sides you see several rows of hard, dark bristles, and amongst these, long silky hairs, perhaps an inch long; see now, I turn the animal to the light at different angles, how brilliant and metallic they are! Orange and green tints in abundance. Under these silky hairs on the back I see several pairs of scaly plates. I will turn the creature over; see how the under surface is divided into a number of transverse rings; I can count about forty of them. Now remember this division into rings. Each ring is produced at the margin into a short fleshy lobe, armed with a threefold row of stiff hairs; by means of these bodies the sea-mouse can swim or crawl; the stiff hairs are curious weapons with barbed teeth, and can inflict a severe wound on soft bodies; by an admirable contrivance they can be withdrawn within their respective sheaths. The specimen we are looking at shows brilliant colours; but, poor thing, it has been knocked about by the waves, and does not appear to the best advantage. The best specimens are obtained by dredging. I remember some years ago, when at Guernsey, getting splendid fellows in the dredge. The sea-mouse preys upon other animals, and does not object to make an occasional meal on one of its own species. Mr. Rymer Jones once kept two sea-mice in an aquarium; after living peaceably

together two or three days, the former was found attempting to devour his companion, which was a good deal smaller. One half was already swallowed into its strong and capacious proboscis, while the victim struggled desperately to be free. However, after retaining the prey for some time, the assailant was obliged to disgorge it, but the animal's back was broken. Next morning only half of the poor fellow remained, the other portion having been devoured; the conqueror now darted out its proboscis repeatedly, in order to finish its meal on the rest, as it lay in a corner. Well, we have not found many objects, so far as number goes, but all are interesting, and will unfold tales of delight to those who care to examine their structure carefully. There goes an old shrimp-woman: we have not time to go and chat with her; but the old lady's net is quite a treasury for a naturalist. We will talk with her and examine the contents of her net on some other occasion. Let us return to our lodgings and examine our captures.



WALK II.

HE tide will be a low one to-day, so we will stroll along the beach for a couple of hours before low water; there are several people on the sands, but few that take any interest in the curious things to be found there. Now, May, look about for shells, put them in your basket, and let me see if I can name them. Well, what have you got? Here is the very common but very beautiful and very delicate *Tellina tenuis*; here is the razor-shell, *maetra*, *pholas*, *mya truncata*, *donax trunculus*, cockle, and mussel shells.

The tellinæ you see are very common; you can hardly walk a yard without finding some; they are beautifully polished, and often painted with glowing hues. "But, papa," said Jack, "the shells are always empty, and we generally find them single; sometimes, however, we find the two valves joined together, forming such a pretty little box; where do the animals that form them live?" These molluscs live in sand or mud, and you may get a few by digging; the animal is of a delicate white colour, and has two long nearly equal siphons, and a pretty fringed mantle; but you must put the creature in water before you can see them. "But what is the

use of these siphons?" asked Willy. The siphons are merely tubular prolongations of the animal's mantle; the one brings currents of water to enable the animal to breathe, the other expels the water after it has passed through its gills or lungs. Here is the brittle paper-shell, *Pholas dactylus*, of delicate texture and of a pure white hue; the outer surface is rough with transverse scaly ridges. The word *pholas* is derived from a Greek word signifying "to be hidden," in allusion to the custom of the animals to live in holes which they make for themselves in peat, mud, clay, wood, and stone. "But, papa," said Jack, "how can an animal with so brittle a shell—see how easily it breaks in my hand—bore for itself a hole in hard stone?" You have asked a puzzling question, and one on which, I believe, there is still much difference of opinion; but, first of all, let me tell you what the animal is like. He is fat and club-shaped, with a large flat foot, and a pair of siphons united externally into one. I have already said these siphons are respiratory organs; the one admits the water, the other expels it. These currents may be seen by placing the animal, or any other mollusc possessing the respiratory siphons, in a vessel of water with minute particles of matter; by the one entrance you will see the water to be drawn in, by the other expelled. "But you have not told us how so brittle a shell can pierce the rocks in which you say the *pholas* often lives," Willy remarked. You may suppose that various explanations have been given, and I will first enumerate them. Some say that the boring

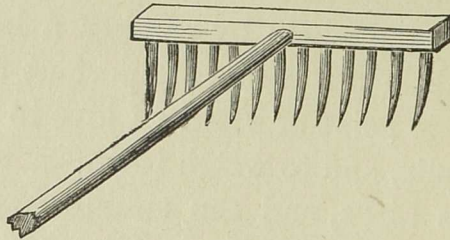
molluscs perforate by means of the rotation of the valves of their shells, which serve as augers; others say that the holes are made by rasping, caused by silicious particles studding the surface of certain parts of the animals; others, that currents of water, set in action by the motions of vibratile cilia, are the agents. Some affirm that the animal secretes an acid which dissolves the substance into which it bores; others say that the boring is effected by the combined action of some acid, and the rasping of the valves. "Who shall decide when doctors disagree?" My own opinion is that the boring is effected by the simple constant action of the mollusc's foot. "But," said May, "it still seems curious that so soft a thing as a sea-snail's foot should wear a hole in a solid hard wall." Very good; but you must remember that time works wonders. Look at these hollows on this bit of rock; those impressions, I know, were made by limpets, which, by moving their soft bodies constantly on one spot, wear away the substance on which they have taken their stand. "Well, papa," said Jacko, "that reminds me of what I have often seen under the canal bridges at Preston. You know there are some iron pillars placed against the corners of the stone bridges, and you can see several grooves made in these pillars by the action of the rope against them, as it is drawn tightly by the horse that is towing the barge. I suppose the soft rope has made these grooves in the hard iron." You are quite right, Jack, and your illustration is a capital one. As, in time, a soft rope constantly rubbing against hard iron wears

it away, so, I believe, the foot of a *pholas*, by constant rubbing, in time wears away a hole in the solid rock.

Oh, do look how prettily the sea-gulls are skimming over the surface of the water; now ascending with extended wings, now darting down and nearly touching the water; it seems no effort whatever to them to raise themselves quite suddenly aloft. "Papa," said May, "I think you said, some time ago, that it was not lawful to shoot gulls and other sea-birds during the breeding season; the poor birds must enjoy their holiday." Yes, I am very glad the sea-fowl are protected by law; but I wish the insect-feeding birds of our country lanes and fields were also protected. It was a good thing for our Government to stop the wholesale destruction of sea-birds; they should crown the whole by passing a law to protect our land-birds, a much more important consideration, in an economic point of view. I love to hear the wild cry of the gulls, and to watch their airy flights. They are voracious birds, and can swallow very large food. I remember a tame gull Uncle John had at Brockton some years ago; he used to call it "Jim," and, long after the bird's death, a small strip of water in which it used to swim retained the name of "Jim's river." After dinner we used to put our heads out of the window, and call "Jim;" the bird soon responded, if he was hungry, by making a peculiar noise. Presently "Jim" made his appearance in front of the window, and we used to throw out pieces of bone with meat on. "Jim" could swallow enormous bones. Sometimes we caught a rat in a steel trap, and "Jim" was

very fond of rats; he would pull the rat about for a time, and bruise it with well-directed blows of his strong bill; and when he thought it was sufficiently tender, he would raise his head aloft, and, with four or five consecutive efforts, contrive to swallow the rat, tail and all. But Master "Jim" was fond of daintier food than rats; the young ducks and chickens used to disappear down his capacious throat, and strict watch had to be kept upon him. I forget what became of "Jim;" he died long before his master, but whether by a violent or natural death, I do not now remember.

Oh! just look at this fish's head popping above the sand near low-water mark. How curious! "Why,



RAKE FOR PROCURING SAND-LAUNCES.

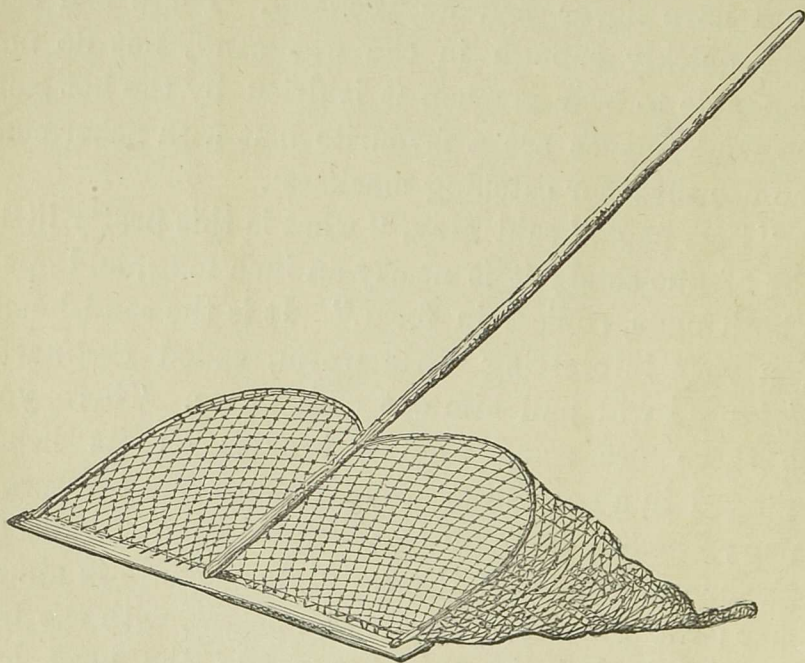
if we look about us," said Willy, "we can see any quantity; some near the water's edge are quite lively, but those higher up and further removed from the sea are dead. What are they?" They are little fish called sand-launces, *Ammodytes*, and very pretty little fish they are. There are, I believe, three species of sand-launce, and all inhabit the water near the sandy coasts. Here we meet with the larger and lesser sand-launce. See how the whole shore is spread

with them. Hundreds are quite dead; the tide is unusually low, and the fish have been waiting for the return of the sea-water. The hot sun, I suppose, has destroyed them; at any rate, there they are quite dead. Those nearer the water are pretty lively; the sea-water has only just left them. Willy wanted to know whether they were ever eaten. They are valued as food by some people. I should think, to judge from their appearance, they are very good eating; but I have never had any cooked. These fish can move quickly enough in the wet sand, but do not seem able to bear it when it is dried by the hot sun. The sand-launces are a favourite bait with fishermen, who use them for catching mackerel.

“See, papa,” said May, “what is this pretty little tube of fine sand; it is nearly an inch long, and open at both ends, conical in form.” It is the sand-house of a very interesting little worm, called *Pectinaria belgica*. I will pull him out of his case. There, you see there are some shining bristles on its head, arranged in a comb-like form; whence the creature’s name;—*pecten*, in Latin meaning “a comb.” Let us look for some more of them. Here they are in abundance; the tubes always stand upright, with the tail end slightly imbedded in the sand; the head has many tentacles besides the comb of bristles.

“But, papa,” said Jack, “how does the little worm make this delicate tube of sand as thin as paper?” It selects the grains of sand by means of its tentacles, which secrete a sticky fluid; the grains adhere to them and the creature applies them to the rim of

its tube. "Oh!" exclaimed May, "in this respect the little pectinaria resembles the fresh-water *Melicerta* we find abundantly on the weeds in the canal at home." It does, and both build upwards, for the tube is only increased by addition to this end, the tail portion undergoing no alteration. The worm exactly fits its case, the thickness of which does not exceed a single grain. The usual length of these tubes is about



SHRIMPERS' NET.

an inch; but they are occasionally found as long as two inches and a half; Sir John Dalyell mentions his having seen a tube five inches long, the worm nearly corresponding in size. It is probable this was a different species. Ah! there is the old shrimpwoman



1. LESSER SAND LAUNCE. 2. VIPER WEAVER. 3. HIPPOCAMPUS. 4. GARFISH.

about two hundred yards ahead of us; she is pushing her shrimp net before her, let us hasten to her before she throws her "rubbish" away. Well, old lady, are you having good sport? Have you caught many shrimps? bring your net out, please, and let us look. "I have caught a goodish few," said the old woman, "will you be so good as to buy six penn'oth of srimps; they be very fine ones." Oh yes, we will buy some, but let us look what you have got in your net besides shrimps. "Lor, young maister, dunna ye touch that nasty baste," exclaimed the old lady, as she thought Willy was about to seize on a small fish he espied in the net; "it'll sting ye, lad, till ye cry out wi' pain." Well, let us get the fish out of the net and place it on the sand that we may get a good view of it. Ah! it is the lesser weever (*Trachinus vipera*), a very common fish on all our shores; this specimen is about four inches long. "But how does it sting?" asked Jack. Do you notice that black fin on the back with its four or five sharp prickles; those are the fish's weapons, and there is no doubt a prick from one of them occasions a good deal of pain with much swelling. Do you observe also the up-turned position of the fish's mouth? Its habit is to bury itself in the sand with its head exposed, the shape of the mouth being admirably formed for snapping up any creature that may swim over it which it wishes to eat. The precision and skill with which the formidable spine of the neck is thus directed to an object of fear that shall touch it or approach too closely, are indeed sur-

prising; by a sudden and rapid impulse it will inflict a wound if even the touch is confined to the tail, and that too without any injury to itself; and formidable indeed is the effect produced by the puncture. It is certain that no exudation or discharge of a poisonous fluid proceeds from this projecting spine; but it is equally certain that the pain which instantly follows the puncture is severe; and there are instances where within a few minutes this pain has extended from the hand as high as the shoulder. On one occasion when a fisherman had laid hold of a weever which he had taken on a line, the sudden plunge of the piercing instrument instantly compelled him to drop his prize; and when ignorant of the danger, it was grasped successively by two other persons, so great was the agony felt by all of them, that they were compelled to leave their fishing and proceed to land in order to procure relief; which however was readily obtained by means of smart friction with the sand of the shore.* I must also ask you to notice two long formidable spines directed backwards and fixed to the gill cover; there is no doubt these would inflict similar pain. There is a larger species of weever, not uncommon on some parts of the British coasts, measuring a foot or more in length; this species prefers deep water; it is called the greater weever or sting-fish (*Trachinus draco*). The French eat it and say it is excellent, but the fishermen are compelled by a police regulation to cut off the spines before they

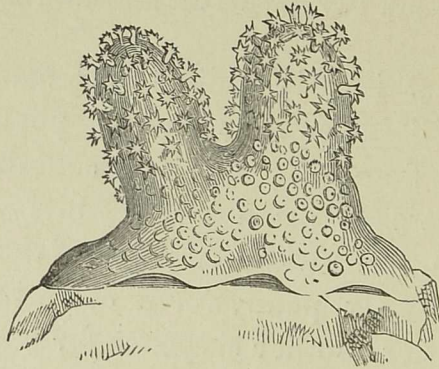
expose the fish for sale. Drayton in his "Poly-
olbion," has the following lines—

The Weever, which although his prickles venom be,
By Fisher's cut away, which buyers seldom see ;
Yet for the fish he bears 'tis not accounted bad.

"Ah! what is this white thick mass in the old woman's net?" It is the zoophyte popularly termed "dead men's fingers." The net contains a number of young flat fish, small crabs, bits of sea-weed, some star-fish. We will pick some of these things out of the net, buy six pennyworth of shrimps from the woman, give her another sixpence for having kept her waiting, and say good morning to the old dame.

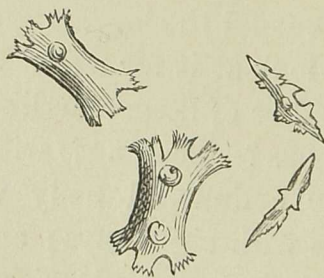
"What a curious name, 'Dead Men's Fingers,' to give to this zoophyte," said Jack. Yes it is; the specimen before us is a long, thick, oblong mass, but sometimes they are divided into several finger-like branches; it looks very uninteresting at present and very inanimate; but fill the largest glass jar with clear water, and let us look at it for a few minutes. There, do you see a number of little star-like bodies issuing from the fleshy mass? Look at it with this lens; each polyp has a clear cylindrical body with a beautiful flower-like mouth with eight rays; and now the whole substance is densely covered with these miniature animated flowers. If this spectacle will not delight a man, I should think nothing can. The *Alcyonium digitatum*, for that is the Latin name, is a good specimen of a compound polyp; like the hydra, each polyp of the alcyon, seizes its food by means of its eight ten-

tacles, the mouth being situated in the centre of the flower. I will suddenly move the glass jar; do you see every little creature has withdrawn itself into its cell? the flowers are all gone, and the alcyon



ALCYONIUM DIGITATUM.

is nothing but an apparently dead mass. Imbedded in this fleshy mass are a number of curious bodies called *spicula*. You cannot see them without the help of a good microscope; but if I were to cut a

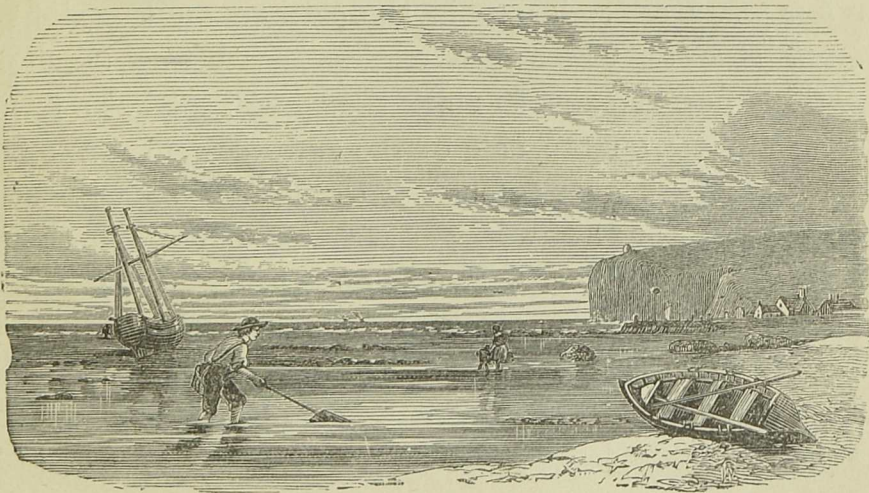


SPICULES OF ALCYONIUM.


thin slice off this mass, lay it on a glass slip, with a little caustic potass to dissolve the fleshy portion, and put it under the microscope, I should see these calcareous spicules. The specimen before us is a small

one. *Alcyonium* loves deep water, from whence very large specimens may be obtained by dredging. They are generally attached to old oyster-shells. What a number of jelly-fish the retiring waters have left behind them! they look very uninteresting now, but it is a beautiful sight to see them on a calm summer's day to watch their movements in the water; we will pay attention to them on another occasion.

Now is it pleasant in the summer-eve,
When a broad shore retiring waters leave,
Awhile to wait upon the fine fair sand
When all is calm at sea, all still on land;
And there the ocean's produce to explore
As floating by, or rolling on the shore;
Those living jellies which the flesh inflame
Fierce as a nettle, and from that their name;
Some in huge masses, some that you may bring
In the small compass of a lady's ring;
Figured by Hand Divine—there's not a gem
Wrought by man's art to be compared to them.
Soft, brilliant, tender, through the wave they glow
And make the moonbeam brighter where they flow.



WALK III.

O-DAY we will take the train to Colwyn, and from thence walk along the shore as far as the Fishing Weir at Rhos-fynach, to see Mr. Parry Evans and his celebrated dog "Jack" catching salmon. "Oh!" was the universal exclamation of delight, "that will be fun; and we will take our baskets and bottles in case of catching something we would like to bring home." So off we start by train from Pensarn. When we have passed over about two miles of the railroad we come to that memorable spot where the dreadful "Abergele accident" happened a few years ago. There is the cottage on the right hand side to which the engine-driver was taken; nothing now remains to mark the exact spot but a few stones lying on the side of the embankment. Well, we soon pass over; but we cannot do so without deep thought as we picture to ourselves that terrible calamity. On we go through a tunnel and skirt the coast, looking down upon the calm, clear, blue sea; the children chattering with delight at the prospect of seeing a dog catch live salmon; I myself wondering what different kinds of fish or

other marine creatures will be left in the Weir as the waters retire. Oh! for a life not *on* the ocean wave, but somewhere *near* it, a spot where I could study some of the endless forms of marine zoology, and inhale the invigorating sea breezes, come they as the gentle zephyr or the violent storm.

The sounds and seas each creek and bay
With fry innumerable swarm, and shoals
Of fish that with their fins and shining scales
Glide under the green waves, in scales that oft
Bank the mid sea; part single or with mate
Graze the sea-weed their pasture, and through groves
Of coral stray, or sporting with quick glance
Show to the sun their waved coats dropped with gold;
Or, in their pearly shells at ease, attend
Moist nutriment; or under rocks their food
In jointed armour watch; or smooth the seal
And bended dolphins play; part huge of bulk
Wallowing unwieldy, enormous in their gait,
Tempest the ocean.

“Colwyn, Colwyn,” uttered in loud, but peculiarly indistinct tones—railway porters always cry out the names of the stations in unintelligible language—aroused me from my reverie, and we were soon on our way along the shore towards Mr. Parry Evans’ Weir Fishery at Rhos-fynach. But we have more than a mile to walk, and lots of time; and how can a man walk along the shore without stopping every minute almost to look at something that has caught his eye. Here are some odd-looking plants, close to the railway embankment. They are growing in the driest kind of sand. Here we see the sea-weed (*Ammophila arun-*

dinacea), a very coarse but handsome grass, sometimes called mat-weed, from its matted, creeping roots; it is now in flower. As its roots are of use in preventing the inroad of the sea on the land, it is protected by an Act of Parliament. I do not think any kind of cattle will eat it; not even a half-starved New Brighton donkey. Here is the yellow-horned poppy, with its very long, horn-like pods; here, too, are some wild geraniums and stork-bills. Let us take a few back with us. "What are those little fish?" asked Willy, "that the tide has left in these small pools?" You ought to know them as we have seen them before; but try and catch two or three. Well! now you must know them? "Oh yes, they must be young sand-launces, about three inches long." "Papa," said May, "there are some large stones near the water; do you not think we might find some sea-anemones attached to these stones?" Off we all scamper, and Jack very soon tells us he has discovered what he thinks must be a sea-anemone. At once I recognize the animal as a specimen of the common smooth anemone (*Actinia mesembryanthemum*); we will wait by this large stone and examine the creature. It is fixed by its broad fleshy base to this bit of rock, its numerous tentacles spread out in the little pool the tide has left; the mouth is situated in the centre of the disc. I dare say we can tempt the creature to use it for our instruction. I will catch a small fish and offer it to the anemone. See the tentacles have caught hold of it, and are bringing it to its mouth; in about two minutes the fish is swallowed.

Here is another sea-anemone, a much finer specimen than the one Jack found. "Oh," said May, "it is a beautiful specimen; is it the same species?" It is generally considered to be a variety of the other one; it is called the "strawberry" anemone, from its resemblance to the fruit of that name. If I touch its



SEA-ANEMONES.

tentacles, it immediately closes itself up. These creatures have no eyes, yet are so susceptible of light, that they will often show they are aware of a passing cloud by shrinking. "Should an unlucky crab, though stronger far apparently and much more active than the zoophyte, touch the expanded arms, activity and strength avail it little; with slow, but

pertinacious and unflinching grasp, the actinia seizes hold of it, and soon involving all its limbs with the tentacula around the mouth, the victim is gradually dragged into the polyp's stomach, there to perish. All its softer parts, all that can be nutritious, is digested and dissolved, until at length the actinia, being satisfied with its abundant meal, opens again



PTILOTA PLUMOSA.

its mouth, and then regurgitates the shell and what is indigestible. Nor does a little food suffice to satisfy its appetite. The actinia is voracious, harmless and flower-like though it seems; sometimes, for instance, it will swallow whole three or four mussels for a breakfast, and dissolve them all except the shells. Mr. Gosse calls this species the "beadlet," from its possessing a number of blue bead-like tubercles around its mouth. The scientific name of actinia is from a Greek word, meaning "a ray," in allusion to the tentacles. This is a very variable species as to colour, and the commonest of all the sea-anemone family. The actiniæ resemble their relatives the hydræ, in their

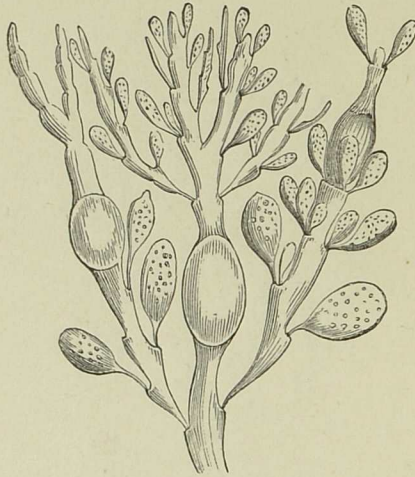
power of reproducing lost portions of their bodies. If one be cut in two with a sharp knife or razor, each half will grow to a whole animal. When we return home, I will show you beautifully-coloured figures of the British species of sea-anemones, drawn by Mr. Gosse in his book on those animals. There are a great many species, but these shores do not afford much variety. Look, May, at this pretty



CORALLINA OFFICINALIS.

little sea-weed (*Ptilota plumosa*), a very common, but a very beautiful species; it often grows parasitically on the stems of that large strap-like sea-weed, called sea-tangle (*Laminaria*). See how lovely it is now I float it out in water. On the southern shores of England, this alga is not found at all. Here is the vivid-green sea-lettuce (*Ulva latissima*), and here the long *Enteromorpha compressa*. These are capital weeds to keep in an aquarium. Here is a piece of *Corallina officinalis*

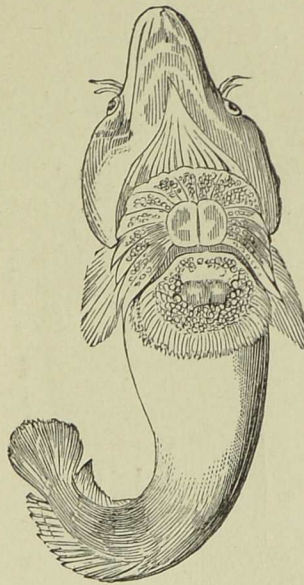
incrusting the stone. Look at its purple-pointed stems, and feel how hard it is; the plant is covered with a coating of chalk. There is a quantity of the very common fucus, or yellow tang, with its thick leathery stems and numerous air-bladders, which crack as we tread on them. But this shore is but scantily supplied with sea-weeds; you must wait till we go to Torquay or Tenby, where you will be delighted



FUCUS NODOSUS.

with the numerous little rock pools left by the retiring tide, and fringed with various kinds of beautiful sea-weed. Here is the purple laver (*Porphyra lacinnata*), a capital condiment with roast meat. "Why, papa," said May, "do you mean to say that any sea-weed is good to eat?" Yes, several kinds are used as articles of food; six or seven British species are eaten. There is the *dulse* of the Scotch, and *dillisk* of the Irish, which is eaten in

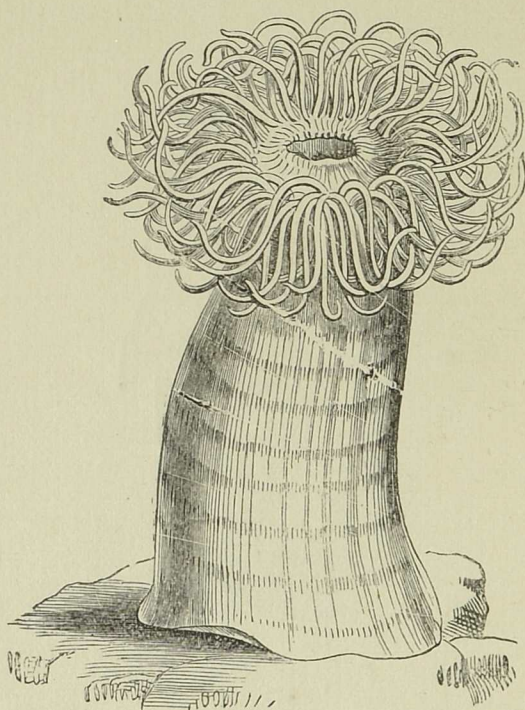
some parts of Ireland and Scotland. This is the *Rhodymenia palmata*, which, after being washed and dried, is eaten raw. The Irish, or "Carrageen Moss," you may see in almost every druggist's shop, is a seaweed called *Chondrus crispus*. It is used for making iellies, and at one time was used for fattening calves. "We can see no reason," remark Messrs. Johnstone



CORNISH SUCKER.

and Croall, "why many species of sea-weed should not contribute to the luxuries of our tables, and furnish even the poor with a wholesome and nourishing dish. Many of them are composed almost wholly of starch, the principal material for which we are indebted to other vegetables; and why should we not receive them through the medium of plants which grow in the sea as well as on the land?"

“Oh, papa,” exclaimed Willy, “here is such a curious fish under this stone. Now I have got him; do you know what it is?” It is the Cornish Sucker (*Lepidogaster*), so called from having been first noticed on the Cornish coast. It is common enough round our shores. There, do you see? the fish, after a



SNAKE-LOCKED ANEMONE.

slight shake, has attached itself to the inside of my hand. Now I turn it over, and you see underneath the fish's sucker; it is a double disc separated by a groove, and united with the fins. See what a strange-looking head it has, with a long narrow snout. It is of a liver colour, and about three inches long.

Ah! here is another species of actinia; it is the Snake-locked anemone (*Sagartia viduata*), a very pretty kind. See how its tentacles lock together, like so many snakes; it is fond of cracks in rocks, in which it hides itself, but it also lives in the sand.

We have some time to wait yet before the tide will be sufficiently low for us to go to Mr. Parry Evans' Weir Fishery. In the mean time, I will read some account of it, written by the late Archdeacon Jones, of Brynsteddfod:—

“ RHOS-FYNACH FARM AND WEIR.

“ Mr. Parry Evans is said, in Williams's ‘Conway,’ to derive his title to this property by a grant from the Earl of Leicester, 17 Eliz., as a portion of the Lordship of Denbigh. It may be so; but the name of the farm to which the Weir is attached, *Rhos-fynach*—in English, the fen-farm of the monks—would seem to prove that the Weir is of much greater antiquity than that grant. The names of towns, rivers, and farms in North Wales are very ancient, and mark some peculiarity attached to them. Thus, St. Asaph is in Welch, *Llan Elwyn*, “the town on the Elwy;” Holywell, *Treffynow*, “the town near the fountain;” the river Conway, *Cyn-wy*, “the first of rivers,” being the chief river in North Wales. The road across the lowland under Brynsteddfod, *sarn Mynach*, “the causeway made by the monks;” and so I would infer that the Weir, which has been held time out of mind with Rhos farm, from the farm being designated Rhos-fynach, was made by the monks of the abbey of Conway,

when they possessed that farm. In the year 1198, Llewellyn, Prince of North Wales, founded the abbey of Conway, and endowed it with large possessions at Conway, Creuddyn, etc., with the rivers and sea-coast bounding those lands and the fisheries.

“Fish being an article of the first necessity for the food of the monks, it is reasonable to presume that the Weir connected with Rhos-fynach—the farm now bearing that name being not more than three or four miles from Conway—was erected by them during the period they were settled at Conway, from 1198 to 1239.

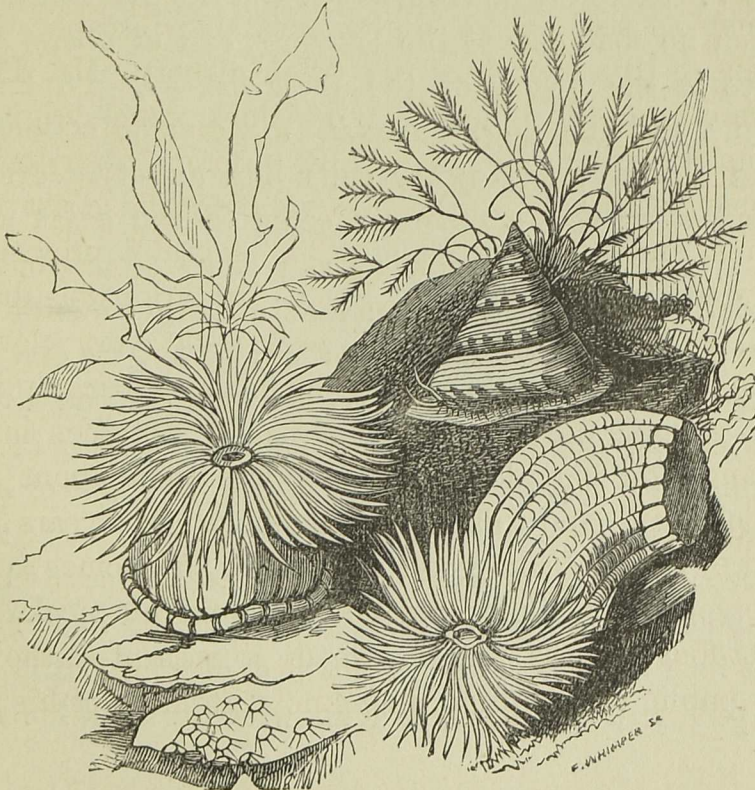
“In that year Edward I., having conquered Wales, and not wishing to have so powerful a body of Welch clergy in his new town of Conway, removed the abbey to Maenan, ten miles from Conway, with the consent of the Pope.

“He at the same time took from the monks all their possessions in Conway, giving them in lieu thereof others of equal or greater value near Maenan.

“The chief possessions of the abbey near Conway were transferred by Edward I. at this time to the Mayor and Corporation of Conway; but it does not appear that Rhos-fynach was included in their grant, nor is there any record of its being within the present boundaries of the Corporation. In fact, the greater part of the corporate property has passed into other hands, *sub silentio*. The facts now stated are presumed to be sufficient to show that the Weir is of great antiquity, and if erected by the monks of the abbey of Conway—and there were no other within twenty or


thirty miles of the place—that it is 650 years old. It may also be shown that it is of the rudest construction, and has never been adapted to modern improvements, and that, consequently, it cannot be removed under the provisions of the Act 24 and 25 Vict. 109.” We will now proceed quietly along the shore to the Weir.

I ought to say that some few years ago the government tried to deprive Mr. Parry Evans of his right to this Weir fishery, but it was decided he had legal claim to the right. A Weir fishery not more than a few hundred yards from his, concerning which a dispute had arisen, was considered illegal; and the shattered remains at present exist to point out the former existence of this fishery.

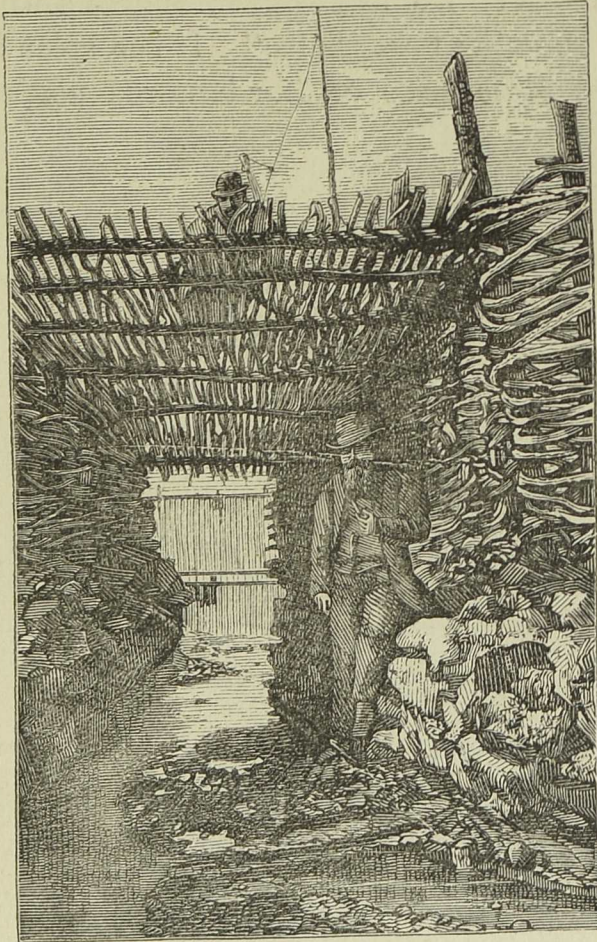


WALK III.

(Continued.)

E have now reached the Weir; the tide is getting low, and several spectators have arrived, anxiously waiting to see the sport. The Weir, you see, is constructed of large stones and strong wattle work above; it is something of the shape of a V. There is a fine iron grating at the point through which no fish, except the smallest, can escape. Ah! there is the owner of the Weir fishery, Mr. Parry Evans, and his dog, "Jack." Jack came originally from Prussia; his owner calls him an otter-terrier. Some years ago, a schooner came to the coast near Rhos, and the crew, having run short of provisions, landed with the dog. Mr. Evans' attention was drawn to "Jack" by seeing him swim about very cleverly round the schooner, and so he made a bargain with the sailors, and gave them a bag of potatoes in exchange for the dog. "Jack" was then about nine months old, and this happened about eight years ago. Here, Jack, Jack, good dog. See, he comes to us. Do you notice the silver collar round his neck? It cost four guineas, and was made a present to the dog by public subscription, in acknowledgment of his skill

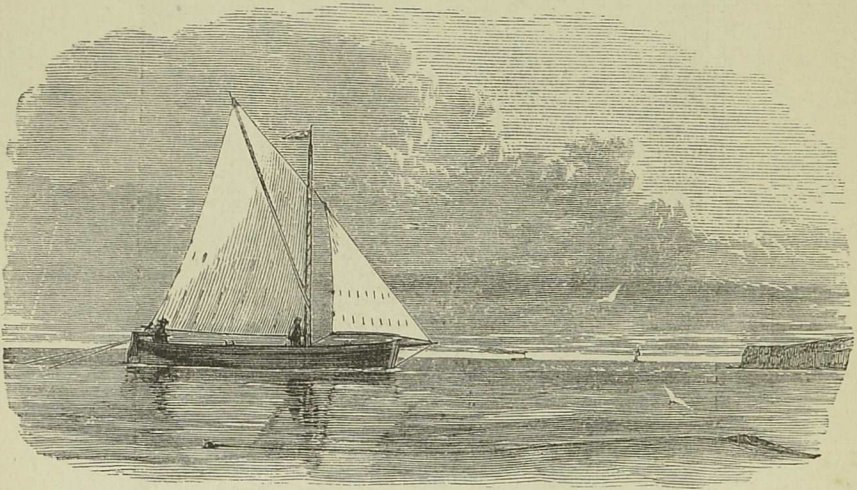
and sagacity as a salmon-fisher. We will now climb on the large stones of the Weir, and look down on the pool so clear and bright. I dare say twenty minutes will yet elapse ere Mr. Parry Evans begins to



HEAD OF WEIR, SHOWING IRON GRATING.

take the fish out. "Oh! look there, look there," said Willy, "something dashed along the water with the swiftness of an arrow." I see; now the fish is right under us; it is a salmon, seven or eight pounds'

weight perhaps. Does he not look splendid in the bright water? Off he goes again like a shot; he will give Master "Jack" some trouble to catch, I'll be bound. "Oh! did you ever see such a beautiful sight as this? Do look, papa; here is a whole shoal of fish swimming towards us." It is a splendid sight, certainly; some three or four hundred mackerel that



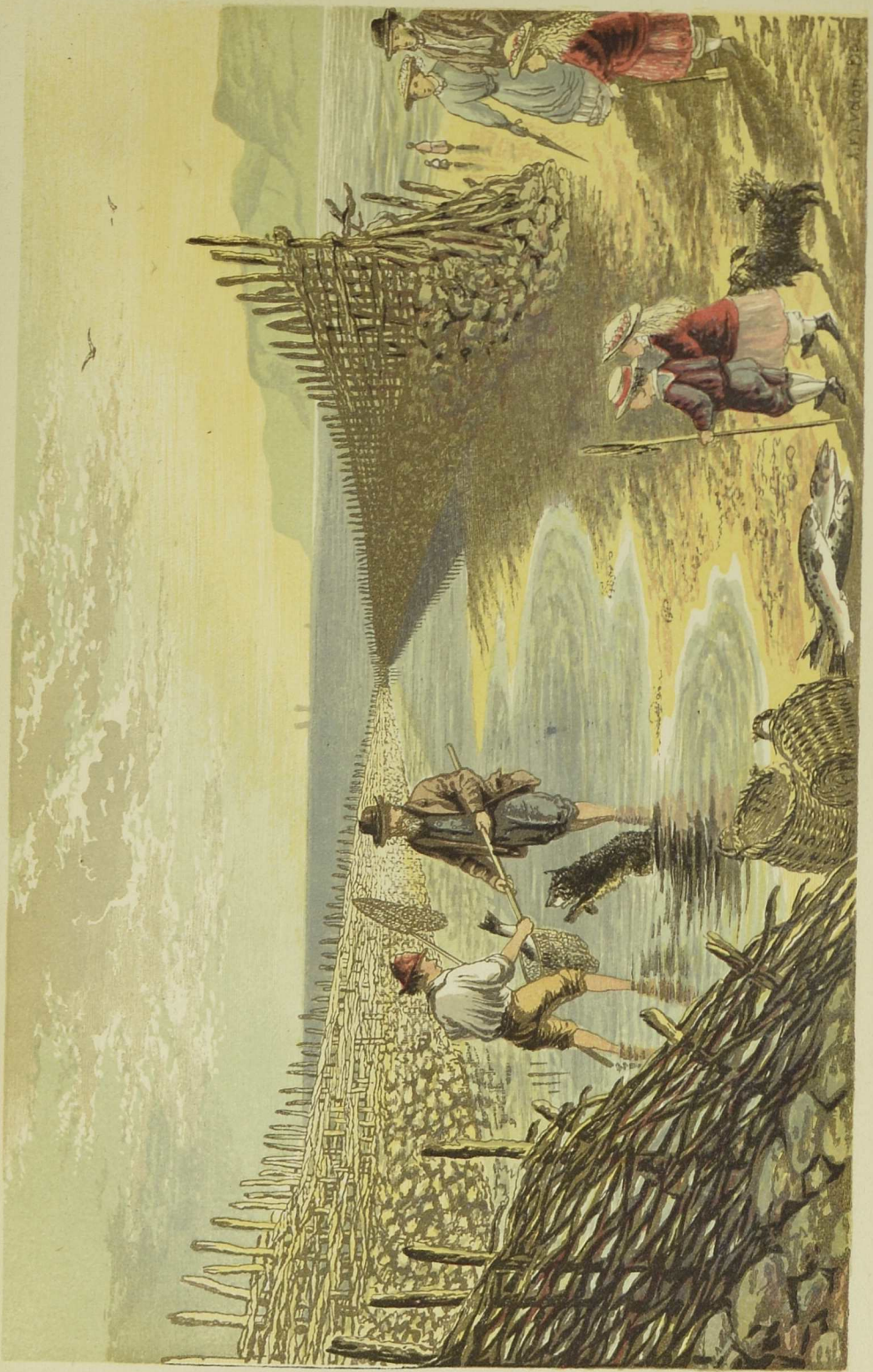
OPEN BOAT FOR MACKEREL FISHING.

have found their own way in, but will have to come Mr. Evans' way out. There they go, with their bright blue backs leafed with green, and beautifully crossed with numerous dark bars or wavy stripes. The mackerel is a very valuable fish, and, as you know, very excellent for the table. Enormous quantities of mackerel are sometimes taken in the nets; as many as 15,000 have been taken in a single night off Lowestoft and Yarmouth. At this latter place, the mackerel fishing employs ninety boats, with a tonnage of upwards of

3000 tons and 870 men, producing about £20,000 a year. Mackerel are said to be voracious feeders, and to grow very fast; they should be eaten when very fresh, as the fish would in hot weather soon become unfit for food. On this account, mackerel were allowed to be cried on Sundays through the streets of London in 1698, and I believe the law still exists. Most fish which in the winter retire into deep water, to be out of the way of violent storms—for you know it is only the surface of the sea that is affected by the storms—approach the shores around our coasts in immense shoals, and thus supply excellent food, being caught, as mackerel are, in millions every season. Fish come to our shores in order to deposit their spawn, thus allowing fishermen to take them in their nets or by the line. “Did you ever fish for mackerel with a line?” Willy asked. Yes, I have done so, and caught a few occasionally. Anything bright will do for a bait; a bit of sand-launce is a capital bait. You let the line out a long way, and sail or row quickly through the water.

There goes another salmon; we shall have some sport soon, they cannot pass the iron grating; but just look at these myriads of tiny shining fish, not larger than Jack’s little finger. They are whitebait, and Mr. Parry Evans will fill our basket for us if we like. They are beautiful little things; see how the water glitters with the scales that have been rubbed off by the hand-net. Willy asked whether whitebait was a distinct species, or whether the small fish were merely the fry of other large ones. It was once sup-

posed that it was a distinct species. Mr. Yarrell so thought, and gave it the name of *Clupea alba*, and Mr. Couch is of the same opinion; but other naturalists, and Dr. Günther amongst them, are convinced that whitebait is merely the young of the herring, or at any rate of some member of the herring family (*Clupeidæ*). Now, as there is so much whitebait, there is every prospect of salmon; because the latter fish are exceedingly fond of whitebait, and it is this multitude of shining fry that has attracted the salmon, and retained them within the pool. Mr. Parry Evans tells me, "No whitebait, no salmon." I suspect, too, the mackerel have been similarly tempted. Salmon whilst they are in salt-water are voracious feeders, but it is a curious fact that, as a rule, they do not eat the whole time they reside in our rivers. I have examined the stomachs of scores of salmon, and never found the slightest traces of food from fresh-water specimens; but I have taken as many as four good sized herrings out of the stomach of a salt-water fed salmon. "But, papa," said Jack, "they must live upon something all the months they live in our rivers." They do not take in any food, but are nourished by their own internal fat; and a salmon after it has been long in the fresh water gets very poor and very thin. When once in the sea again its appetite returns, and it soon regains its health and fatness. Mr. Evans jams in a lot of sea-weed, fucus and laminaria, into the iron grating to stop the whitebait from getting through the bars. But see, here comes another shoal. Why, May, just look, are they not queer fellows as



FISHING-WEIR.

they swim right under us? These are a shoal of garfish. Look at their long, shining, eel-like bodies, and jaws resembling snipes' bills. Oh! do they not look beautiful? they seem to be about a foot long. Mr. Couch tells us that wherever the garfish is found it is a restless, wandering species, having a quick digestion, and always prepared to seize a bait, grasping it with a peculiar action of the protruded jaws. It does not swallow as quickly as some other species, so that when the fisherman's boat is passing rapidly along, the bait is sometimes torn from the fish. When the garfish feels the hook, it does not try to escape by darting away, but annoyed by the restraint of the line, rapidly mounts to the surface, and with body partly out of the water struggles in many active contortions with the line. The garfish seems to have a ready appetite for any animal it can seize and swallow. Mr. Couch mentions as a favourite food a certain black fly which alights on the sea in fine weather; he has seen its stomach filled with these, and also with herrings at about one-third of their growth, a single one in each garfish. "There are times also, when the sea is calm and smooth, that it may be seen in solitary amusement at the surface, or perhaps many together, leaping again and again over some floating object, as a rod or straw; or it may thrust itself bolt upright out of the water, to fall back again in an apparently clumsy manner. It is an amusement for fisherboys to throw some slender stick to the garfish, when it will exercise a variety of evolutions about and over it as it floats." The poor fish, however, are too much frightened

at the presence of so many people to be at all playfully inclined. I ought to tell you that the bones of this fish are quite green. There, Willy, do you see that jelly fish in the water? How different from the lifeless mass we so often see on the shore! Look, how graceful are its movements, as it contracts and expands its umbrella-like disc with slow and even motion. What have we now? Do you see that fish swimming near the bottom with strange-looking head and two magnificent fins spread out fan-like? This is the Sapphirine Gurnard, and is so called from the beautiful blue colour of the inside of the pectoral fins; this is a small specimen, but the species grows sometimes to the length of two feet. There are many British kinds of gurnards, the sapphirine and the cuckoo gurnard being probably the most common. They are very good fish to eat, and often exposed to sale in the Liverpool market; but I do not think I ever saw one in Newport or Wellington; they are caught in trawl-nets, and sometimes with lines and baited hooks. The gurnards are voracious fish; I have seen them coming to the top of the water, and jumping out of it in pursuit of other fish.

Well, Mr. Parry Evans, how many salmon have you counted in the pool? "There are seven or eight good fish in, sir, this time; and one or two will be ten or eleven pounds each." Look at the dog "Jack;" he is evidently getting a little impatient, as he sees in the retiring water of the pool every now and then a salmon darting along. And now Mr. Evans takes the silver collar off, and sets "Jack"

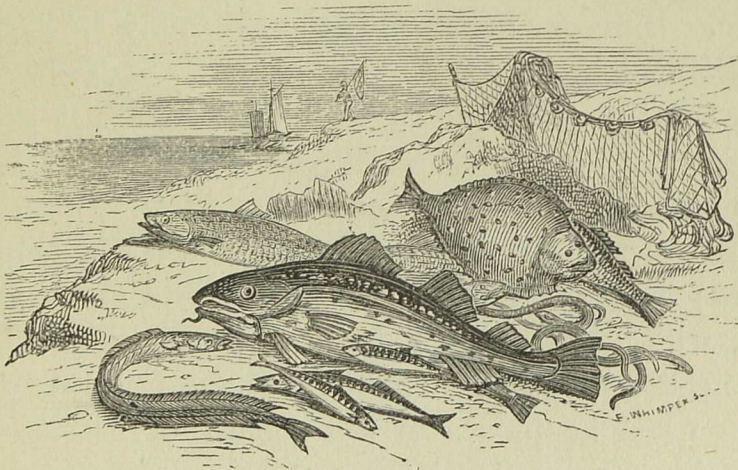
free ; and in a second he is in the middle of the pool. Now for the fun ! Willy and Jack tuck up their trowsers, take off their shoes and stockings, and with nets in their hands enter the water. Bah ! it is rather cold at first, but the excitement soon warms them. There goes a salmon, full tilt, and "Jack" after him. What a splashing in the water, to be sure ! There is another dog learning the trade, and "Jack" is his tutor in the art ; he is a brown retriever, and dashes about the water after the salmon as if he enjoyed the fun immensely, but he has not yet learned how to catch a slippery fish. There ! there ! see ! see ! good dog ; now you have him ! No ! off again ; well done, salmon ! Now dog ! have at him !

How immensely rapid is the motion of a frightened salmon. "Quick as an arrow" is hardly a figure of speech. Bravo, "Jack," bravo ! Do you see ? He has caught the salmon firmly by the head. Good dog ! Mr. Parry Evans is immediately on the spot, and takes the fish from old "Jack," whom he kindly pats on the back, holds the salmon aloft for us all to see, and consigns him to the basket which his man is guarding on the shore. See, see, again ! off they go, dogs and men, and soon another salmon is captured ; and there is lots of fun, meanwhile, in catching the mackerel and garfish. How they rush about, poor things, and get dispersed in the commotion. Now, Jacky boy—not Mr. Evans' dog—you have that long-nosed garfish. No, he has wriggled off. Well, try again. Well done, you have him this time. Take him to the basket. What ! you think he will bite ?

Not he. There, you have let him go. "Well, papa, he was so slippery, you know." Never mind, there are lots more. Now, Willy, work away. There goes the dog again, helter-skelter all, dogs and men, and another salmon. "How beautiful the fish look now they are landed!" said Mr. Parry Evans. It was a very natural remark. To my eye, they looked prettier swimming in the pool; but practically, they were better for all, no doubt, in the net. Well, the sport of catching the various fish in the pool—there were nine salmon, averaging about five pounds each—lasted about half an hour. "Jack" behaved admirably; it was wonderful to see his skill in the pursuit; he generally caught hold of the salmon by the head, on which he gave one strong bite, and the fish was rendered helpless almost instantaneously. Sometimes he would catch hold of the back fin. When the sport was finished, we went to survey the spoils; and a nice "kettle of fish" there was. I bought one salmon and the gurnard; the rest were soon disposed of by Mr. Evans to his numerous visitors, all of whom were much pleased with the sport. But wait a little; some of the fish lie on the sand. I will look for parasites. Here, on this salmon, is a curious parasite, with a body an inch long, and with two long tail-like projections three times the length of the creature itself. It is a crustacean, and related to the *Argulus foliaceus* we have found abundantly on trout in the rivers in Shropshire.* Those two long tails are tubes containing eggs; they remind me at

* See "Country Walks," p. 71.

once of the egg-sacs of the small crustacean *Cyclops*, so common in fresh-water ponds. There are some smaller parasites on the same fish, and somewhat similar in form, but without the tail-like ends. These are the males of the same creature. The name of the parasite is *Lepeophtharies stromii*. Had it a short English name, I would have given it you instead. The old dog, no doubt, thinks he has done a good day's work, and walks quietly behind his master home; and we are all of the same opinion as the old dog, and leave Rhos-fynach Weir Fishery with impressions that will perhaps never be effaced.



WALK IV.



WE will stroll again on the shore, and look out for some plants on the dry part furthest from the tide. We shall find plants that we never see in the country, being peculiar to the sea-shore. Here, for instance, is the Sea-holly (*Eryngium maritimum*) with its thick prickly leaves of a glaucous hue, prettily veined with white. You see it grows abundantly here, and a very handsome plant it is, with its dense heads of blue flowers; the roots which penetrate the sand to a great depth are slightly bitter; a preparation of them was made many years ago, with sugar, in the form of sweetmeats. They were called "kissing-comfits." Shakespeare refers to them when he puts into the mouth of Falstaff the following words: "Let the sky rain potatoes; let it thunder to the tune of *Green-sleeves*; hail kissing-comfits and snow eringoes, I will shelter me here."

Colchester was long famous for these sweetmeats. The root of the sea-holly was supposed to have a tonic property, and I believe it is still used by some people as a medicine. In Sweden, the young top-shoots are eaten like asparagus. It is a hardy plant,

and preserves its colour and form for a long time after it is gathered.

Eryngo, to the threat'ning storm
With dauntless pride uprears
His azure crest and warrior form,
And points his spears.

Here is the Sea-spurge (*Euphorbia paralias*), with its curious yellowish-green flowers and glaucous leaves. You see, when I break a bit, what a quantity of milky fluid flows out. All the species of the spurge tribe (*Euphorbiaceæ*) abound in this juice, which is extremely acrid. If you were to put a drop on your tongue and swallow the smallest morsel, you would feel a burning heat in the mouth and throat for hours. Large draughts of milk allay this unpleasant sensation. Old Gerarde, speaking of the sea-spurge, says—“Some write by respect of others that it enflameth exceedingly, but myselfe speak by experience; for walking along the sea-coast at Lee, in Essex, with a gentleman called Mr. Rich, dwelling in the same towne, I took one drop of it in my mouth, which, neverthelesse, did so inflame and swelle in my throte, that I hardly escaped with my life. And in like case was the gentleman, which caused us to take our horses, and poste for our lives to the next farm-house to drinke some milke, to quench the extremitie of our heate, which then ceased.”

“Oh, papa, look there! what is that large bird flying near the sea—it cannot be a gull?” said Jack. No, it is a cormorant. I will tell you something about

cormorants just now, but I want you at present to hear a little more about this curious family of plants. I said that the milky juice of the spurges is poisonous; and do you know, Willy, that the Irish peasants of Kerry are said to collect a lot of spurge, and, after bruising it, to put it in a covered basket and sink it in the river, for the purpose of poisoning or stupefying the fish. Some of the members of this order, which grow in tropical countries, are fearfully poisonous. I do not know whether I ever told you of the Manchineal-tree of the West India Islands. It is said to be dangerous even to sleep under its shade, and that the land-crabs, so frequently found in the Manchineal woods, acquire their poisonous properties from them. There may be some exaggeration, perhaps, in the stories, but the fact that the Manchineal is exceedingly poisonous remains. Then there is the Manihot of the same order of plants, a shrub much cultivated in tropical countries, which contains a very poisonous substance. "I do not see," said Jack, "what is the use of cultivating poisonous plants." Well, I was going to explain that the Manihot abounds in starchy matter, that the poisonous properties can be completely driven off by roasting or washing, and that the starch is then converted into what is known as Cassava-bread, a palatable and nutritious article of diet. The Indians use the juice of this shrub for poisoning their arrows. "I should not much fancy," said May, "the Cassava-bread." You actually have occasionally eaten nearly the same thing; that is, if you have ever eaten tapioca-pudding, which is pre-

pared from the starch of the roots of the bitter Cassava. The Sandbox-tree, also a native of the West Indies, sometimes called by the funny name of the Monkey's Dinner-bell-tree, is another dangerous plant, the milk of which is so venomous as to produce blindness if applied to the eye. Castor-oil—don't shudder Jack—is produced from a tree which belongs to the spurge family; the poisonous property remains behind, and is not expressed with the oil from the seeds.

“There goes another cormorant,” exclaimed Willy; “are not these birds capital fishers?” Yes, indeed they are; and they used formerly to be trained to catch and bring fish to their masters. There are two British species of cormorants—the great cormorant and the shag. They are both splendid divers; the shag has been caught in a crab pot a hundred and twenty feet below the surface. I like to see these birds perched on some craggy eminence overhanging the sea, or flying along with steady flight. The great cormorant makes a large nest of sticks, seaweed, and coarse grass, and lays four or five eggs of a white colour varied with pale blue. I never saw a very young cormorant, but they must be queer-looking fellows; for when first hatched they are covered with a bluish-black skin, acquiring a thick covering of black down in the course of a few days. Cormorants have very wide throats and can swallow large fish. Eels are dainty morsels with them; a cormorant has been seen to pick up an eel from the mud, return to the rail he was previously sitting upon, strike the eel

three or four hard blows against the rail, toss it up into the air, and catching it by the head in its fall, swallow it in an instant. "I should much like," said Willy, "to possess a tame cormorant, would it not be fun to teach it to catch fish for us?" Cormorants possess great intelligence. I think it is Colonel Montague who tells us of one that became so tame that it never seemed happy unless in the presence of its owner. "But to this day in China," Willy remarked, "the people use tame cormorants for fishing purposes, do they not?" Yes, I believe so. Here is an account given by a traveller in that country :* "There were two small boats, containing one man and about ten or twelve birds in each. The birds were standing perched on the sides of the little boat, and apparently had just arrived at the fishing ground. They were now ordered out of the boat by their masters; and so well trained were they that they went on the water immediately, scattered themselves over the canal, and began to look for fish. They have a beautiful sea-green eye, and quick as lightning they see and dive upon the finny tribe, which, once caught in the sharp-notched bill of the bird, never by any possibility can escape. The cormorant now rises to the surface with the fish in his bill; and the moment he is seen by the Chinaman he is called back to the boat. As docile as a dog, he swims after his master and allows himself to be pulled into the san-pan, where he disgorges his prey, and again resumes his labours. And, what is more won-

* Fortune's "China," p. 99.

derful still, if one of the cormorants gets hold of a fish of a large size, so large that he would have some difficulty in taking it to the boat, some of the others, seeing his dilemma, hasten to his assistance, and with their efforts united, capture the animal, and haul him off to the boat. Sometimes a bird seemed to get lazy or playful, and swam about without attending to his business; and then the Chinaman with a long bamboo which he also used for propelling the boat, struck the water near where the bird was, calling out to him in an angry tone. Immediately, like the truant schoolboy who neglects his lessons and is found out, the cormorant gives up his play and resumes his labours. A small string is put round the neck of the bird to prevent him from swallowing the fish which he catches.”

The shag is a smaller bird than the greater cormorant, and is of a more decided green colour. It is said never to quit the salt water to follow the course of a river, as its relative does, and never to settle on trees. The word cormorant means “sea-raven.”*

There is another interesting bird flying past; it is the common tern, or sea-swallow. See how rapidly it flies, now skimming near the water, now rising aloft. It is on the look out for fish, and is a very graceful bird, and has a beautiful red bill and feet. I have seen this tern occasionally in the middle of Shropshire. There are several British species of terns; they all come to this country in May, and leave it in September. They lay two or three eggs of a yellowish

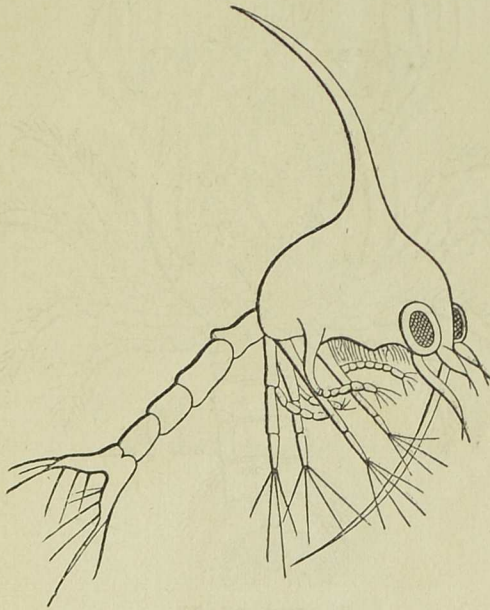
* *Corvus marinus.*

stone colour, spotted with grey and dark red-brown, and take great care of their young ones. Mr. St. John says that the terns are very fond of sand-eels (sand-launces), and that though "the swiftest little creature in the whole sea is the sand-eel, yet they catch thousands of these fish in the same way as the osprey catches the trout, excepting that the tern uses its sharp-pointed bill, instead of its feet. I have often taken up the sand-eels which the terns have dropped on being alarmed, and have invariably found that the little fish had but one small wound, immediately behind the head. That a bird should catch such a slippery active fish as the sand-eel, in the manner in which a tern catches it, seems almost inconceivable, and yet every dweller on the sea-coast sees it done every hour during the period that these birds frequent our shores." Mr. St. John also informs us that when the day is bright and the sun hot, the terns hovering constantly over their eggs, leave them to the heat of the sun reflected from and increased by the warm shingle. Let us get nearer to the water, the tide is getting low ; here is a large shore-crab scuttling away as fast as his legs can carry him. Crabs are grotesque fellows, and it is most laughable to watch their doings in an aquarium. Let us catch this fellow, but mind he does not bite us ; how many legs has he ? count them, Jack. "He has got four on each side, papa, and he wants to bite me with his claws." See how strong the claws are ; the crab uses them as a man uses his hands. It is amusing to see a crab in an aquarium quietly helping himself to some dead shell-



TERN FEEDING YOUNG.

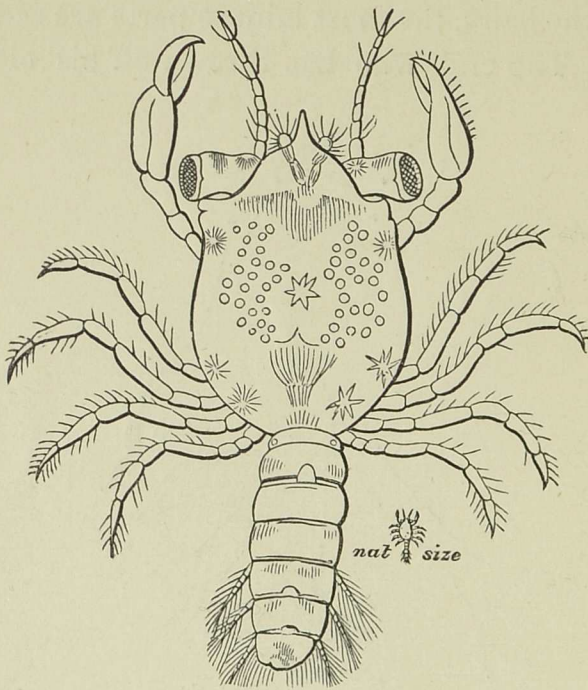
fish or other food ; he picks a bit off and hands it to his mouth "almost like a Christian," as country folks sometimes say. Fish, flesh, or fowl, fresh or putrid, is duly appreciated by Mr. Crab. Crabs, like other crustacea cast their shells. It is most curious to notice how perfect is the cast-off shell ; the antennæ, the bristles, the eyes, the hairs, the most minute parts are seen in the old shell. The crab who has thrown off his old crusty



FIRST STAGE OF YOUNG CRAB.

coat, remains for some time in a soft state, but in course of time constructs another shelly coat from the mineral particles in the water. Willy wished to know whether crabs underwent any metamorphosis like insects. The metamorphosis of the crab is an extremely instructive and interesting subject. The

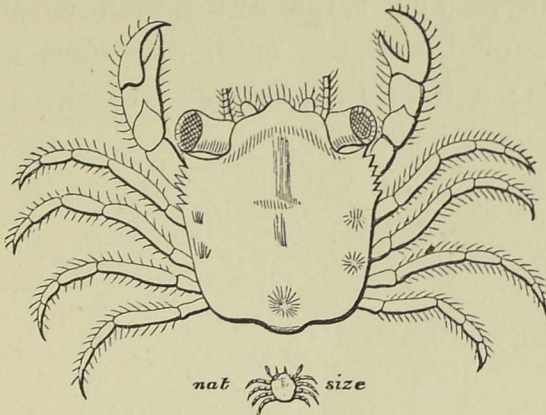
eggs are carried under the tail ; and when first hatched, the young are most strange looking creatures. I have seen these little things swimming about like an animated mass of dust in an aquarium. On submitting a few specimens to microscopic examination, I



SECOND STAGE.

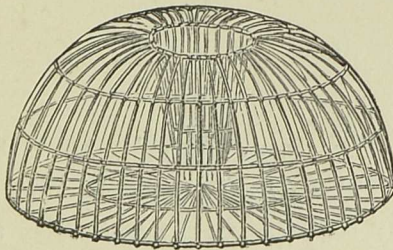
soon found I had under inspection the young of the crab. When in its earliest stage the creature was first observed, it was supposed to be some new thing altogether, and naturalists called it a *zoea* ; in its second stage of transformation it looks more like a crab ; and still more so in its third stage ; finally it assumes the adult crab form.

“But this is not the kind of crab that people eat,” said May, “is it?” No; the crab you see exposed for sale in the markets is the edible crab



THIRD STAGE.

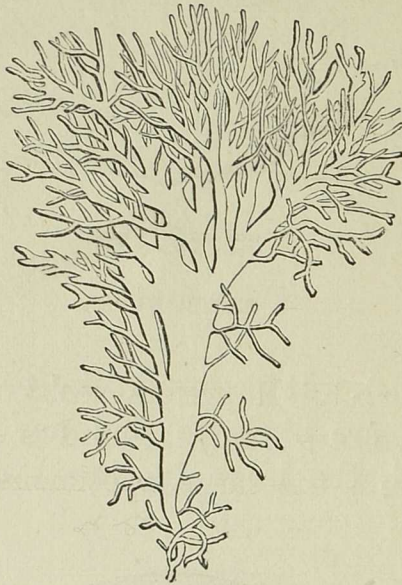
(*Cancer pagurus*). It prefers rocky coasts, and I do not think we are likely to find any on this sandy shore. Indeed, the large specimens of this species



CRAB-POT.

live out far from the shore in deep water. Crab-fishing is a very important trade on many parts of our coast. Immense numbers are taken in what are called

crab-pots; these are round traps or baskets made of wicker-work, the twigs of the golden willow (*Salix vitellina*) being much used on account of their toughness. "But how do the crabs get into these traps?" asked Willy. The traps are baited with pieces of fish or any offal, and are sunk by stones attached to the bottom; a long line, fastened to the trap with a



RHODYMENIA PALMATA.

cork at the other end, shows where the trap is situated. A crab-trap is not unlike one kind of mouse-trap, only the entrance is at the top and not at the sides. Putrid flesh is the usual bait to which it is probable the crab is attracted by the sense of smell.

Here, on an old oyster-shell, is a bit of very pretty pink sea-weed, called *Rhodymenia palmata*. The

first-named word means "red leaf," or "membrane." It is common all round our coast, and is a pretty plant for an aquarium.

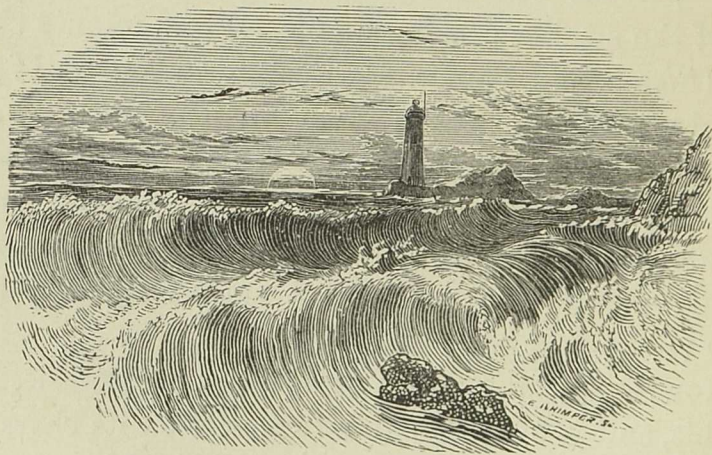
"We are not aware," say Messrs. Johnstone and Croall, "that it is eaten anywhere in Scotland at the present day as an article of food, although it is said to have been so at one period, and it is still much eaten as a relish by all the inhabitants that live near the coast. It is always, we believe, eaten in the raw state; but we remember seeing, when a boy, some people giving it a slight scorching or roasting by rolling it round a heated poker, after which it had a very peculiar flavour, which to most persons, as well as to us, was very disagreeable. By this process the red colour was changed to green. Those specimens which are covered by parasites, such as *Calithamnia* and *Ectocarpus*, are generally most in request; and many persons consider it no disparagement that a few of the smaller crustacea (*Idotea*) and minute shell-fish (*Rissoa* and young *Mytilus*) form a part of the delicate morsel. When sold in the markets, or hawked through the towns or rural districts, as it often is during the summer months, the young stems of *Laminaria digitata* (tang or tangle) are generally mixed up with it; and also a sprinkling of pepper dulse (*Laurencia pinnatifida*)."*

Now, May, take a bite; there are no parasites on this bit, and you will be able to report on its character as food. "No, thank you, papa," said May; "it is very pretty, but the smell is not very inviting."


* "Nature Printed Sea-weeds," ii. p. 12.

Here is a tuft of a zoophyte called "Lobster's-horn," growing on a stone imbedded in the sand; you see each branch is jointed like the antennæ of a lobster. A row of small cups extends at regular intervals down the inside; these are the houses of the polyps. Here is *Plumularia falcata*, a very elegant little zoophyte, and here is *Campanularia verticellata*. Let us put them in one of our small boxes for examination under the microscope. What wonderful variety there is in nature!

New buds and bulbs the living fabric shoots
 On lengthening branches and protruding roots;
 Or, on the father's side, from bursting glands,
 Th' adhering young its nascent form expands;
 In branching lines the parent trunk adorns,
 And parts, ere long, like plumage, hairs or horns.



WALK V.

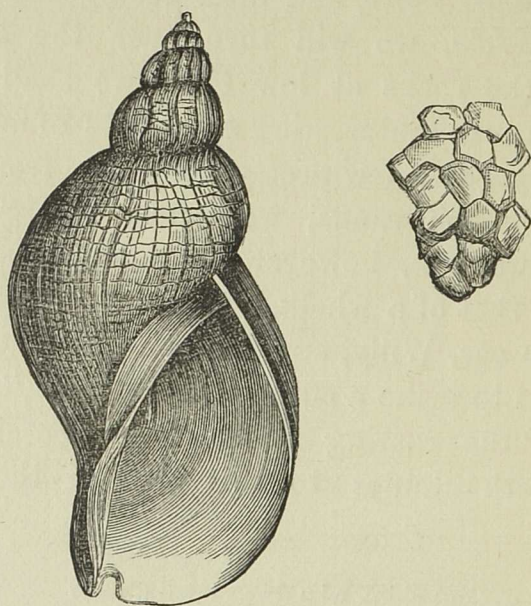
E will take the train and visit Rhos-fynach once more, and after seeing the fun at the Weir, we will turn over the stones and examine the rocks at low tide; we shall no doubt meet with many interesting specimens of animals, and I dare say get a few pretty sea-weeds from the rock pools. On the sands, we found a large univalve shell; there was, however, no animal inside it; the shell was that of a whelk (*Buccinum undatum*). Put it to your ear, Willy, and listen to the murmurings. "It seems to make a curious noise, papa," Yes, this shell is "the roaring buckie" of Scotch children. Wordsworth alludes to this idea in the following lines—

I have seen

A curious child, who dwelt upon a tract
Of inland ground, applying to his ear
The convolutions of a smooth-lipp'd shell;
To which, in silence hushed, his very soul
Listen'd intensely, and his countenance soon
Brightened with joy: for murmurings from within
Were heard, sonorous cadences, whereby,
To his belief, the monitor express'd
Mysterious unions with its native sea.

The whelk, of which there are many varieties, is a common mollusc in all parts of the British seas. The

animal is very voracious ; it has a yellowish body streaked with black, and a long powerful proboscis, within which is a muscular sheath that contains a very curiously-formed tongue. This tongue is a beautiful microscopic object, and when we get home again, I will show you its form and structure. The creature burrows in the sand. I have often taken specimens out dredging. Mr. Gwyn Jeffrey's says he has seen between



WHELK-SHELL AND EGG-CASES.

thirty and forty shells of this mollusc taken from the stomach of a single cod. "Do any people eat whelks as they eat cockles and periwinkles?" asked Jack. I believe vast numbers are eaten in London, where you may often see them exposed for sale. According to Mr. Mayhew, as many as four million, nine hundred and fifty thousand whelks are sold in the streets of London every year. They have from very early

times been eaten in this country ; and when the Romans were in England they acquired a taste for whelks. "How do you know that, papa?" said May. Because whelk-shells have been found mixed with oyster-shells at Richborough, in Kent, an old Roman station. We know that the old Romans were very fond of shell-fish. Snails were dainty morsels ; and do you know they used to eat sea-urchins and sea-anemones? Even bishops and archbishops used to eat whelks, for in 1504, when William Warham was made Archbishop of Canterbury, eight thousand whelks were provided for the feast at five shillings a thousand. I should like to see archbishops now-a-days eating whelks. In the shell-fish market at Billingsgate, the present species goes by the name of the "white," or common whelk, in contradistinction to the *Fusus antiquus*, which is there called the "red," or "almond" whelk ; they are brought chiefly from Whitstable, Ramsgate, Margate, Grimsby, and Harwich.*

Wilks—the word is spelt in different ways—must be sold during the same day they are received, that is, the day after they are caught. If the supply is greater than the demand, they are boiled, in which state they keep good for several days. "Evidence was given before a Select Committee of the House of Commons in the Session of 1866, on the Whitstable Oyster-Fishery Bill, that the whelk-fishery on a sandy flat in that bay yielded £12,000 a year—part of the produce being disposed of in the London market for

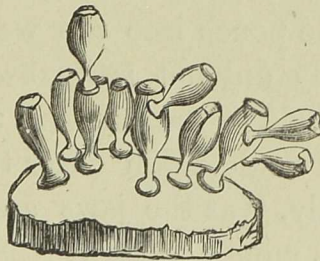
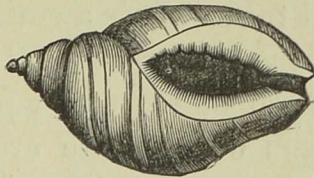
* Jeffrey's "British Conchology," iv. p. 290.

food, and the rest sent to the cod-fishery banks for bait. They are seldom eaten in the northern part of our isles. At Dieppe, and Nantes, they may occasionally be seen exposed for sale in the fish-markets."

"What is this light ball?" asked Willy, giving it a kick. That is a cluster of the egg-cases of the whelk we have been talking about. Some people call them "sea-wash balls," because sailors are said to use them instead of soap to wash their hands. You see it is made up of a number of round pockets, one upon the other, and attached by their edges at the base; perhaps there may be four hundred of these pockets, and each pocket may contain several hundred eggs! Now there is a very curious fact about these eggs; though there are so many at first, perhaps not more than twenty or thirty come to be young whelks. What has become of the other eggs? Some say that the eggs are first spherical, but that afterwards they unite and form bodies of a different shape; but Sir John Lubbock, a most accurate observer, says that the more forward young ones swallow the other eggs whole; and he has drawn a figure of a young whelk in the act of swallowing an egg. I believe that this is now generally accepted as the true explanation.

"What have we here, papa," said Willy, "on these large rough stones?" Ah! that is a kind of cousin of the whelks; you see the shells are not very dissimilar in shape, but much smaller. There are dog-whelks (*Purpura lapillus*), and you observe also on the stone a lot of things shaped something like miniature egg-cups, are they not curious? Those dog-

whelks, or whelk-tingles, are very injurious to oysters, and destroy vast numbers. "But how," asked Jack, "can they get at the oyster, surrounded as he is by his hard shelly coat?" The whelk-tingle has a long tongue which has a number of flinty spines upon it; by working this tongue round and round a hole is at length bored in the oyster's shell. The process is no doubt a slow one. It has been noticed that it took two



DOG-WHELK AND EGG CASES ON STONE.

days to get through the shell of a moderately-sized mussel. This mollusc secretes a purple dye, which was formerly used by the monks in illuminating their Biblical manuscripts. I will break one of these dogwhelks; do you see the slightly yellow fluid? "But, papa, you said it was purple," said Willy. Well; wait a minute, you will see it change colour; it is assuming

a greenish hue ; watch it a little longer, now it is violet, now it is purple : this change in the colour is due to the action of the sun. Let us look into this rock pool. There goes a fish, let us catch him. "Oh ! what an odd-looking thing ; it is something like an eel," said Jack. It is not an eel, but one of the pipe-fishes ; what an extraordinary head it has ! Its mouth, you see, is a cylindrical tube ; the jaws being united, the gills are not formed as in most fishes, but are arranged in small tufts. It is a curious fact to notice in the history of these pipe-fishes that the male has a membranous pouch on the under part, near the tail, into which the eggs of its mate are put ; here they are developed into young ones, and herein they are sheltered from danger. Mr. Yarrell says that he has been assured by fishermen that if the young were shaken out of the pouch into the water over the side of the boat, they did not swim away, but when the parent fish was held in the water in a favourable position, the young would again enter the pouch. "But, papa," said Willy, "as the jaws are united how can the fish open its mouth when it wishes to eat?" It cannot separate its jaws of course, but it sucks up the water through the opening of the tubular mouth by dilating its throat. The food which consists of small crustacea, worms, etc., is drawn into the mouth as water is into a syringe. Those curious little fish called sea-horses (*hippocampi*)* of which you may remember I have a pickled specimen at home, belong to the pipe-fish family, and resemble them a good deal

* See Plate, Fig. 3.

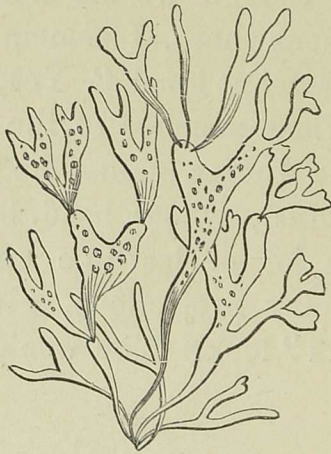
in their habits. The short-nosed hippocampus is occasionally met with on our English coasts; it swims about in a vertical position, ready to grasp with its tail any object in the water. It is from six to ten inches long; the body is much compressed, the tail divided by many ridges, and very prehensile. The eggs and young are protected in the pouch of the male as in pipe-fishes. "You do see most extraordinary forms of fish," said Willy, "and the hippocampus is certainly one of them; for though we are not likely to meet with any specimens here, I remember the one you have in a glass vessel at home." Yes, and you remind me of a most curious member of the pipe-fish family that inhabits the Indian seas—the foliated pipe-fish (*Syngnathus foliatus*), whose head, back, and tail are provided with a lot of leaf-like appendages set in strong, rough, spiny projections, giving it a sort of "rags and tatters" look. You would suppose at first



DELESSERIA SANGUINEA.

sight that these "rags and tatters" were leaves of sea-weed that had been transfixed by the spiny pro-

jections. "Oh papa, do come here," cried May; "here is such a lovely bit of sea-weed growing hidden under this crack in the rock." It is the *Delesseria sanguinea*, most beautiful indeed. Look at its brilliant crimson pink colouring, its delicate membraneous frond with midrib and branching veins; it is, however, somewhat torn now; had we found it in the month of May it would have been in a better state of preservation.



PHYLLOPHORA RUBENS.

Ah! another bit of pretty sea-weed (the *Phyllophora rubens*), it is of a bright transparent red colour, and of a firm substance; it loves to hide under the projecting ledges of little rock pools.

Here is another small fish; what is he, Jack? "He has retreated under a stone, but I will soon fetch him out." There, now you have him; let me look. Oh! I see, it is a specimen of the shanny (*Blennius pholis*), common enough in most

parts of our coasts; it differs from other *blennies* in the absence of any appendages on the head. The shanny confines itself to the bottom, where it takes up its residence on a rock or stone, from which it rarely wanders far, and beneath which it seeks shelter from ravenous fishes and birds; for cormorants, with their long and sharp beaks, drag multitudes of them from those retreats, and devour them. When the tide is receding, many of these fishes hide under the stones or in pools; but the larger individuals quit the water, and by the use of the pectoral fins creep into convenient holes, rarely more than one in each, and there, with the head outward, they wait for a few hours, until the return of the water restores them to liberty. If discovered or alarmed in these chambers, they retire by a backward motion to the bottom of the cavity. "Lacepede records an instance, where, as he supposed, a shanny had made an attempt to feed on an oyster that lay with its valves open, in consequence of which it became shut up a prisoner by the closing of the shell. In this condition of confinement the fish had continued so long that the oyster had been dredged and carried to a considerable distance, when, on opening it, the captive was again set free, alive and without injury."* Like the chameleon, the shanny can turn its eyes in opposite directions. "Oh! what is this very beautiful little creature, crawling on a bit of laminaria," asked May; "is it not lovely?" It is one of the nudibranchiate molluscs, an extremely interesting and very elegant

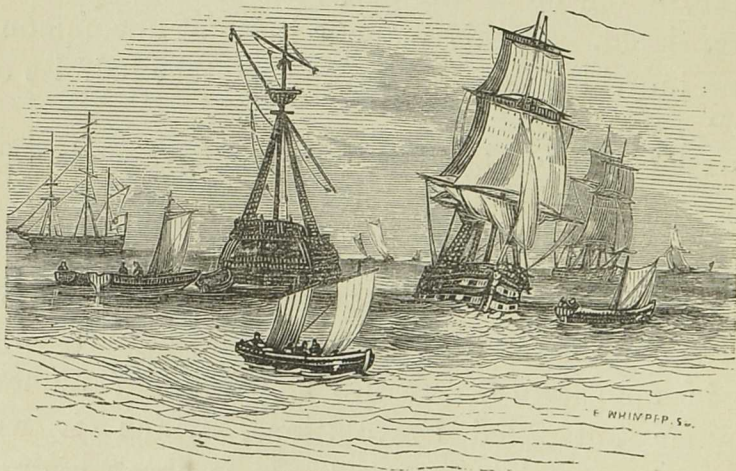
* Couch's Fishes, ii. 228.

family. Let me put it in my bottle. There, now we see it more clearly; look at the tufts of a delicate rose-colour which adorn its back; these are the creature's lungs, and as they are exposed, the term *nudibranchiate*—naked-gilled—has been given to these molluscs. This specimen is the *Eolis coronata*, one of the most beautiful of the tribe. The body is about an inch long, slender, tapering to a point, of a transparent watery-white, tinged with rose-colour and buff. It has four appendages—two near the mouth, called the oral tentacles, and two on the back part of the head, called the dorsal tentacles. The branchial tufts form six or seven clusters down each side of the back; they are of a beautiful rose-red colour, slightly tinged with blue. It looks like a miniature bed of animated flowers. A great number of various species of nudibranchiates have been described as belonging to the British fauna. I am always much delighted to find specimens. The early spring, however, is the best time, I believe, because these molluscs at that time approach the shores for the purpose of depositing their spawn on the underside of rocks and stones near low-water mark. The spawn is a jelly-like thread, arranged in several spiral coils, within which the eggs are imbedded. See how gracefully the little creature bends its tentacles; now extended, now suddenly contracted, as they come in contact with something. But do you know that, charmingly beautiful as many of these nudibranchiates are, they are often sad cannibals. That they will devour the tentacles of the sea-anemones I myself have had proof of. Messrs. Alder and Han-


cock in their beautiful book on these molluscs, which I will show you when we get home again, say that they had several opportunities of noticing the carnivorous propensities of this species, which is certainly not the least voracious of its tribe. "After having been for a day or two without food, they will even devour their own kind—the weaker falling a sacrifice to the cravings of the stronger. Large individuals will content themselves with plucking off each other's papillæ; but should a smaller specimen be within reach, it is most mercilessly attacked, the more powerful animal laying hold of any part of the weaker that may happen to be nearest. The tail, however, is generally first seized, and fierce and determined is the onset. The devourer raises and shakes his papillæ in the manner that the porcupine shakes its quills when irritated, and then, laying back the dorsal tentacles, and curling up the oral ones, fixes the protruded mouth and jaws upon his prey, when, with a convulsive shrinking up of the body, morsel after morsel is appropriated. In this manner it is not uncommon to see an individual entirely devour another half its own size."

"Oh! papa," said Jack, "do come; here is a very unpleasant-looking creature which I do not like to touch. I found it under this flat stone; I suppose it is some kind of worm." It is a worm, and a very curious one too; and, I must confess, not prepossessing in appearance. It lies coiled up in numerous irregular entangled convolutions, which it would appear impossible to unravel. It is about a quarter

of an inch thick, of a dark reddish-brown colour, and may be six or seven feet long. It is the Sea Long-worm (*Nemertes Borlasii*). Specimens are said sometimes to attain the enormous length of thirty yards. The mouth is a longitudinal slit; and inside it is a long tubular proboscis. Sir J. Dalyell, who once kept one of these strange creatures in confinement, says: "He was a long time perplexed regarding the food of this worm; a creature so unwieldy and unmanageable in itself appeared to be very ill-adapted for overcoming any resisting prey. In the natural state, it certainly enters the tube of an *Amphitrite* to devour the tenant; and in one instance it seized and devoured a *Terebella* before me, which had lost its protective dwelling; and this, too, in spite of the size and apparently superior strength of the prey. It feeds on mussels also." I have occasionally met with this worm, but am glad to have another opportunity of studying it. We will take it to our lodgings.



WALK VI.

E will take the train to-day and visit Llandudno, and enjoy a stroll round the Great Ormeshead; the day is tolerably clear, and we shall have a lovely view.

We soon arrive at Llandudno, and at once make our way to the Great Ormeshead. Various plants soon attract our attention, for the rock of the Ormeshead is limestone, which is favourable to a varied vegetation; and one British plant, the *Cotoneaster vulgaris*, is found nowhere else, in a truly wild state, in the kingdom. I remember finding it many years ago growing on a limestone ledge looking inland; it will take us out of our beat, however, to search for it now. The cotoneaster is a shrubby plant with small rose-coloured drooping flowers and dark-green leaves, producing in the autumn very pretty red coral-like berries. It is often cultivated in gardens, and is no doubt familiar to you all. I will remember the next time I see it to show you the plant. "Oh, papa," said May, "what is this pretty yellow flower growing so abundantly here?" It is the rock-rose (*Helianthemum vulgare*), see how beautiful the blossoms look, as the bright

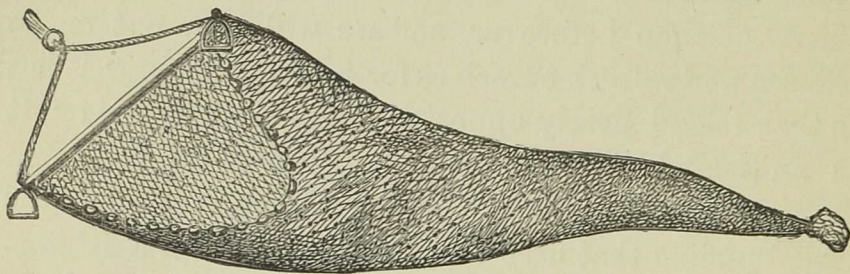
sunshine tinges their sides, and opens out the golden petals. The rock-rose, or cistus, as it is also called, never opens its petals except when skies are bright. see how sensitive the stamens are. I touch them with this pin, and at once they lie down on the petals, where they remain for a long time. Here is another species, the Hoary Dwarf rock-rose (*H. canum*); its leaves are quite grey with down, hence its Latin name; the flowers are yellow like the common species but smaller. It is a very rare species, so we will take a few specimens home and dry them. Here is another uncommon plant, the Nottingham Catchfly, as it is called (*Silene nutans*); there are several kinds of catchflies, and I dare say we shall find some more of them in the course of our ramble. "What a curious name," said Jack, "to give to a flower!" Yes, it is so called because many small flies are often caught in the sticky fluid which in some species surround parts of the stem. The starry blossoms are very pretty in the evening, and very fragrant; you will detect neither beauty nor odour now, for this flower loves to unfold in the evening, unlike the rock-rose which loves the bright sunshine. The Nottingham Catchfly is one of

The flowers that shun the blaze of noon,
To blow beneath the midnight moon;
The garish world they will not bless,
But only live in loneliness.

The odour it gives forth is so powerful as to be unbearable in a room.

“Here,” said May, “is another very beautiful plant; do you know its name?” Indeed it is very pretty, with its spike of bright blue blossoms; it is the Spiked Speedwell (*Veronica spicata*), and is, I believe, a rare plant, never growing except on limestone or chalk. I have often seen this species cultivated in gardens where the spikes of blossoms sometimes grow to nearly a foot in length; gardeners call it the “Cats’ Tail Speedwell.” “Papa,” said Jack, as we had walked nearly half way round the Ormeshead, “it is very hot, let us sit down here in the shade and rest.” A very good idea, Jacko; we have plenty of time before us, and we will look out on to the sea and refresh ourselves for half an hour. “What is that island nearly opposite us?” Willy asked; “it is an island, is it not, papa?” Yes, it is Puffin Island, so called from the great numbers of birds called puffins that used to visit it. “Is that a fishing-boat we see in the distance?” asked Willy. I have no doubt it is a trawler, and probably has a lot of fish on board, most of which will perhaps find its way to the Liverpool market. “What is a trawler?” May asked. It is a fishing-boat which carries a net called a trawl. Some years ago it was a common thing for the steam-boats plying between Beaumaris and Liverpool to stop for a few minutes off Puffin Island, and take in baskets of fish from the trawlers that came alongside; these the steamer took to Liverpool. “I should think,” said Willy, “it must be good fun being in a trawler, and seeing the fish and other curious creatures secured in the net. Have you ever seen fish

taken in a trawl-net?" Yes, and while we are resting I will describe partly in words I used some years ago elsewhere, the trawl-net and the mode of working it. The trawl is a purse-shaped net, between sixty and seventy feet long, about forty feet wide at the mouth, and gradually diminishing to four or five feet at the commencement of the smaller end of the net, or "cod," as it is technically termed. This narrow part is about ten feet long, closed at the end by a draw rope. The net is kept open at its broad mouth by a wooden beam, which is fixed upon two upright iron



TRAWL-NET.

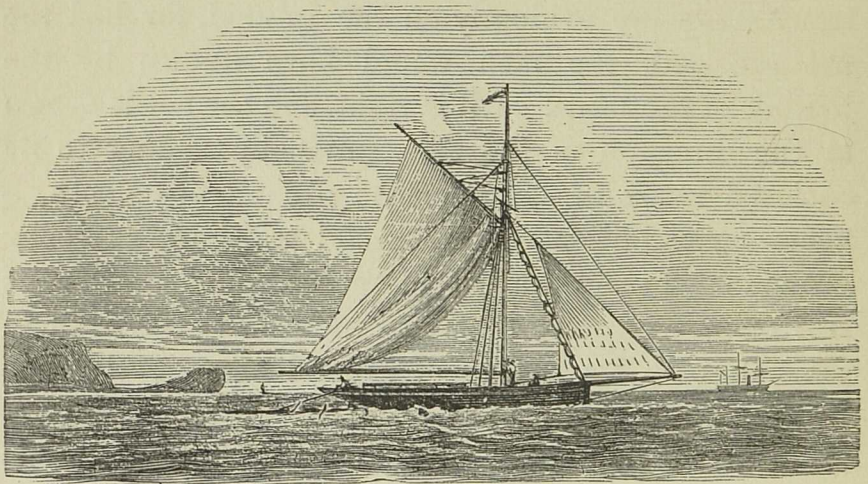
frames three feet high, one at each end; these are called the "trawl-heads." The bottom part of the trawl-head is flat, to rest upon the ground. The underside of the net corresponds to the back, excepting at the mouth, where it is curved deeply inwards; along this portion runs the "ground rope," extending from one trawl head to another; when the net is on the ground, this rope rests upon the bottom. The net has pockets, one on each side, and its meshes vary in size from four inches square near the mouth to an inch and quarter square in the cod. The cod portion of the

net is protected by pieces of old worn-out nets, the upper part being of Manilla twine for buoyancy, the lower of a heavier kind of hemp. Well, suppose the men are hoving the trawl over the side of the vessel. Down sinks the net, beam uppermost; a hundred fathoms of the warp, which is immensely strong, and as thick as a man's wrist, are payed out, the depth of the water being about twenty-five fathoms. The trawl-heads are evidently on the ground, for had the net capsized, the men would have known by the jerking of the warp. All is right, and the net is drawn in the direction of the tide, gradually adding to its enclosed stock of fishes. The ground is smooth, a necessary condition for successful trawling, as rocky ground soon tears the net to pieces. The trawl-irons rest on the bottom, and the inside curved margin of the net, with its border of ground-rope gently rubs the noses of the fish before it.

It is the nature of fish to lie with their heads opposite the stream, so when the ground-rope warns them to "move on," the fish dart forward. If they take their way upwards, the advanced part of the net prevents their escape; if they find their way to the lower portion of the net, they are almost sure to be caught in one of the pockets.

The smack has been towing the trawl at the rate of a mile an hour faster than the tide, and now the master has given orders for "hauling," or recovering the trawl-net. The bulwarks of the smack are taken away, and hauling begun by the help of a windlass. Steadily the warp with its heavy burden is drawn up,

and the great trawl pulled on deck. What a scene of excitement as fish of various forms and colours are emptied out of the cod and pockets! what flapping of fins, shaking of tails, opening and shutting of mouths! Crawling crabs of grotesque form scudding away, some with legs like a spider, others with the soft part of their bodies encased in the deserted shells of univalve



YACHT FOR TRAWLING.

molluscs; old oyster-shells perforated by a boring annelid with numerous round small holes, and now become the habitations of sponges, bearing on their surfaces delicate forms of serpulæ, whose diminished heads are hidden within their tortuous tubes; various starfishes; the red sun-star, the fragile ophiuræ, the snake-armed ophiocomæ, the common five-fingers, detested by oyster cultivators for the mischief it causes amongst those highly-prized molluscs, crawling worms of various species and of rainbow hues in their own

element, though now exhibiting but few attractions. We observe, also, many sea urchins (*Echini*), some as large as a baby's head, others small as a walnut, with purple spines of different sizes and forms, sea-cucumbers, polyzoa, and zoophytes in abundance, tunicated molluscs, masses of whelk eggs, spawn, magnificent scallops, grape-like bunches of cuttle-fish eggs, leathery nidamenta of rays and "dogs," huge oysters, which, though inferior in flavour to natives, are palatable enough to appetites sharpened by the sea-breeze. But nearly all these things are "rubbish" to the fishermen, though treasures to the naturalist; so overboard they go.

Let us glance at the fish. We see several skates, with their long prickly tails and squinting eyes—not bad food, however, when properly cooked, with cockle or egg-sauce, and held in estimation by college dons long ago, less popular now than their merits deserve; haddocks and soles; turbot thirty pounds weight and more; spotted dog-fish, plaice, flounders, and brill. Here, too, is a fish of which I have spoken to you before; beware of touching it, for the erect phalanx of dorsal spines bespeaks mischief. This is the great weever, the *noli me tangere* of the ocean beds, capable of inflicting a severe wound with its poisoned weapons. The "rubbish" is soon thrown overboard, and the men have plenty to do to sort the fish, and consign them to their respective compartments.

"Have you ever shot a puffin?" Willy asked. Yes, many years ago I shot two or three specimens, a guillemot and a razor-bill—birds that used to be very

common on the Ormeshead and on Puffin Island. I had them stuffed. The puffin is a very curious bird; it is sometimes called the sea-parrot, as its bill bears some resemblance to a parrot. These birds are only summer visitors to our coasts, arriving in April and leaving about the end of August. Early in May puffins deposit a single large egg, sometimes in crevices and fissures on the perpendicular surfaces of the cliffs, at the depth of three or four feet from the front. Rabbit warrens are not unfrequent on our coast, and where this happens the puffins often contend with the rabbits for the possession of some of the burrows.

Many puffins, Mr. Selby observes, "resort to the Fern Islands, selecting such as are covered with a stratum of vegetable mould; and here they dig their own burrows, from there not being any rabbits to dispossess upon the particular islets they frequent. They commence this operation about the first week in May, and the hole is generally excavated to the depth of three feet, often in a curving direction, and occasionally with two entrances. When engaged in digging, which is principally performed by the males, they are sometimes so intent upon their work as to admit of being taken by the hand, and the same may also be done during incubation. At this period I have frequently obtained specimens by thrusting my arm into the burrow, though at the risk of receiving a severe bite from the powerful and sharp-edged bill of the old bird. At the farther end of this hole the single egg is deposited, which in size nearly equals



PUFFIN AND YOUNG.

that of a pullet. Its colour when first laid is white, sometimes spotted with pale cinereous,* but it soon becomes soiled and dirty from its immediate contact with the earth, no materials being collected for a nest at the end of a burrow. The young are hatched after a month's incubation, and are then covered with a long blackish down above, which gradually gives place to the feathered plumage; so that at the end of a month or five weeks they are able to quit the burrow, and follow their parents to the open sea. Soon after this time, or about the second week in August, the whole leave our coasts."

Willy wanted to know what these birds feed on, and whether they are good divers. Puffins feed on small fish and various crustacea. Mr. Yarrell states he has seen old birds, when they had a young one to feed, returning to the rocks with several small fish hanging by the head from the angle of the gape of the mouth. Puffins are capital divers. Mr. John Macgillivray says, "that at St. Kilda many puffins are taken when sitting on the rocks, by means of a noose of horse-hair attached to a slender rod of bamboo-cane. This mode is most successful in wet weather, as the puffins then sit best upon the rocks, allowing a person to approach within a few yards, and as many as three hundred may be taken in the course of one day by an expert bird-catcher."

Well, we have rested long enough, and must proceed on our walk. Now, May, gather some more plants. Here is the lesser meadow Rue (*Thalictrum*

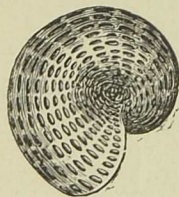
* "Ash-coloured," from *cinis*, "ashes."

minus); look at the quantity of stamens, like little tufts of golden threads. What, May, you do not admire the odour? It is unpleasant, I grant. Here is the Bloody Crane'sbill (*Geraneum sanguineum*), with its bright purple flowers and deeply-cut leaves; and here in abundance is Lady's Fingers (*Anthyllis vulneraria*); the white calyxes are covered with woolly down, and in some places, on this account, the plant is called Lamb's Toes. The specific name of *vulneraria*, from the Latin word *vulnus*, "a wound," was given to it from its having been formerly used to staunch wounds. But we must now make the best of our way to Llandudno station, though I should much like to prolong our stay here in search of more wild flowers.

Happy, in my judgment,
 The wandering herbalist, who, clear alike
 From vain, and that worse evil, vexing thoughts,
 Casts on these uncouth forms a slight regard
 Of transitory interest, and peeps round
 For some rare flow'ret of the hills, or plant
 Of craggy fountain; what he hopes for wins,
 Or learns, at least, that 'tis not to be won:
 Then, keen and eager as a fine-nosed hound,
 By soul-engrossing instinct driven along
 Through wood or open field, the harmless man
 Departs intent upon his onward quest!
 No flow'ret blooms
 Throughout the lofty range of these rough hills
 Or in the woods, that could from him conceal
 Its birthplace.

WALK VII.

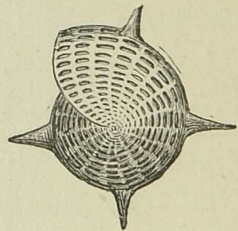
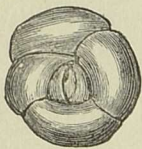
WE will have another stroll on the shore to-day. But before we start, let us go into the town and see what the fishmonger has for sale. I want, too, to buy a sponge. Soles, salmon, kippered herrings, all which, I believe, are supplied from Rhyl, are on the slab; we will buy a bit of salmon for dinner, and a few kippered herrings for breakfast. And now for the druggist's shop for a sponge. This one will do well; do you see how full of sand it is? But, besides sand, sponges contain some very beautiful microscopic objects, called *Foraminifera*. They vary much in size, but all are minute. The name is derived from *foramen*, "a hole," and *fero*, "I carry," in



FORAMINIFERA.

allusion to the number of small holes with which many of the calcareous shells are pierced. What I see through my lens are merely empty cases. But once they were inhabited by little jelly-like creatures, of low organization, that lived in the sea. They possess a number

of long, thread-like processes, which may be seen issuing from the numerous apertures of the shell. These processes act as feet, and serve for locomotion. The shells are made chiefly of carbonate of lime, but the texture varies considerably. In some it is opaque, like porcelain, and in these there are no perforations; in others there are numerous little holes; in others again, the structure is transparent, like glass. Some forms remind one strongly of the nautilus, and formerly the creatures that dwelt inside them were considered to belong to the molluscous order, and to be related to the nautilus. It has, however, long ago been shown that the foraminifera are not at all like little molluscs, except in the external shape of some of



FORAMINIFERA.

the shells. But minute and unimportant as these foraminifera may appear to be, I must tell you that they have played a very important part in nature. "The geological chalk formations, which here and there rise in long chains of mountains, are due to agglomerations of animalcules with calcareous carapaces, and in spite of the size of their layers, are nevertheless composed of the *debris* of microscopic foraminifera. It is they that encircle England with the immense rampart of beautiful white, to which it

owes its ancient name of Albion. In Russia, near the Volga, in the north of France, in Denmark, Sweden, Greece, Sicily, Africa, and Arabia, many chalk hills have a similar origin." The stones of the Pyramids of Egypt are full of a species of foraminifera called *nummulite*, from its coin-like appearance,—*nummus* in Latin, you know, meaning "money." I have no doubt that the objects which Strabo, the Greek geographer, speaks of as having himself seen at the Pyramids, were some kinds of foraminifera. He says, "I saw one remarkable thing at the Pyramids, which I must not pass over without notice. In front of the pyramids lie heaps of stones from the quarries; among these are found pieces which in shape and size resemble lentils. Some contain substances like grains half peeled. It is said that these are the remnants of the workmen's food changed into stone, which is improbable."

I have some very pretty forms of these shells, which I will show you under the microscope when we get home. You will also admire the beautiful engravings in Dr. Williamson's and Dr. Carpenter's splendid books on the Foraminifera. Well has the first-named naturalist remarked—"Little to be envied is the man whose eye rests without interest upon forms so replete with elegance, as are many of these microscopic atoms. Grace and beauty meet him on every hand; whilst the objects in which these attributes are displayed often suggest associations little to be anticipated in creatures so minute. Miniature and fairy-like representatives of the classic nautilus present

themselves in rich abundance. The Attic Amphora and the Roman Lachrymatory are foreshadowed amongst the graceful Lagenæ; whilst some of the Cristellariæ might have been the prototypes of those ancient lamps that illuminated the hall of the Carthaginian queen, when

“ Dependent lychni laqueraribus aureis,
Incensi, et noctem flammis funalia vincunt.”

Imagination may long revel amongst these lovely creations, ever finding abundant scope for the play of fancy; and should anyone still exist, in this nineteenth century, who is disposed to frown upon such objects as unworthy of serious study, let him submit to be reminded that in nature as well as in art,

“ A thing of beauty is a joy for ever.”

Now for the shore again; the tide is going out fast. Willy, run to our lodgings and borrow a spade; I will dig for some lugworms. All right; here he comes with a strong useful spade. Now, do you see these little hollows in the sand, and the worm-casts near them? What quantities there are! They are made by the common lugworm (*Arenicola piscatorum*), so extensively used as bait by fishermen. I will dig one up; I dare say he is two feet deep in his sandy retreat. There! I have one perfectly uninjured. “Oh! papa,” said May, “it is a disgusting-looking thing.” Well, it is not very prepossessing, I allow, just at present, and see, as I handle it, it discharges a yellow fluid that stains the fingers. But I will put the worm into this tall bottle full of clear sea-water. There! what do you

think now of his appearance? “Oh! it is certainly not nearly so ugly now, and what are those beautiful red and purple tufts that beset each side of its body for more than half its length?” asked May. Those tufts are indeed beautiful; they are the creature’s gills, or breathing organs; see how prettily formed they are, branching out like miniature trees.

The blood of the worm is constantly passing through the vessels in these tufts, where it is supplied with fresh air or oxygen, contained in the water. Let us look more closely at the lugworm. It is about ten inches long, with a contractile cylindrical body, thick and changeable in form for about half its length from the head, then suddenly narrowing; it is yellowish in colour, but in this respect specimens vary. There are about nineteen rings or segments; the gill-tufts are situated on the rings of the middle part of the body only; the mouth is provided with a short thick tubular proboscis; on each side of the body you will also notice several pairs of bristle-like feet. The worm bores its way through the sand by means of those bristle-like feet, which serve as a fulcrum. A kind of sticky fluid is secreted by the animal which cements the sides of the tunnel in the sand bored by the worm. Strange to say, the worm in making its excavation in the sand, repeatedly swallows large portions of it; the worm-casts—these little heaps of spiral rolls of sand so abundant here—are what the creature has swallowed and passed through its body. Willy asked whether the lugworm could reproduce lost portions of its body like the common earthworm. I have no knowledge,

my boy, on this point. There is no doubt that the common earthworm possesses the power, and if I remember rightly, a highly organized marine worm, the *Eunice sanguinea*, has been known to reproduce its amputated head. We were now close to the water's edge, and Willy espied about a couple of hundred yards off, swimming in the water, a bird, which with the aid of my binocular field-glass, I discovered to be the lesser black-backed gull (*Larus fuscus*), whose back is not, however, really black, but dark slate; the neck, breast, and tail are of a lovely pure white. Mr. Hewetson tells us these gulls are very bold in the defence of their eggs; he says, "whilst among them I was amused with one, near the nest of which I was sitting; it retired to a certain distance, to give it full force in its attack, and then made a stoop at my head, coming within two or three yards of me; this it continued to do incessantly, till I left it. It is also said that an old woman who was in the habit of gathering their eggs, had her bonnet almost torn to pieces—it being perforated through with their bills." The lesser black-backed gull was first observed as a British bird, breeding at Anglesey, by Pennant; it is pretty common in Wales, and no doubt breeds on the rocks and cliffs of the Ormeshead and Puffin island in company with other species of the gull family. "Is there not a kind of a gull that seldom or never fishes for itself, but pursues other gulls and makes them drop the fish they have caught?" asked Willy. Yes, the birds you mean, though they have the general appearance of gulls, are not true gulls, differing from them

both in form and habit. They are called by the strange name of Skua, from, as is supposed, the note of the bird which sounds like *skui*.

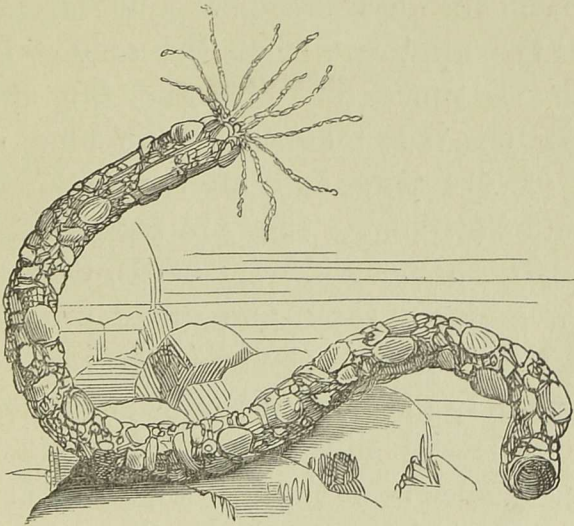
There are three or four British species ; but as they are for the most part inhabitants of northern regions, some are rarely seen. The toes of the skua are furnished with long curved claws, in which they hold their prey while tearing it in pieces ; the beak is also strong and hooked ; thus reminding us of the Falcon family amongst the non-swimming birds. Mr. Henry Shaw, of Shrewsbury, had some years ago a Pomerine skua, which had been killed by flying against the spire of St. Mary's Church in that town.

“But do they never take the trouble to fish for themselves?” asked Jack. I believe they rarely do so ; but I am only acquainted with their habits by reading of them ; I have no personal experience of them. Mr. Charles St. John speaks of the habits of the black-toed gull—the species called Richardson's Skua—in the following words : “While all the other gulls are busy searching for food, and satisfying their hunger, the black-toed gull sits quietly and, apparently, paying no attention to the busy flock. As soon, however, as a gull, however large, has picked up, and swallowed any large substance, the black-toed gull launches himself into the air, and pursues the bird on which he has fixed his eye. The latter screams, and wheels swiftly in every direction to escape his pursuer, but in vain ; every effort to avoid him is fruitless, and to escape further persecution, the gull brings up and ejects the coveted morsel, which the skua catches and swallows

before it reaches the sea or ground over which they are flying. In this manner the robber makes his living, apparently never hunting for himself, but compelling the other gulls to give up the fruits of their industry."

Ah! Jacko, what have you just picked up from the shore? "I do not know, papa; it looks like the tubular house of some kind of sea-worm." You are quite right; it is the empty case of *Terebella conchilega*. You see the tube is made of broken shell, sand, and gravel, and is about as thick as a quill. Both ends are open; at the upper end you notice some ten or dozen thread-like processes of sand; these have been formed by some of the worm's tentacles, which, secreting a sticky fluid, have cemented the grains of the sand together. "But where," asked Willy, "is the worm that once lived in the case?" He has probably hidden himself in the sand; or he may be dead, and his house to be let. The animals themselves are not very easy to obtain as perfect specimens; each lives nearly at the bottom of the tube, excepting when the inmate is feeding, or building. It retreats at the back-door with the greatest rapidity when it has reason to suppose any intruder meditates attack at the front. Still they are to be dug out. Give me the spade, Willy. There, by a sharp, rapid casting out of the sand by the spade, I have succeeded in getting a terebella. "Oh! papa, what a strange looking creature," said May; "what a quantity of long thread-like fleshy processes are entangled near the head." Yes; these are the worm's tentacles, and they serve as so many hands in building the house in which it

lives. "If a specimen be dislodged from its tube," Sir John Dalyell tells us, "it swims by violent contortions in the water, after the fashion of the Nereis, and some other worms or annelides. The tentacles and the branchiæ are compressed and contracted about the head like a brush, and as the animal very soon becomes exhausted by such unnatural exertions, it soon sinks to the bottom. Should a quantity of sand be now



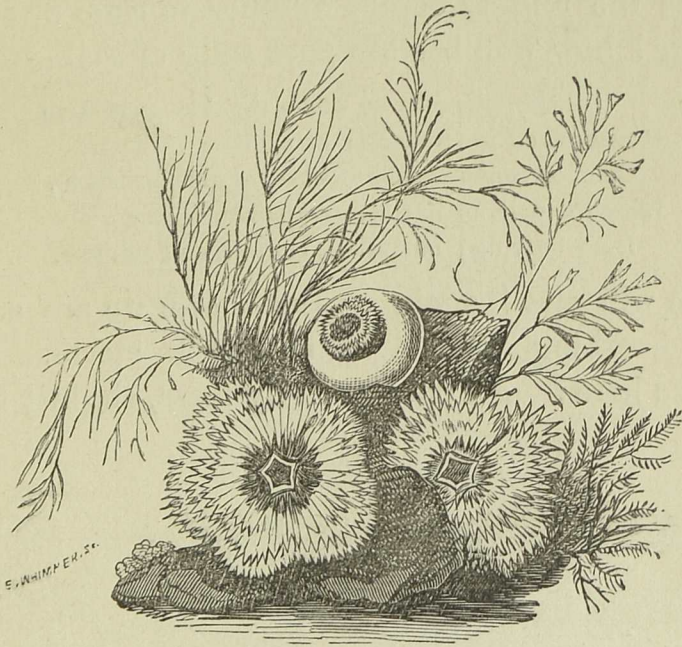
TEREBELLA CONCHILEGA.

scattered from above, the tentacula relaxing speedily extend to sweep the vessel clean, so that in the briefest interval, not a particle remains within their reach. The whole have been collected for employment in the construction of a new artificial dwelling for sheltering the naked body of the architect. Permanent exposure to the light, or to the air, is pernicious.

“The artifice, the selection of materials, and the expedition demonstrated by this creature are truly admirable; nor is it a small gratification to the curious, that all its qualities may be displayed before them. Should a tube be already constructed on the side of a glass vessel, wherein a specimen has had a permanent abode, the inhabitant is found lurking within in the earlier part of the day, only the extremities of the tentacula protrude beyond the orifice, and so they remain till towards noon. But scarcely has the sun passed the meridian, when the animal begins to be restless. Between four and five, the animal has risen upwards, the tentacula extending with the approach of evening, and after sunset, they are in the greatest activity. They are now let down from the orifice like so many slender cords, each seizes on one or more grains of sand, and drags up its burden to the top, there to be employed at the summit of the tube, according to whatever service is requisite. Should any of the lading slip its hold, the same organs search eagerly after it at the bottom, to be seized and raised up to the top anew. Such operations are protracted during several hours, though without any visible additions to the tube. Nevertheless, on resuming inspection next morning, a surprising prolongation will be discovered; or instead of an accession of the same description, the orifice is sometimes surrounded by forking threads of sandy particles agglutinated together.

“The architect has now retired to repose; but, as evening comes, its activity is renewed, and against

sunrise a further prolongation has augmented its dwelling. All these are nocturnal labours. Such, indeed, are the habits common to the tenants of the deep, whose faculties are most energetic, and their industry most active, while the upper world are buried in sleep." Sir J. G. Dalyell tells us further that this quick and clever little workman never resumes a possession of a tube it has once forsaken. When it wants a new house, it begins to build again from the very foundation.

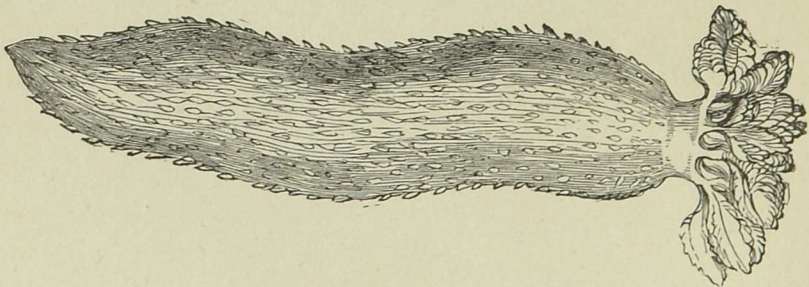


WALK VIII.

THE wind was very high last night, and the waves are still tossing themselves, and showing their white crests. What a magnificent sight is the mighty ocean, whether in calm or stormy weather ! how well has the poet sung of that—

Glorious mirror, where the Almighty form
Glasses itself in tempests ; in all time
Calm or convulsed—in breeze, or gale, or storm,
Icing the pole, or in the torrid clime,
Dark heaving ; boundless, endless, and sublime.

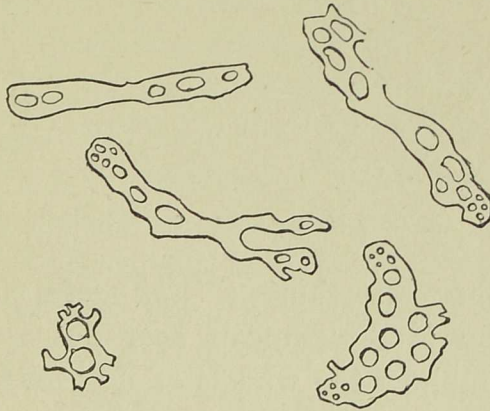
We will stroll again on the shore, we are sure to find something washed up after the storm. What have we here ? An oblong fleshy mass, slightly taper-



SEA CUCUMBER.

ing to each end, about three inches long ; but when the animal is in the water it can extend itself consider-

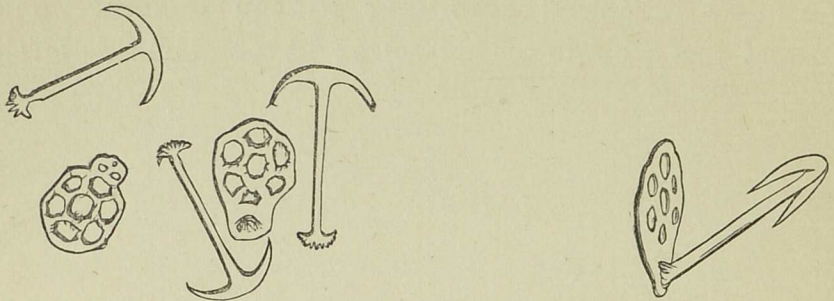
ably more. It is one of the sea cucumbers (*Holothuriadæ*); the form of the body when in a contracted state reminds one strongly of the vegetable of that name. They are also sometimes called "sea-puddings." Their bodies are furnished with numerous suckers, similar in form to those of the sea-urchins and starfishes, variously arranged according to the genera. The animal has a circle of tentacles; at present this circle



CALCAREOUS PLATES OF SEA CUCUMBER.

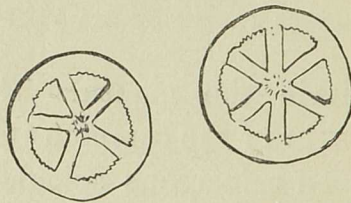
is concealed within the mouth. The skin is very tough; like the skin of the common starfish, it contains numerous scattered calcareous spicules. If I were to snip off a thin bit of the sea-cucumber's skin and dissolve it in potash, and then wash the sediment carefully in pure water, and examine it under the microscope, I should see that what, to the naked eye looks like fine dust, is made up of numberless spicules of remarkable elegance of form. A closely related member of the same family of *Holothuriadæ*, the *Synapta inhærens* of the Mediterranean seas—not found

I believe on our coasts—has imbedded in its skin minute spicules of a very striking and beautiful form. Each spicule consists of an oblong calcareous plate, regularly perforated by large holes; at one end there is a projection to which is attached another spicule, which bears a remarkable likeness to the anchor of a



ANCHOR AND PLATES OF SYNAPTA.

ship. Another Holothurian (*Chirodota violacea*), also found in the Mediterranean sea, possesses spicules exactly resembling the wheels of a carriage—all these



WHEEL-LIKE PLATES OF CHIRODOTA VIOLACEA.

are very beautiful objects; and I have mounted specimens at home which some day I will show you under the microscope. I have often spoken to you of certain animals which have the power of reproducing lost parts, perhaps the members of the sea-cucumber family possess this faculty in a more remarkable degree than

any other known animal. They can part with the entire insides of their bodies, and be none the worse for this rejection of the "inner man;" on the contrary, having got rid of such troublesome trifles as their old insides, they are quite ready to begin the world again with a new set! a physiological feat much to be coveted by all dyspeptic patients amongst mankind! The "trepang," of which you may have heard, and which is used extensively in China and other parts of the East as an article of food, is a member of this family; it is called the *Holothuria edulis*. Your Uncle Robert, when with his regiment in China, a few years ago, frequently ate of trepang soup, or sea-slug porridge, and considered the dish by no means a bad one.

"Oh, papa," exclaimed Willy, "what have I found now?—a lot of hard, twisted, shelly tubes attached to an old oyster-shell. Are they the houses of some kind of marine worm?" Yes; and a most beautiful and interesting worm, too. Let me see whether the animals are at home, and open to receive visitors; to be sure they are. I can tell by the stoppers closing the doors. Let us sit down on this large stone, and place the twisting tubes in this small pool left by the tide. By and by, I dare say some of the worms will pop out their heads. "There goes another cormorant," exclaimed May; "they seem to be common on this coast." They are; I forgot to tell you, by the by, when we talked about those birds on our walk the other day, that cormorants have been trained to catch fish in this country as well as in China. James I. introduced cormorant-fishing into this

country from China ; “ he built an extensive establishment for cormorants about the spot where the new Houses of Parliament have been erected ; and here he had ponds made, and stored with suitable fish, and filled with water from the Thames by means of sluices. A person of the name of John Wood seems to have been the first Master of the Royal Cormorants, which, like the Master of the Horse, and the Master of the Royal Buckhounds, was an office of importance.” The king was very jealous of all interlopers ; none were allowed to interfere with, or even to gaze upon his feathered favourites at “ the keeper’s most extremest peril.” The Secretary of State Conway, we are told, was obliged by the king to act as head cormorant-keeper himself. One of the king’s much-prized birds having been lost, and it being suspected that Sir Francis Wortley, Lord Conway’s cousin, had the bird in his possession, the Secretary of State writes a sharp letter to his cousin, to restore the bird at once. The bird had by some means come into Sir F. Wortley’s possession, and accordingly he restored it. Wood, the Master of the Royal Cormorants, received eighty-four pounds per annum, with half-a-crown daily fee for going to the Isle of Man, and other northern localities, in search of haggard and nestling cormorants.

Cormorant-fishing has been quite recently introduced into England by Captain Salvin, who has given an extremely interesting account of the daily management of the birds, the apparatus used with them, the proper dress for the fishermen, the tempers and

peculiarities of his tame birds, etc., etc., whose names were Hobble-gobble, Kas-wang, the Pick-pocket, the Detective, and the Artful Dodger. The following animated description of a day's cormorant fishing is from the pen of the same sportsman:—

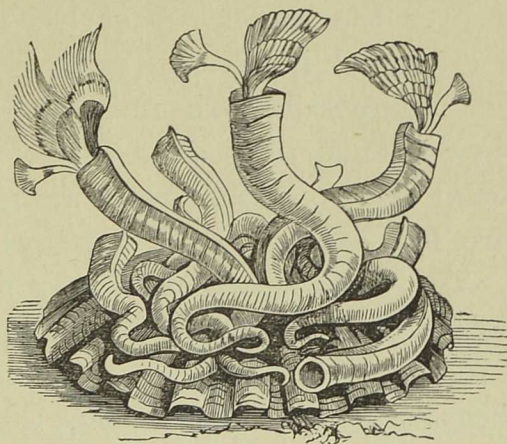
“I will suppose that the spring-cart is ready, and that you are in fishing costume. Catch the birds, strap them, and put each into its chamber upon a little straw, and putting them into your conveyance with some wet grass over the top in very hot weather to keep them cool, put also into the cart a fishing-creel, a lure on a string, a short whip that will crack well, and a sponge to keep all clean, and drive off to the stream you are to fish. Now, pull up at a likely bend in the brook, and turn out a couple of birds, reserving one to be put in a little later when the others require rest; stir up their tardy movements by a good crack of your whip, accompanied by a little hunting language as—‘Get away, haw!’ and now and then throwing a little light soil, as a handful of a mole-hill, at them. They are both on the surface, where they cannot catch fish; but now give another crack, and rate them again, when they will take headers, and the water being clear, you will see them hunting and prying about into all the likely places. Now there's a splendid course; two or three sharp doubles, and up comes ‘Kas-wang’ with a big chub, which, though it struggles fearfully, is eventually ‘pouched,’ all but the tail, which sticks out of the bird's mouth. The line is of no use in this case, for there is clearly no room for it, and as the cormorant,

finding his load very inconvenient and unpleasant, is not long before he lands with it; going up very quietly, you put your hand slowly above his head, just when he is trying to swallow, and taking him by the bill, you bring him upon the grass and then disgorge him. Whilst this is going on, a loud shout and roars of laughter proclaim that the 'Detective' has caught an eel, which is giving him much trouble, for the slippery thief is constantly getting away, and has to be recaptured; though no reward has been promised at least this bird—a famous one at eels—sees his opportunity and takes it. There is a nice open sloping bank; and tossing and playing as it were with the eel, he bolts up the bank with him to worry him on land. This old dodge of his is certain death; and the master, in his excitement, cries 'Whoo-up!' which makes all ring again. Eels often get away from cormorants, especially where the banks are steep, but where they slope none escape the 'Detective,' though they may try every means to get off, not forgetting to twist round his neck, with the hopes of garroting him. These birds are so fond of eels that where they abound they will take no other fish; and I have known this to be a great nuisance when your object has been to take trout. Eels, again, soon tire them, on account of the hard work it is to take them.

“It is a pretty sight to see cormorants throw a small fish into the air, which they often do, when they catch it by the tail or thereabouts, and then re-take it by the head as it descends; for all fish must go down head first, on account of their fins lying back from

head to tail, and consequently being uncomfortable when reversed.”*

Now let us look at *Serpula contortuplicata*, for that is the very long name of this pretty worm. There!



SERPULA CONTORTUPLICATA.

you see three or four heads out of the cases ; are they not lovely ? Look at their scarlet fins, beautiful as coral, and the trumpet-shaped stoppers of the same brilliant colour. The scarlet fins are the creature's branchiæ or gills ; they form two corresponding erect fan-shaped tufts ; there are two tentacles between the gills, the trumpet-shaped stopper being one of them, this is spread out into an *operculum*, or stopper, where-with the worm closes the mouth of the tube. I touch one of these protruded coral heads. There ! quick as thought, it has vanished ; and now the other heads have also retreated. They are timid, nervous, little creatures ; but Mr. Shirley Hibberd, an excellent

* "Land and Water Journal," July 29, 1867.

authority, tells us that "whatever may be said about taming creatures which seem so destitute of intelligence as sea-worms, the serpulæ certainly change their habits somewhat in confinement, and instead of withdrawing on the slightest alarm, even of a footfall, or the passing of a shadow over the vessel, get at last quite bold, and remain expanded in spite of small disturbances. At first it is quite impossible to examine them minutely, owing to their timidity, but after a while, they will give the student every opportunity for applying a lens, and there are few subjects more worthy of a close scrutiny."* The serpulæ will certainly occasionally throw off their stoppers, and continue to live for some time afterwards, as I have witnessed myself; whether the animal has the power of reproducing them, is not, I believe, known. Ha! what is this funny fellow scuttling away as fast as his legs can carry him, as if conscious he is a rogue and does not want to be "taken up." "Look at him, papa," said Jack, "I cannot make out this creature at all; he looks to be partly a crab and partly a mollusc." It is the Hermit or Soldier crab, that has taken possession of a whelk's shell; no wonder the rogue ran away from us, Jacko! How sly he looks too! Do you think he has only taken possession of a house, "apartments to let," a tenant being wanted; or has he murderously destroyed the real owner of the shell, in order to take possession? I am inclined to think Mr. Hermit Crab is not, as a rule, guilty of murder, but that being in want of a house, and having fortunately found one empty, he did not care to consider the justice of the old proverb,

* "Marine Aquarium," p. 115.

“an empty house is better than a bad tenant,” and conceived he was in no way guilty of burglary in taking possession thereof. “But why?” asked Willy, “does the Soldier crab want the house of another animal in which to live. Crabs generally do not require houses.” Quite true, but the hinder parts of the Hermit crabs are quite soft and need protection; and it is most amusing to see the Hermits when deprived of their homes, seeking for fresh ones—first trying one and then another, to see whether or not it is comfortable, and readily portable. They have received the name of Soldiers from their pugnacious dispositions. I have often witnessed combats between them, and sometimes seen one fellow forcibly drag his enemy out of his house, and quietly ensconce himself therein. Mr. J. A. Salter says, “I have many times found Hermit crabs out of their shells in the mingled mass of a dredge haul, and on three occasions have watched the method in which the houseless creature domiciliates himself. These were the only occasions on which I endeavoured to observe the operation; they always seem willing enough to exhibit their housing performance. My plan of observation was simply this—I put a naked crab into a large glass jar of sea water, with one shell, the latter of size about proportioned to the former; and then I contemplate. In each case the crab proceeded in the same way.

Appearing to *see* the shell in the distance, the animal crawled up to it for the purpose of seeing if the house were to let; and this circumstance he discovered not by sight but by *touch*. Upon reaching the shell

he hooked two of his legs into its open mouth, and thrusting them as far down into its cavity as possible, commenced scrambling round the edge; he was evidently probing to discover if there was already an inhabitant. In each case the crab pursued this probing operation in the same direction, commencing on the projecting side of the shell, and ending on the receding side. Having performed this process once round, he instantly, in the twinkling of an eye, erected straight his tail, and whisked himself *over the smooth lip of the shell* into its tube with a rapid adroitness that was perfectly marvellous. And then in his new contrasted position he looked so funny—such *at home-ishness* there was in it; he was so different from the poor houseless vagabond with a drivelling tail, that one had seen miserably crawling about a moment before; he looked right up in your face and said, as plainly as looks can speak, ‘How d’ye do? here I am, quite at home already.’ I never saw it without laughing.”

There are several British species of these Soldier crabs, all of which inhabit the shells of molluscs. The belly part is always soft and provided with a pair of unsymmetrical appendages, by means of which the crab drags about his home. But it is time to return to our home.



SHELDRAKE AND YOUNG.

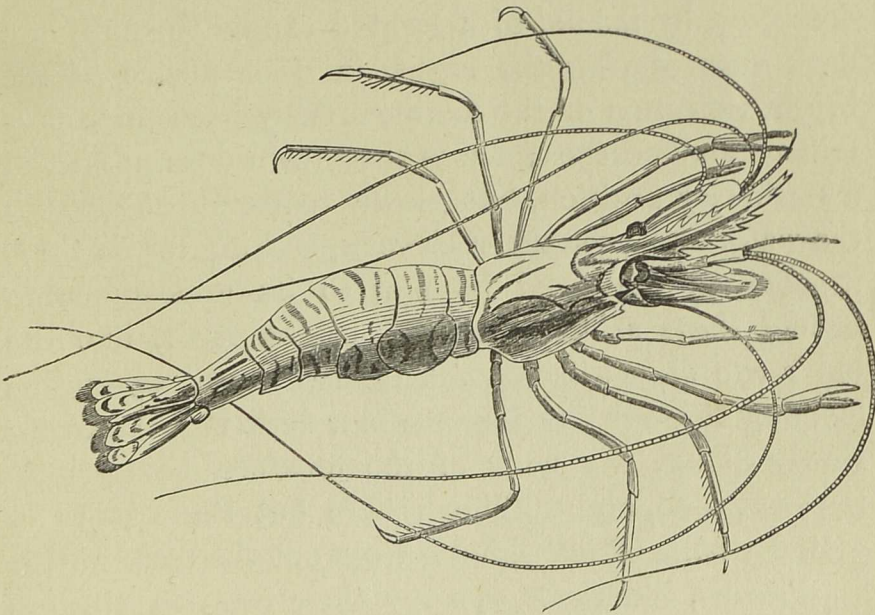
WALK IX.

TO-DAY we will take the train as far as Colwyn, and revisit the rocky shore near the Weir Fishery. The tide will suit us capitally, and there is a nice breeze from the sea; so we shall not feel the heat. "What is that large house about half a mile above Colwyn Station, prettily situated in the midst of trees?" Willy asked. It is Pwlycrochan Hotel, and a most charming spot it is; there is a beautiful view of the sea from it, as you may suppose. It was formerly the residence of Lady Erskine. I should like to hunt those woods, Willy, in the autumn for funguses. I suspect we should find some we have never seen before. We must try and get a holiday in the autumn some time or other. I dare say we could get leave from Mrs. Lloyd Wynne, of Coed Coch, to ramble about the woods there, which I believe abound in various kinds of funguses. Well; we are soon out of the train, and on the shore. May soon calls my attention to some birds which she saw on the shore some way off. With the aid of my field-glass, I discovered that they were shelldrakes. Very beautiful birds they are, with their red bills, bodies white and

chestnut, head and neck bright glossy green, and pink feet and toes. When as a boy I lived near Parkgate, I used to get some of the young ones which were caught on the sands, and very pretty little things young shelldrakes are. I believe these ducks lay their eggs in deserted rabbit burrows, or in holes in the sand. In some places they are called Burrow Ducks. Whilst the duck is sitting, the drake watches near; and when his mate wants to leave the nest for food he takes his turn upon the eggs. It is said that where the nest is some way from the water, the young are sometimes carried thither in their parents' bills. Their food consists almost entirely of shell-fish, especially cockles, which, Mr. St. John informs us, this bird extracts from the sand by paddling or stamping with both its feet. This brings the cockle quickly to the surface. He also mentions that tame birds often do the same in the poultry-yard if impatient for their food, which when in confinement should be grain, soaked bread, etc. Though the shelldrake is so beautiful a bird, its flesh is coarse and unpleasant, both in flavour and smell. They are very ornamental as water-fowl in gentlemen's parks, but are said to be somewhat quarrelsome with other birds.

"Oh! papa, I do think I have caught a prawn in my net," cried Jack. So it is, though a small one. Where did you find him? "I found him in this little rock pool," said Jack; "perhaps there may be some more there." To be sure; there goes one flitting like a shadow, so transparent is the fairy form of an active living prawn. "I thought," said May, "that

prawns were red; these creatures are almost colourless." They turn red when boiled, but in a living state they are as you see them here. It is not easy to study their habits in their native haunts, for they soon seek the shelter of the sea-weeds and cracks in the rocks; but I have occasionally kept them in an aquarium, and most interesting it is to see their move-



COMMON PRAWN.

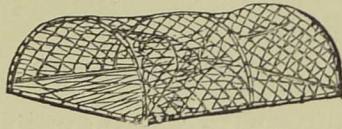
ments. "When in full swimming action," says Professor Rymer Jones, "the appearance of these beautifully transparent crustaceans is most elegant. The front feet are generally laid backward and tucked under the body, like the fore legs of the deer tribe in the act of leaping. The long and delicate antennæ stream gracefully on each side of its body, and float

for some distance beyond its entire length; while its strong abdominal paddles propel it rapidly through the water."

A prawn possesses a pair of forceps in the feet, which it uses as hands in a very clever and amusing way; the food is seized by these organs, and conveyed to the mouth. Professor R. Jones also remarks that it is a striking and curious thing to observe these creatures, by the aid of a lighted candle or lamp, in a dark room during the night, in consequence of the bright reflection of the luminous body from their prominent stalked eyes; for as the prawn does not retain a stationary position, but slowly roams about through the water and over the rockwork, seeking for its food, it adds an increased interest to its appearance to behold these small globes of bright light, like the bull's-eye signal-lamps of a miniature railway-engine looming through the distance in a dark night, moving slowly along, the body of the creature being quite imperceptible, and nothing visible but these pairs of globular balls of fire shining from out the dark water.

Prawns, like shrimps, carry their eggs in clusters under their fins. The young undergo metamorphosis; and as they grow, throw off their external covering periodically. The prominent horn or *rostrum*, as it is called, is, you see, very sharp and armed with seven or eight pointed teeth, hence the Latin name of *serratus*, from *serra*, "a saw." "How are prawns caught, papa?" asked May. Prawns are caught in great numbers with the shrimp net, and also in wicker-work pots. I believe prawns are not common except on the south coast

unlike shrimps which prefer a sandy shore, prawns prefer a rocky coast. I remember when at Lulworth,



PRAWN-TRAP.

many years ago, eating some of the largest, most juicy and delicious prawns I had ever seen. As much as eighteen shillings a hundred has been paid in London for these crustacea.

“Here is a bit of old wood with several round holes bored through it, what do you think, papa” said Jack, “has made these holes?” The holes you see are nearly half an inch in diameter, and, as a rule, always in the direction of the grain; so I have no doubt they have been made by one of the most destructive creatures in existence, namely “the ship-worm.” It is wrongly, however, called a worm for it is a mollusc. Its Latin name is *Teredo navalis*. The animal is elongated and worm-like; the shell thick, short and globular. The animal is generally about a foot long, but sometimes grows to a much larger size. It bores into ships, piles, and piers. In 1732, “the Dutch were greatly alarmed by an apprehension of being overwhelmed by an inundation occasioned by worms, which were said to have consumed the piles of timber-work that supported their dykes. They prayed and fasted with uncommon zeal in terror of this calamity, which they did not know how to avert in any other manner. At length they were

delivered from their fears by a hard frost, which effectually destroyed their dangerous enemies." Copper sheathing is a protection against the ravages of these creatures. It is very curious to observe that though these "ship-worms" often work in companies, they never interfere with each other nor cross each other's path. Occasionally, when a hard knot occurs in the wood, the animal bores across the grain to avoid it, but its usual course is with the grain. By what means the creatures makes these holes has, I believe, never yet been determined. "What are all these sharp shell-like things completely covering large portions of this large stone?" said May. They are Cirripedes, or Sea-acorn shells. The tide being out at present, the valves of the shell, which in this genus (*Balanus*) are six in number, are closed; when the returning tide covers the stone, thousands of these little animals will open their valves and thrust out their delicate hands in search of food, which are thus brought to their mouths. Here is a small lot of acorn barnacles on this stone, not larger than my fist. I will place the stone in this hole in the rock which is full of water, and I dare say the little creatures will soon open their valves. You notice at first a narrow slit which soon widens to an oval, and now you observe a feathery hand, consisting of delicate curled threads, is shot quickly forth, opening out and uncurling to the form of a fan; then, quick as thought, the tips of the threads curl up once more, and the whole net is quickly withdrawn and disappears beneath the closing valves; soon, however, they open again and the process is

continually repeated. As the acorn barnacle is fixed at the basal end to the stone, he is unable to make excursions in search of food; so he is content to remain at home and to throw his casting net from his castle door for any microscopic creatures that the water may bring near him. In their young state, however, the barnacles move freely about. In this stage the young barnacles are very unlike their parents, reminding one of some of the water-fleas, (*Cyclops*) of our ditches and ponds. Very wonderful are the metamorphoses through which many animals pass, and those of the acorn barnacles are perhaps amongst the most striking.

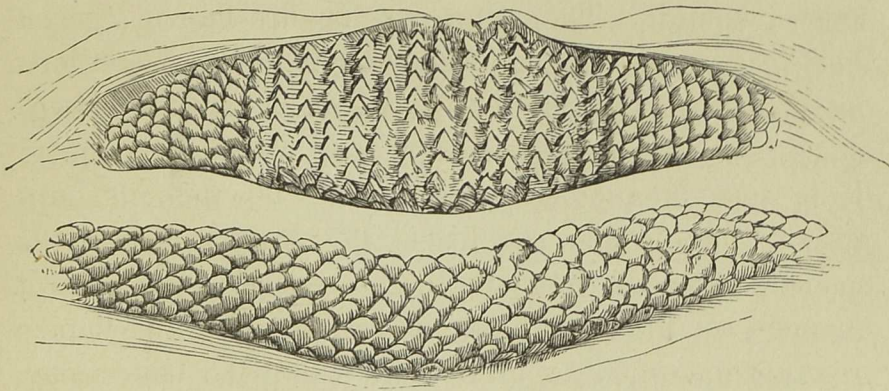
Some foreign species of barnacles, as the *Balanus psittaceus*, of the coast of Chili, grow to the size of five or six inches. Under the name of *pico*, the inhabitants eat this species, which is said to be as rich and delicate as the flesh of the crab. "But, papa," said Willy, "are those the barnacles that were once supposed to turn into geese, as I have somewhere read in some of your books!" No, the species you mean is the *Lepas anatifera*; the latter Latin word signifying "goose-bearing." The animals belonging to this genus have a long, flexible, hollow muscular peduncle, or foot-stalk, by which they attach themselves to submarine bodies, posts of wood, ships'-bottoms, etc. "Oh, papa," said Jack, "do you really mean to say people were so foolish as to believe that shell-fish could ever turn into geese? what simpletons they must have been!" Some people, my boy, who never care to think and examine for themselves, will believe anything. It

is a fact, however, that even men of eminence have believed in the idea that barnacles produced geese. This is what old Gerrarde, writing in the sixteenth century, says:—

“ But what our eyes have seen, and our hands have touched, we shall declare. There is a small island in Lancashire, called the ‘ Pile of Foulder’s,’ wherein are found the broken pieces of old and bruised ships, some whereof have been cast thither by shipwracke, and also the trunks and bodies, with the branches, of old and rotten trees cast up there likewise, whereon is found a certain spume or froth that, in time, breedeth into certain shels, in shape, like those of the muskle, but sharper pointed, and of a whitish colour, wherein is contained a thing in form like a piece of silke finely woven as it were together, of a whitish colour, one end whereof is fastened unto the inside of the shell, even as the fish of oisters and muskles are ; the other end is made fast unto the belly of a rude masse or lump, which in time commeth to the shape and form of a bird. When it is perfectly formed, the shell gapeth open, and the first thing that appeareth is the foresaid lace or string ; next cometh the legs of the bird hanging out, and as it groweth greater, it openeth the shell by degrees, till at length it is all come forth, and hangeth onely by the bill ; in short space after it commeth to full maturitie, and falleth into the sea, where it gathereth feathers, and groweth to a fowle bigger than a mallard and lesser than a goose, having blacke legs, and bill or beake, and feathers blacke and white, spotted in such a manner

as our magpie, called in some places a *Pie-annet*, which the people of Lancashire call by no other name than a tree-goose, which place aforesaid, and all those parts adjoining, do so much abound therewith, that one of the best is bought for three pence. For the truth hereof, if any doubt, may it please them to repair unto me, and I shall satisfie them by the testimonie of good witnesses."

"Oh, papa," exclaimed Jack, "here is part of a dead fish lying on the shore; it must have been a

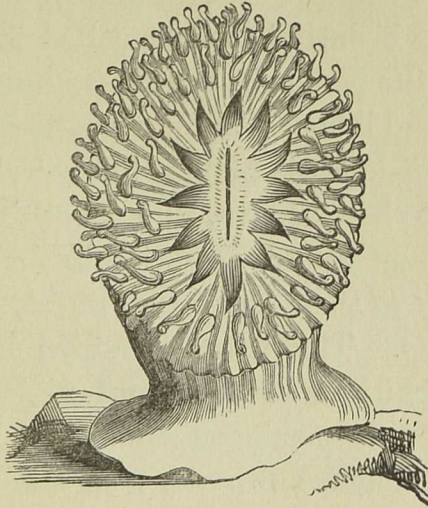


JAWS OF THORNBACK RAY.

queer creature with its long tail." It is one of the skate fishes evidently, belonging to the *Raiidæ*, or Ray family. See, here are its teeth. "Are those blunt knobs its teeth?" asked Willy. "I thought that the skate-fishes, like sharks, to which you once told me they were related, had sharp teeth like them. The teeth of I believe nearly all the skates are flat and pavement like, as you see in this specimen I hold in my hand. The young are inclosed in a horny case,

square in shape, with four projecting horns, exactly resembling a butcher's tray, so commonly seen in large towns. They are like the shark's egg we picked up the other day; but the four projections are short and without tendrils. These fish, like the sharks, have five gill-openings, but they are placed on the under side. The teeth are evidently well fitted to crush the crustacea and molluscs on which they principally feed. There are a great many species of skates, and some are used as food. The tails of several are armed with sharp spines, capable of inflicting a severe wound. The sting-ray, or fire-flaire (*Trygon pastinaca*), not unfrequently taken on the southern coast, has a most formidable weapon on its tail—a long, sharp, saw-like spine, which it uses with great effect; it is not venomous, however, as the ancients supposed. Mr. Couch says that the skate is never the special object of the fisherman's search; and when it chances to take the hook, it may give him perhaps a greater amount of trouble than the prize can repay. As if sensible of danger, it will lie as still as if the line had got entangled with a rock, in which case the only resource is patience; for an attempt to raise it from the ground will only have the effect of causing it to remain more still. If, however, the head be raised, the body will follow, and the fish ascends like a kite into the air; the effort of the fisherman being directed to gather in his line in such a manner that the fish shall not be able again to turn its head downwards, which, if it did, no strength he could employ would interrupt its descent. Willoughby tells us of

one of these fish, weighing two hundred pounds, being served on the table at St. John's College, Cambridge, and one hundred and twenty dons partaking thereof. I think skate and cockle sauce very good food myself, but many people will not touch it. The Liverpool markets are well supplied with skate, which is sold at a cheap rate to the poor. We must return to Colwyn for the train.



WALK X.



WHILST strolling in Pensarn this morning, we saw flitting about in a shop window one of those beautiful insects, called Humming-bird hawk-moths; the people in the shop kindly allowed me to capture it, and it is now in May's collection of insects. The name hawk-moth is applied to several other moths, as the Privet hawk-moth, the Death's-head hawk-moth, etc. They are all remarkable for the strength and peculiarity of their hawk-like flight, and often for their large size. The Humming-bird hawk-moth is at once distinguished by its rapid flight, every now and then gracefully poising itself on its wings, which vibrate with immense rapidity; so similar in this respect are the gestures of birds and insects, that the moth has often been mistaken for a humming-bird. It may be seen occasionally in gardens, poising itself before the petals of some flower into which it inserts its long tongue for the nectar contained therein. It appeared in great numbers in several counties in England, Ireland and Scotland, in the year 1865. The caterpillar of this moth is green, yellow and white, arranged in stripes; it feeds on the bed straw and other *galiums*. The tail of the moth is spread out

into tufts, which give it a bird-like form. It is a most attractive insect, and I dare say you will some time have an opportunity of seeing it in the garden at Preston.

We will now be off again to the shore. "Oh, papa, what are these little hopping creatures that occur in great numbers under bits of dried sea-weed? Hah! hah! how funnily they jump." They are sand-hoppers, (*Talitrus locusta*) Jacko, and very clever jumpers they are; they do not, however, use their legs to raise them aloft, but their tails; this organ is very short and folded beneath the body; it is, however, worked by very strong muscles, and when struck forcibly out, enables the creature to spring to a considerable distance. The French call it "Puce de mer." The Latin name *Talitrus* or *Talitrum*, means a "fillip," and appropriately describes the jumping properties of this little crustacean. It is to this species, doubtless, that Archdeacon Paley alludes, under the name of *shrimps*. "Walking by the sea-side, in a calm evening, upon a sandy shore, and with an ebbing tide, I have frequently remarked the appearance of a dark cloud, or rather very thick mist, hanging over the edge of the water, to the height, perhaps, of half a yard, and of the breadth of two or three yards, stretching along the coast as far as the eye could reach, and always returning with the water. When the cloud came to be examined, it proved to be nothing than so much space filled with young *shrimps* in the act of bounding into the air from the shallow margin of the water, upon the wet sand. If any motion of a mute

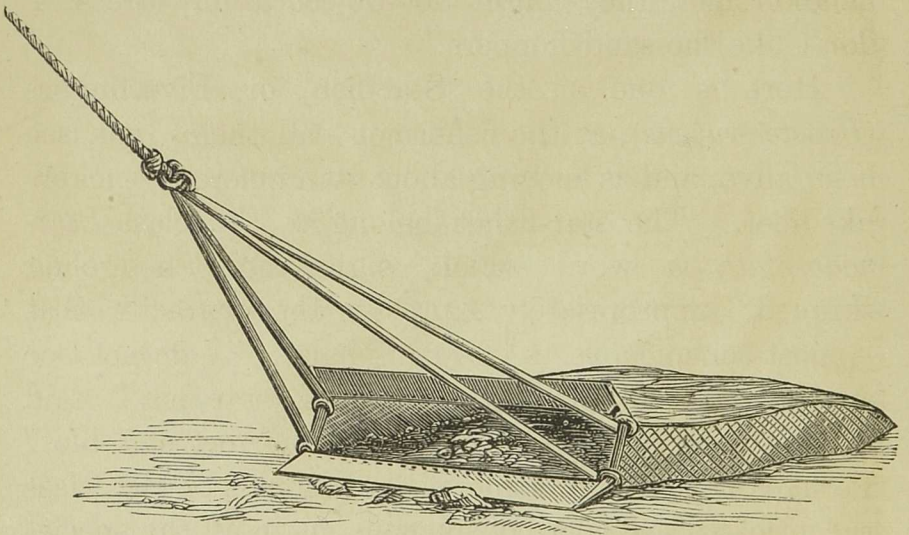
animal could express delight, it was this; if they had meant to make signs of their happiness, they could not have done it more intelligibly. Suppose, then, what I have no doubt of, each individual of this number to be in a state of positive enjoyment, what a sum, collectively, of a gratification and pleasure we have here before our view." Catch one of the little fellows, Willy, and close your hand upon it; do you notice how he tries to get out between your fingers, and feel what strength he has? "The sand-hoppers are never found in the water, but dwell beneath the decaying sea-weed or other stray substances which preclude the evaporation of moisture from the scorched sandy-beach." Mr. Gosse tells us that he has found them at the depth of several inches in half-rotten beds of algæ, where the fermentation has induced a heat so great that he could scarcely bear his hand. "What do they eat, papa?" said Jack. They are not at all particular nor dainty in this respect, Jacko; almost any dead or decaying animal is readily attacked by them. Professor Westwood and Mr. Spence Bate say they have seen them enjoy their repast upon a common earth-worm; and that drowned puppies and other mammals afford a luxury to thousands, and when they can get nothing else they are content to feed upon each other. "Upon the sands of Whitsand Bay," the same writers continue, "our friend, Mr. Swain, informs us that one day at a pic-nic party, he saw not millions, but cart-loads of this species lying piled together along the margin of the sea. They hopped and leaped about, devouring each other as if

from very wantonness. A handkerchief, which a lady let fall amongst them, was soon reduced to a piece of open work by the jaws of these creatures." They form agreeable food to the ring-plover, and other shore birds; there are also two species of beetles that have been observed to prey upon them. "Come away, papa," said May, "or perhaps the nasty things will want to prey upon us; if they would eat a lady's handkerchief, they might not object to my dress. I don't like the sand-hoppers."

Here is one of the Star-fish, or Five-fingers (*Uraster rubens*), as the fishermen call them; you see it is alive, and is moving about its numerous sucker-like feet. The star-fishes belong to the class *Echinodermata*, a word which, signifying "hedgehog skinned," appropriately expresses the character that is most conspicuous in these animals. "I do not see any long sharp prickles upon this star-fish," said Willy, "and do not think the name is very suitable." Perhaps not; but in some of the animals of this class the prickles are very conspicuous, as in all the species of the sea-urchin order. Now, it can be shown that there is a manifest relationship between star-fish, sea-urchins, and sea-cucumbers, and by what beautiful and instructive gradations the orders pass one into the other, will, I hope, some day afford you most interesting and instructive matter for contemplation. See how the creature moves its suckers, like so many tiny worms. These, in the star-fishes, sea-urchins, and sea-cucumbers, are the organs of motion. It is a most interesting sight to see a star-fish or sea-urchin

walk up a glass vessel. We see a number of these worm-like suckers appear, waving to and fro; these, coming in contact with the glass vessel, adhere to it, and drag the creature along by muscular action.

There are several kinds of star-fish, found on the British Coasts. There is the Sun-star, the Bird's-foot, the Eyed-cribella, the highly-interesting Feather-star, the Brittle-star, the Sand-star, all of which I



DREDGE IN ACTION.

have, from time to time, met with when I have been out dredging. "But tell us," said Jacko, "something more about the common Five-fingers, which we can examine ourselves, and find whenever we go to look for them. I wish, however, you would take us out in a boat some day; it would be such fun to dredge up a number of curious animals from the sea-bottom." Well, we may have an opportunity some day; and when you get older you will, I hope, have more know-



CRUSTACEA, STARFISH, ETC.

- 1. Sea-mouse.
- 2. *Squilla contortuplicata*.
- 3. *Squilla*.
- 4. *Stomatopoda*.
- 5. Prawn.
- 6. *Trochus Ziziphinus*.
- 7. Bottle Star.
- 9. *Cribrella*.
- 10. *Galathea*.
- 11. Dog Wheel.

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A. Lyden. Del.

ledge of natural history, and be better able to understand what you examine. The common Five-fingers is a great enemy to oysters, and fishermen have a deeply-rooted aversion to them and all their relatives. Not only when fishing with the line does the star-fish annoy them by taking the bait time after time, but they will come in mighty shoals upon oyster-beds, and devour the dainty meat. "How," said Willy, "can a star-fish open the shells of an oyster? I have seen you take a long time sometimes, even with the help of an oyster-knife." The ancients supposed that the star-fish watched when the oyster opened its shell; it then stuck one of his fingers in, and caused the oyster to open wide his folding-doors.

The prickly *star* creeps on with like deceit,
To force the oyster from his close retreat.
When gaping lids their widen'd void display,
The watching *star* thrusts in a pointed ray,
Of all its treasure spoils the rifled case,
And empty shells the sandy hillocks grace.

"Dear me, how funny!" "But, papa," said May, "why did not the oyster close his valves, and squeeze Mr. Star-fish's finger for him? Oysters do sometimes close their shells on creatures, and catch them—do they not?" Yes; Mr. Frank Buckland gives us the story of a rail being caught in this way by an oyster. "Some time ago," he says, "when examining the famous oyster-beds at Helston, near Falmouth, Mr. Hill mentioned to me that he had a curious specimen of a bird that had been caught by an oyster. The bird and oyster had been mounted in a case by Mr. Vingor, of

Penzance. I have received from Mr. Hill a photograph of the above event, which I have since had engraved. The history is that a woman who sells oysters went one morning to the Helford river, and found the bird—a common rail—quite dead, with its beak held firmly by the oyster, which was still alive. The bird, in all probability, was wandering along the foreshore looking for his dinner, and Mr. Oyster—possibly left longer by the tide than usual—was opening his shells, waiting the incoming water. The hungry rail, seeing something that looked like a white and dainty bit of food, pecked at the body of the oyster, and probably pricked him sharply with his beak. The oyster then snapped his shells together as quick as a rat-trap, and the poor bird instantly became a prisoner, to die (or possibly get drowned as the tide rose) in his prison.”*

“But how,” asked Willy again, “can a star-fish destroy an oyster?” It has long been a question amongst naturalists how so comparatively powerless a creature as a star-fish can destroy an oyster, which he certainly cannot swallow. Small crustacea and worms, the star-fish can have no difficulty in devouring whole; but how does he get at the dainty morsel so firmly locked in the ostrean larder? I only know what is said on this subject, I have no personal knowledge of it. Its mode of proceeding is said to be as follows:—“Grasping its shell-clad prey between its rays, and firmly fixing it by means of its prehensile suckers, it proceeds deliberately to turn its stomach

* “Land and Water” for April, 1870.

inside out, embracing in its ample folds the helpless bivalve, and perhaps at the same time instilling some torpifying fluid, for the shells of the poor victim seized soon open, and it then becomes an easy prey." Whatever may be the true explanation of the mode, there is no doubt of the fact that oysters are destroyed by these destructive Five-fingers.

Many kinds of star-fish throw off their limbs, and it is not uncommon to meet with a "four fingers" or a "three fingers:" in one species known as *Luidia fragilis*, it is almost impossible to obtain perfect specimens, on account of their suicidal habits. The late Professor Edward Forbes, had often failed to procure a good specimen, so one day he took with him in his boat a bucket of fresh water, in order to kill instantaneously any specimens the dredge might bring up. "As I expected," he says, "a *Luidia* came, a gorgeous specimen. As it does not generally break up before it is raised above the surface of the sea, cautiously and anxiously I sunk my bucket to a level with the dredge's mouth, and proceeded in the most gentle manner to introduce *Luidia* to the purer element. Whether the cold element was too much for him, or the sight of the bucket too terrific, I know not, but in a moment he proceeded to dissolve his corporation, and at every mesh of the dredge his fragments were seen escaping. In despair, I grasped the largest, and brought up the extremity of an arm with its terminating eye, the spinous eyelid of which opened and closed with something exceedingly like a wink of derision."

“Is there not a bird called an oyster-catcher,” Jack asked. “I wonder if it tries to get at the inside of those shell-fish, and whether it ever shares the same fate as the rail.” The oyster-catcher, or sea-pie as it is better called, is a pretty common bird all over our coasts; it is black and white, can run, swim, and dive well, and has a beak about three inches long, of a bright deep orange at its base, lighter in colour towards the tip. The bird is sometimes exposed for sale in the Liverpool market. Mr. Gould thinks that the oyster-catcher has been falsely accused of destroying the much-esteemed oyster, though he may detach limpets from the rock, and no doubt destroys other small molluscs, worms and other marine creatures. Mr. Yarrell says that young birds are frequently kept tame, and will associate with domestic poultry. Mr. Wiseman has seen a carrion crow come at low tide, pick up an oyster, and flying up in the air, let it fall against the ground, and then descending, get the meat out of the shell as best he could.


“What are young oysters like, papa,” said Willy, “and what makes them so scarce and dear, as they have been for some years past?” The young oysters when they leave their mother’s mantle are very unlike their parents; they are provided with a swimming apparatus, formed by a kind of ciliated pad, the numerous hairs of which, by their constant motion, row the little creatures about in search for food and a resting place. How long this locomotive life lasts I do not know; but the young ones in time settle down on old shells and other submerged bodies as

“spat,” taking the form of the adult shell, and growing for about four years, when they first become ready for the market. I cannot answer your question as to the scarcity of oysters; it seems an essential condition that the spawning time should be favoured with calm and warm weather, and this rarely occurs at the critical time. Perhaps, in a few years’ time, experiments may be tried in the large new aquarium at Brighton, and the present perplexing problem be solved.

“What is that pretty shell-fish crawling over this large stone?” asked May. It is one of the top shells (*Trochus ziziphinus*) and a large and very handsome species. It has a sharp rasping tongue, which under the microscope is a beautiful object. The different kinds of “tops” are useful in an aquarium; for by means of their rasping tongues they mow off the green confervoid growth that under the influence of light soon obscures the glass. The tide is coming rapidly in now, so we will go to our lodgings.

All hail to the rivers, the rocks, and the shores!
Thou wide-rolling ocean, all hail!
Now brilliant with sunbeams and dimpled with oars,
Now dark with the fresh-blowing gale,
While, soft o’er thy bosom the cloud-shadows sail,
And the silver-winged sea fowl on high,
Like meteors bespangle the sky,
Or dive in the gulf, or triumphantly ride,
Like foam on the surges, the swans of the tide.

WALK XI.

HAT a storm there is this morning! the wind is blowing almost a hurricane; the mighty waves, curling in sheets of foam, tossing themselves on high, and fighting furiously with each other, roll heavily upon the shore. The sea-gulls are wheeling to and fro, and uttering their wild shrieks, no doubt wondering what the wild waves are saying. See how the water dashes with tremendous fury against that jetting rocky prominence in the distance.

And it bubbles and seethes, and it hisses and roars,
 As when fire is with water commix'd and contending;
 And the spray of its wrath to the welkin up-soars,
 And flood upon flood hurries on, never ending;
 And, as with the swell of the far thunder boom,
 Rushes roaringly forth from the heart of the gloom.

The most magnificent storm I ever witnessed was when your mother and I were staying at Herm, one of the Channel Islands, many years ago; it was the time of the equinoctial gales, and lasted for some days, with more or less intermission. Let us go on the beach; the strong blustering wind will give us an appetite.

Blow winds, and crack your checks,

you cannot hurt us, and I dare say you will bring some zoological treasures to the shore! Ha! what do I see rolling over and over in the water in the distance, showing their dark bodies in the white foaming waves for a second or two, and then disappearing? "I know," said Willy; "they are porpoises. There! one jumped quite out of the water. Porpoises are not fish, are they, papa, any more than whales are? They do not breathe by means of gills in the water, but come to the surface, and there take in a supply of atmospheric air." Quite right; though of a fish-like form, porpoises, as well as whales, are not fish at all, but mammals; that is, as you know, animals that suckle their young. Porpoises have warm blood; fish are cold-blooded animals. A few years ago there was a live porpoise in the Zoological Gardens, Regent's Park, London, and a very interesting sight it was to see it swim round its tank; every now and then, exposing its nostril, or "blow hole," which is right at the top of the head, to the air, then descending into the water; as the head sunk the dorsal fin appeared and then disappeared, leaving the impression that the porpoise really rolled over. You remember the porpoise Mr. Bowring, of Wellington, gave me about two years ago; what a thick coat of fat or blubber it had. "This wrapper or blanket, as it has been appropriately called, being a bad conductor of caloric, will at once resist the surrounding cold, and retain the animal heat." It serves also to buoy the animal up, as it is specifically lighter than the water in which the animal swims. I buried this

porpoise in the garden, after having cut off all the flesh I could. We will dig him up some day, and set up his skeleton.

“Oh, papa,” said May, “what is this odd-looking tough leathery bag attached by one end to this scallop shell?” It is one of the Ascidians, or tunicated molluscs; see, I press it, and the water spurts out from the two holes at the top. As they are covered by a leathery skin, they have been called *Ascidians*, from *askos*, a Greek word, meaning a “skin,” or “wine-bag.” I have often dredged them up in great abundance; their structure and history are full of the deepest interest. They are usually attached to rocks, shells, or sea-weeds; others, however, float in the sea. There is great variety amongst them, and some are extremely beautiful in colour. They feed on *desmidiæ*, *diatomaceæ* and the spores of other algæ, which are brought to the mouth, which, oddly enough, is not situated at the top, but at the bottom of a bag enclosed in the interior of the creature, by means of an infinite number of vibratile cilia that clothe the respiratory chamber: these bring currents containing minute particles to the creature’s mouth. The two holes at the top will remind you of the siphons of some of the molluscs, whose functions I described in one of our walks. The water enters at the one hole, which we may call the “inhalent orifice,” and is expelled at the other, the “efferent orifice.” I shall never forget my delight at finding in Guernsey, some years ago, several groups of the crystalline *Clavelina lepadiformis*. From the exceeding transparency

of the tunic, it was easy to make out the whole of the pretty little animal's anatomy. "What are the young Ascidians like?" asked Jack. "Do these creatures undergo a metamorphosis?" Yes; when the young is first hatched it bears a strong resemblance to a tadpole; the body is oval, furnished with black eyespecks, short tentacles, and a long tail, by means of which it swims. In time the tail is absorbed, and the larva assumes the form of the parent.

"Oh! what an extraordinary thing I have found," said Jack; "it is entangled in a mass of sea-weed, and looks like sea-grapes. What a funny idea! Fancy grapes growing in the sea." What you have found are the eggs of a cuttle-fish (*Sepia*), and as you say they are very like grapes, only more pointed at the top; the stalk ends are attached or coiled round part of the stem of *Laminaria*. You see these eggs are soft to the touch, but have a tough skin somewhat resembling indian-rubber. When the young cuttle-fish is ready, the egg case is rent asunder, and Master Cuttle enters on his career. The adult cuttle is about a foot in length, oblong in form, and of a dirty white colour, but spotted all over with a number of coloured marks which dilate and contract, and are perpetually changing their form and position; these changes being produced with great rapidity. I have witnessed this curious phenomenon on three or four occasions; even after death the spots continue to play. Around the cuttle's mouth there are arranged eight short thick arms, each one furnished with a double row of suckers; besides these there are two more arms, much longer

than the rest, and dependent; they are slender except at their ends, which are dilated and which alone are furnished with suckers. Along the whole of the creature's body runs a side fin, or flattened membrane; it is supposed that by these fins the creatures can throw themselves out of the water, and shoot along in the air for some distance; whence they are termed Flying Squid. "During a calm," says Mr. F. D. Bennet, "in lat. 30° N., the flying squid appeared in larger flights than we had ever before witnessed, persecuted probably by the albacore (which select the tranquil time to descend deep in the water, and to rove far from the ship in quest of food), they rise from the sea in large flocks, leaping over its smooth surface, much in the same manner and to the same height and distance as the flying fish. Many of them were captured by birds during their leaps, and one individual in making a desperate effort to escape some aquatic pursuer, sprang to a considerable height above the bulwarks of the ship, and fell with violence upon the deck." "Is the substance called *Sepia*, which artists use in their drawings, taken from the cuttle-fish?" Willy asked. It is, or I should rather say it was; for I believe a considerable portion of *Sepia* is now produced from other sources. Inside of the cuttle-fish is a small pear-shaped sac, which contains a dark brown fluid; there is a channel or duct leading to the efferent or exhalent syphon through which this inky fluid can be forcibly expelled. "What is the use to the animal of this fluid?" said Jack. It serves it as a means of escape, for when pursued it squirts out this dark fluid,

which colours the water and prevents its enemy seeing it. This curious fact was known to the ancient Greeks and Romans, several of whom allude to it. They used it also as ink, as the following lines from Persius will show—

Tunc queritur, crassus calamo quod pendeat humor ;
Nigra quod infusa vanescat sepia lympha ;
Dilutas queritur geminet quod fistula guttas.

“Then he complains that the ink, become thick, sticks in his pen ; then, that if water be added, the black sepia vanishes altogether, then that the reed makes blots with the diluted drops.” The following anecdote of the way in which the cuttle-fish can behave will amuse you. One day “a gallant officer who was inconsiderately collecting shells in a pair of immaculate white trousers, came suddenly upon one of the naked Cephalopoda snugly harboured in a recess in the rock. They looked at each other, and the cuttle, who had his eyes about him, and knew well how to use them upon seeing the enemy advance, took good aim, and shot so true that he covered the snowy inexpressibles with the contents of his ink-bag, and rendered them unpresentable either in drawing-room or dining-room.” The creatures possess exceedingly strong parrot-like beaks, capable of inflicting severe wounds. There are many stories of gigantic cuttle-fish attacking men and even ships, but these stories are purely fictitious. How the wind blows the sand along the shore ! Now Jack and Willy you may run a race with it. There goes May’s hat off, so now you have something to run

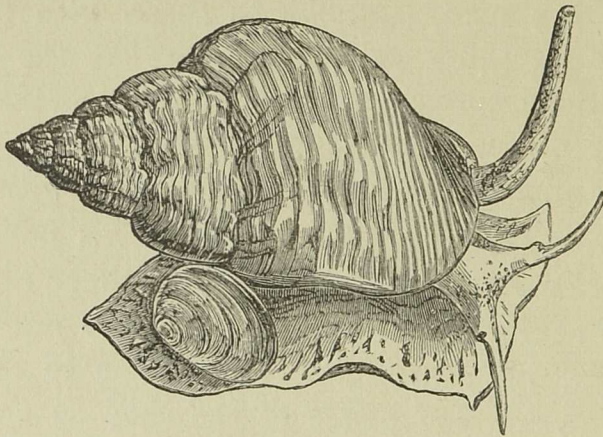
for. Well done, Willy, you have caught it just before it reached the water.

“What is this long sword-shaped shell,” asked May, “lying on the sand?” It is the shell of the *Solenensis*, or razor-fish, as it is sometimes called; it is now empty; the animals that inhabit these shells burrow in the sand, but can also dart about in the water by a rapid opening and shutting of the valves. I believe they are very good to eat, but I have never tasted them. “On the retreat of spring-tides they may be seen nearly half out of their holes, apparently taking in a supply of oxygen for their gills. They are evidently sensible of vibratory movements in the air, as well as on the ground, taking alarm at greater or less distances, according to the state of the atmosphere and direction of the wind. When the solen is disturbed it squirts out water in a strong jet, and having thus compressed the volume of its body, it lengthens and darts out its dibble-shaped foot, and rapidly disappears below the surface to a depth of two or three feet. A solen hunt requires considerable alertness, for if you cannot approach near enough to catch them when partly exposed to view—and this is not easy, their muscular strength being, in proportion to their size, far greater than that of a man—and you delve with your hands after them, they will probably beat you in the race.” You have often laughed at being told to catch a bird, Jacko, by putting a bit of salt on its tail! Well, oddly enough, razor-fish are caught by salt. Fishermen put a pinch of salt in their holes, and out pop the razor-fish. “What effect,” asked

Willy, "has the salt upon them?" Some of the fishermen think that the razor-fish believes the tide is coming in, and rises up to inhale the water. It is probable that the angular particles of salt irritate the creatures by pricking the delicate mantle; so they come to the surface to eject the salt. The mode of catching solen-fish at Naples is very curious. Poli tells us "that the lurking-place of the solen is betrayed by a hole in the sand, agreeing in shape with the apertures of its tubes or siphons. When the water is shallow the fisherman sprinkles some oil on the surface, in order to see these marks more clearly. He then steadies himself by leaning on a staff with his left hand, and feels for the solen with his naked right foot. This he catches, and holds between his big toe and the next; but although his toes are protected by linen bands, the struggles of the solen to escape are so violent, and the edges of the shell so sharp, that very often a severe wound is inflicted by it. When the sea is five or six feet deep, another mode of fishing is adopted. It consists in the fisherman diving or swimming under water with his eyes open, and after having found the holes, digging with his hands for the razor-fish. Sometimes the solen so forcibly resists being taken, that it will suffer its own foot to be torn away, or will even die, rather than surrender."* In places where the razor-fish is sought after for food by poor fishermen and others, it is caught by means of a long narrow wire, bent and sharpened at one end; this is suddenly thrust into the hollows of the sands,

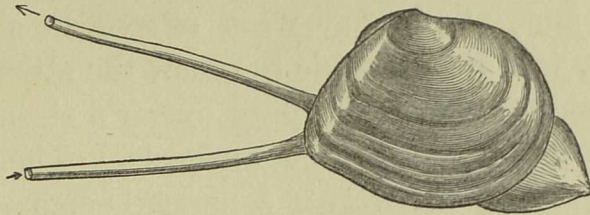
* "British Conchology," vol. iii. p. 13.

which mark the animal's presence, and transfixes its flesh between the valves. Here is another whelk, and this time the creature is at home; the storm of last night has washed him up on shore from deep water; we will put him on this stone, perhaps he will begin to crawl away. There, you see his two horns and large flat thick body.



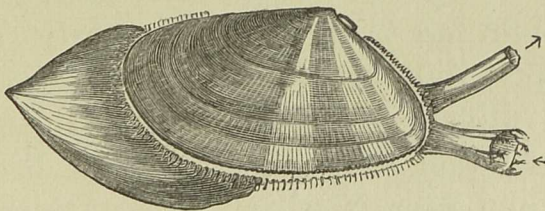
Here is *Tellina solidula*, with the animal inside; I will put it in this bottle of water, with a little sprinkling of sand at the bottom. Now, you see the two long siphons, through one of which the water is taken in for respiration, and expelled through the other. Here, too, is *Donax anatinus*, with its living inhabitant. Here is an old oyster-shell, riddled through and through with small holes. "Meeting with such worm-eaten shells, many persons will pass them by without paying the slightest attention, or, at most, will honour them with but a heedless glance. Others may confine their reveries to recollections of oyster suppers; but it

is just in proportion as our knowledge of natural history extends, and a taste for it exists in the mind, that such an object is capable of interesting us ; simple and



TELLINA SOLIDULA.

common as it appears, a long chapter might be written in merely recording the history of its inhabitant from the time when it lay quietly on its bed among other oysters, lodged in its firmly-built house, and appearing to defy all intruders, to the present dismantled state of the shell, resembling a ruined fortress, pierced in



DONAX ANATINUS.

all directions with cannon shot. The number of enemies which the oyster meets with is considerable, not to speak of those who attack him in front ; and no doubt the dilapidated example before us is the work of several sets of teeth. His first assailants were probably small sea-worms, which, boring through the

shell, attacked him at all points. At first he resisted their assault by fresh depositions of pearly matter, interposed between his soft parts and their intruding mouths, and thus pearls were cast in the path of the enemy. But, alas! they were offered to a swinish multitude, who turned aside to renew the attack on an unprotected point, till the poor oyster's strength was well-nigh exhausted in the struggle. Then in the holes pierced by the worms a parasitic sponge (*Halicondria celata*) probably established itself, which ate further into his vitals, causing the softer parts of the shell to rot away, and spreading through its whole substance, like the dry-rot fungus through a solid beam of timber, until, under his accumulated misfortunes, the poor oyster perished, and his loosened shell was cast to the mercy of the waves."*

Ah! what is that small bird flying somewhat wildly about? I do believe it is the storm petrel, which the gale last night has brought to the coast. The petrel is the smallest web-footed bird known; specimens are frequently driven to great distances inland by the strong wind; they have been taken in Birmingham, Coventry, and near Newbury, in Berkshire. Petrels are chiefly birds of the ocean, and seldom voluntarily approach land, except during the breeding season. They lay one small white egg. They are supposed to be seen only before stormy weather, and are therefore unwelcome visitors to superstitious sailors, who call them "Mother Carey's chickens," Mother Carey being, I suppose, some witch or hag of that name. From its

* Harvey's "Sea-side Book," p. 60

habit of paddling along the surface of the water, it received the name of petrel from the Apostle Peter, who, you may remember, walked on the water.

Mr. Yarrell says it roves over the great part of the Atlantic, feeding on small fishes, crustacea, and mollusca to be found about the extensive masses of seaweed which float about the surface of the ocean. The bird will keep in company with a ship for many days, sometimes for shelter, but also for the sake of the various matters thrown overboard, as they are always ready to stoop and pick up bits of biscuit or meat. On examining the stomach of a stormy petrel, Mr. Couch found about half-an-inch of a common tallow-candle, of a size so disproportionate to the bill and throat of the bird, that it seemed wonderful how it could have been able to swallow it. Other species of petrels occasionally visit our coasts.

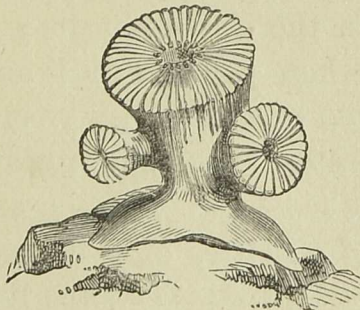
Here is a very pretty sponge; it is composed of many branches, each about the size of a goose-quill; of a light sandy colour; it is very common, but very interesting. It is now merely a horny skeleton; but when it was attached to the rock it was full of a living jelly-like substance, which constituted the animal. This species (*Halichondria oculata*) is often found amongst the shore refuse, having been washed up by the tide. When the creature is alive, to quote the words of the late lamented Dr. Harvey, every portion of the horny fibre is coated over with a semi-fluid slimy matter, like a half-consistent jelly, seeming inert and unorganized, and yet the seat of whatever life the sponge contains. It is by this slime, which may be pressed

out with the finger, that the network is deposited, and from it the whole growth of the mass proceeds. The slimy substance is apparently void of sensation, for it does not shrink when wounded; and the only motion resembling animal life which the mature sponge exhibits is in the imbibition and expulsion of continuous currents of water. If any species of sponge be examined—look at this piece I hold in my hands—the holes with which the substance is everywhere pierced may be seen to be of two kinds, one of larger size than the rest, few in number, and opening into wide channels or tunnels which pierce the sponge through its centre; the other minute, extremely numerous, covering the whole surface, and communicating with the innumerable branching passages which make up the body of the skeleton. According to the observations of Dr. Grant, water is freely imbibed through the smaller holes, and continuously expelled in jets through the larger as long as the animal retains life. These currents may be seen, if a small specimen of a living sponge be placed in a watch-glass or other shallow vessel of salt-water, and examined through the microscope. Nourishing particles dispersed through the water are received into the universal stomach, and what is not required is ejected through the canals.


“Where,” asked Willy, “do the sponges which we use to wash with come from? Are there any British species that would do for that purpose?” No, I believe, not a single one. The sponges of commerce are obtained chiefly from the Mediterranean; Smyrna,

I believe, is the great market for them. There are three distinct kinds of sponge: the horny kind (*Cornea*), which are destitute of spicules, to this belongs the sponge of commerce; the silicious kind (*Silicia*), which have imbedded in their substance a great quantity of flinty spicules; and the calcareous kinds (*Calcareea*), of a somewhat gristly substance, containing many calcareous spicules. These spicules not only vary in composition, but in form; when examined under the microscope many are very beautiful objects.

Sponges can increase by division; they also are propagated by what are termed gemmules, which sprout from the delicate gelatinous substance which covers the skeleton; these are of an oval form, covered with cilia, a word with which, by this time, you must all be familiar. For some time the young sponge swims freely about, rowing itself along by means of cilia, just as a ciliated animalcule; by and by it becomes fixed to some object, and gradually assumes the form of a sponge. I will show you both these gemmules and many forms of spicula when we return to Preston. We will now return to our lodgings.



WALK XII.

HAT a contrast is this day to that on which, four days ago, we had our last walk together. The surface of the sea is undisturbed by the slightest breeze; it is as smooth as glass, and looks so calm and placid, one can scarcely conceive how angry and foaming it was a few days ago. Well, the sea in every condition is, to me, always the source of wonder and delight. When it is stormy, we may expect some interesting zoological specimens to be cast up by the waves; when it is calm, we may expect, amongst other things, to see some of the medusæ swimming joyously in the water. Besides, you know when bathing, the rough waves are not over pleasant, but when it is calm, then you can have a good swim. "Yes, papa," said Willy, "but are you not more likely to get stung by one of your favourite medusæ when the water is calm? You know the other morning, when you and Jack and I bathed before breakfast, you got stung on your arm by a jellyfish, and the water then was unruffled. Did the stinging hurt you much?" The sensation was exactly like the sting of a nettle, only it was much more intense; it produced a redness on the part where I was

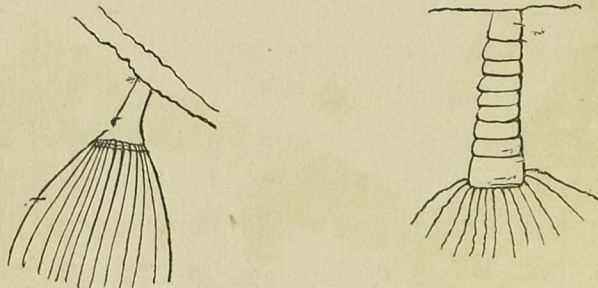
stung, which was under the arm, but I did not feel much pain in two hours afterwards. "But how do these jelly-fish sting?" said Jack; "they have no pointed weapons like bees and wasps, have they?" The stinging power which, however, is probably possessed by a few species only, is supposed to reside in small capsules placed on the medusæ's skin; within these capsules a spiral thread is seen. "The *Cyanea capillata* of our seas is a most formidable creature, and the terror of tender-skinned bathers. With its broad tawny, festooned and scalloped disc, often a full foot or more across, it flaps its way through the yielding waters, and drags after it a long train of ribband-like arms, and seemingly interminable tails, marking its course when the body is far away from us. Once tangled in its trailing 'hair,' the unfortunate who has recklessly ventured across the graceful monster's path, too soon writhes in prickling torture. Every struggle but binds the poisonous threads more firmly round his body, and then there is no escape; for when the winder of the fatal net finds his course impeded by the terrified human victim wrestling in its coils, he, seeking no combat with the mighty biped, casts loose his envenomed arms and swims away. The amputated weapons, severed from their parent body, vent vengeance on the cause of their destruction, and sting as fiercely, as if their original proprietor itself gave the word of attack."

The young of the medusæ are very unlike the parent form, and were once considered to be adult creatures, allied to the hydræ of our fresh-water

ponds, on account of their strong resemblance to them. The name given to this little creature was *Hydra tuba*. When the young medusa first appears, it has an oval form, and is surrounded with cilia. In course of time it attaches itself to some object, puts out four arms or tentacles, which, by and by, are succeeded by many more; at this time buds or germs frequently grow from its side, just as you remember occurs in the hydræ of our fresh-water ponds; the



body of the creature then lengthens, and at last becomes wrinkled; these wrinkles, by and by, become deeper and develop tentacles at their edges; and



in time each ring detaches itself, and swims away an independent creature. Ultimately, these hydra-like larvæ assume the adult form of medusæ. Ah!



A.F. LYDON-DEL.

SEA-ANEMONES.

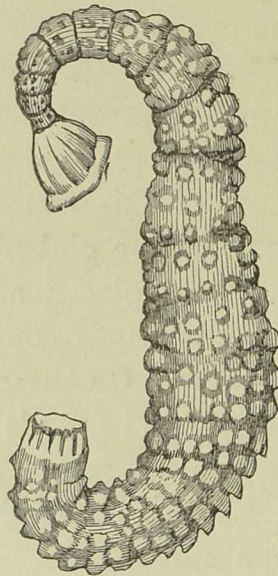
1. The Cave-dwelling Anemone.
2. The Plumose Anemone.
3. The Beadlet.
4. Corynactis.
5. Peachia.
6. The Orange-disked Anemone.

I have found a treasure now in the water close to the shore ; it is as transparent as glass, and looks like a large dew drop when illumined by the sun's rays. If I am not mistaken, it is the lovely and delicate little medusa called *Cydidippe pomiformis*. Fill my bottle with clear sea water, May. There, now, I put my little globule of ice—it is about the size of a pea—into the bottle, and see at the lower end are two long thread-like processes ; these can be folded up and enclosed in the interior of the little creature's body ; but what the use of these graceful appendages is, remains unknown. But the most beautiful part about it is its machinery for moving from place to place. "Stretching from pole to pole of this translucent little orb, like lines of longitude upon a globe," as Professor R. Jones has well said, "and placed at equal distances, are eight broad bands of more consistence than the other portions of the body. On these bands are placed thirty or forty paddles, broad flat plates, for such they seem when magnified, with which the little creature rows itself along. But here the difference lies between the art of man and nature. Man to move his wheels must have much cumbersome machinery ; the furnace, and the boiler, and the herculean arm that makes the wheel revolve, but here all these may be dispensed with, for the paddles are themselves alive, and move themselves at will, with such degree of force as may be needed, either at once, or singly, or in groups, working with mutual consent in any way required."

Here are a few sea anemones, the common smooth

species ; but this shore, as I said, does not present us with much variety. I hope we shall some day be able to spend our sea-side holiday at Tenby or Weymouth, when we should meet with a great many beautiful kinds of sea-anemones. The Menai Straits, however, are not bad hunting ground ; we must bear them in mind if the tide suits for a visit there.

“What is this leech-like thing,” said Willy,

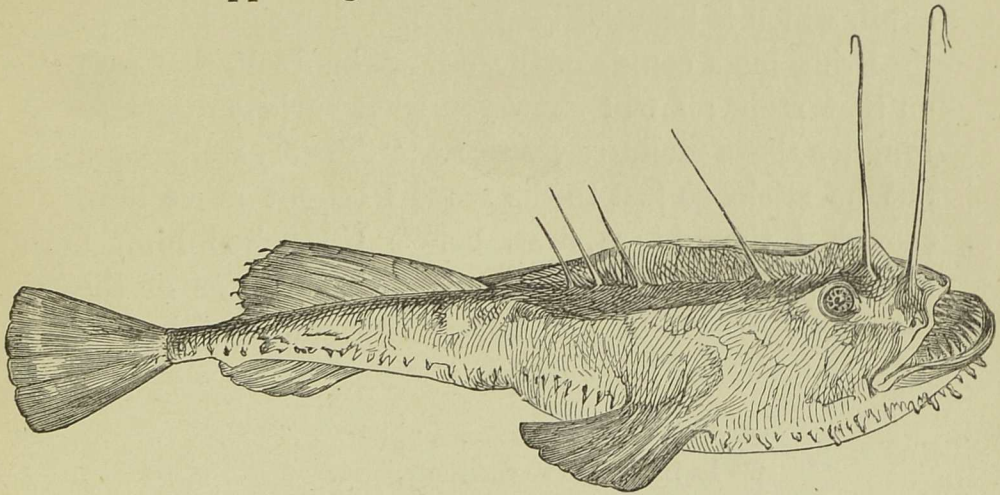


SKATE-LEECH.

“lying on the shore? It is alive.” It is the skate-leech, *Pontobdella muricata*, frequently parasitic on the skate. By means of its sucker it can attach itself securely to the skate, whose blood it sucks. It lays egg-capsules, which something resemble those of the dog-whelk.

“Here are the jaws of some kind of fish,” said

Jack, "that have been washed ashore, perhaps, by the storm the other day." They are the jaws of a very curious fish, called the Angler, or Fishing-frog (*Lophius piscatorius*), a very voracious fish indeed, with an enormous head and wide mouth. It is not a very active swimmer, so has recourse to stratagem to take its prey. On the top of the head are two long slender appendages, which are formed of bone and



THE ANGLER.

covered by the skin; they are curiously fastened or articulated at the base with the top of the head; the process nearest the mouth is articulated by a ring with another ring in the skull, so that it can be moved about in any direction. Now, these long processes are Mr. Angler's fishing-lines, and the use he makes of them is most interesting. The angler hides itself in the sand or mud at the bottom of the water; it then raises these lines, and moves them about most attractively in various directions. Other fish, looking

upon them as tempting bait, are allured to the spot with the intention of making a meal of them, when all of a sudden up springs Mr. Angler, and seizes the unfortunate deluded victim, whom he rapidly devours. There is a beautiful specimen of the skeleton of the angler-fish in Brown's Museum at Liverpool. When we next go there, we must not forget to notice the mode of articulation of this fish's bait-line with the skull, which is beautifully shown.

Bring me a couple of those limpets, Jack, that rest on that stone; I will show you what curious rasp-like tongues these molluscs possess. "All very well, papa, but he sticks so fast to the stone I cannot move him, though I thought at first, before I touched him, I could easily pick him up." Yes, the muscles of the limpet's foot are enormously strong, and enable him to hold the stone most firmly.

At distance view'd it seems to lie
 On its rough bed so carelessly,
 That 'twould an infant's hand obey,
 Stretch'd forth to seize it in its play;
 But let that infant's hand draw near,
 It shrinks with quick instinctive fear,
 And clings as close as though the stone
 It rests upon and it were one.

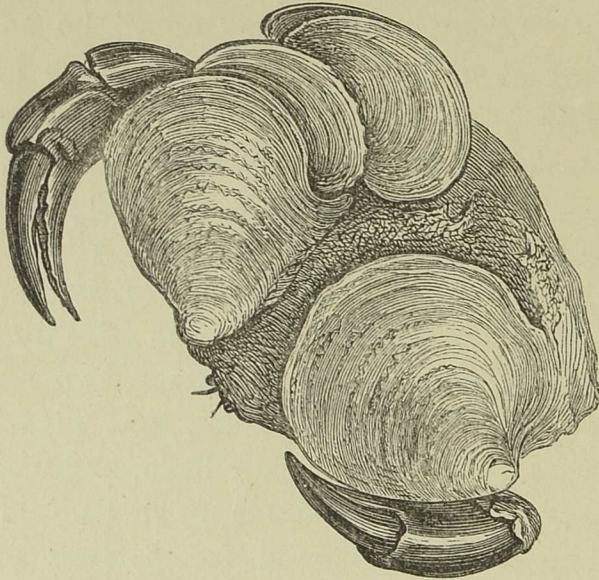
And should the strongest arm endeavour
 The limpet from the rock to sever,
 'Tis seen its loved support to clasp
 With such tenacity of grasp,
 We wonder that such strength should dwell
 In such a small and simple shell.

"Have you ever eaten limpets?" Willy asked. No, I never ventured on any; I should fancy they must

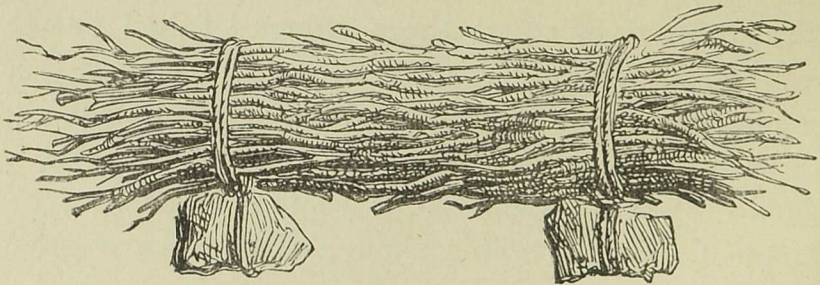
be very tough. The primitive inhabitants of North Britain must have consumed great numbers of them, for heaps of their shells are constantly being turned up. Mr. Gwyn Jeffreys says "roasted limpets are capital eating." "A few years ago," he adds, "I was a guest at a dinner-party in the little island of Herm. The hour was unfashionable—one o'clock, and the meal was served on the turf in the open air. This consisted of fine limpets, laid in their usual position, and cooked by being covered with a heap of straw, which had been set on fire about twenty minutes before dinner. There was also bread and butter. The company were a farmer, two labourers, a sheep-dog, the late Dr. Lukis, and myself. We squatted round the smouldering heap, and left on the board a couple of hundred empty shells." In some places limpets are collected for feeding pigs; in Ireland and the north of England the poor people consume great numbers; they are also extensively used as bait by line fishermen.

"Oh, papa!" said Willy, "do look here; as I was grubbing amongst these stones I fished out this crab, whose back is covered with oysters." It is not uncommon to find oysters and mussels parasitic on crabs and other crustacea. Some of these oysters, I should say, are three or four years old; as *spat* they dropped upon the crab's shell, and there have grown. The crab has small thin claws, and is no doubt a sickly individual, having suffered from the presence of the oysters. You remember my telling you that crabs cast their shells every year, but this individual has

evidently not cast his coat for some years. Talking of oyster-spat reminds me of a mode of artificially rearing oysters, at one time much practised in France ;



fascines or bundles of faggots are formed, and sunk by stones; when the young oysters are ready to



“ settle down ” in life, they attach themselves to these faggots, and when they are large enough for the market they are removed ; but I believe fascines are

not much used now, having been superseded by tiles of various shapes.

Here are a few periwinkles crawling on this fucus ; let us take a few to our lodgings for examination. The periwinkle is a valuable addition to the marine aquarium, for, by means of a long rough tongue, it mows off the green confervoid growth which, under the influence of light, would soon obscure the glass. "Are not these the creatures which I have seen people eat?" said Jack. Yes, periwinkles are extensively used as food amongst the poor of the sea-port towns, and you may often see old women picking them out with pins, and eating them with great gusto. "The supply is about two thousand bushels per week for six months, from March until August inclusive, and about five hundred bushels per week for the remaining six months. The number of persons employed in gathering is at least one thousand (chiefly women and children), and quite as many more in selling. The best gathering grounds are the coasts of Scotland, Orkney, Shetland, and Iceland. The trade price varies from two to eight shillings per bushel of eight gallons heaped measure ; the larger the 'winkles' are the higher the price. Those gathered from rocks keep a fortnight in summer and a month in winter ; mud winkles will not live more than half that time."*

Careful examination of sea-weeds will often reveal most beautiful forms of molluscan life. Tennyson has some very pretty lines on a delicate shell, which you may learn by heart :—

* "British Conchology," iii. 375.

See what a lovely shell,
 Small and pure as a pearl,
 Lying close to my foot,
 Frail, but a work divine,
 Made so fairly well
 With delicate spire and whorl,
 How exquisitely minute,
 A miracle of design!

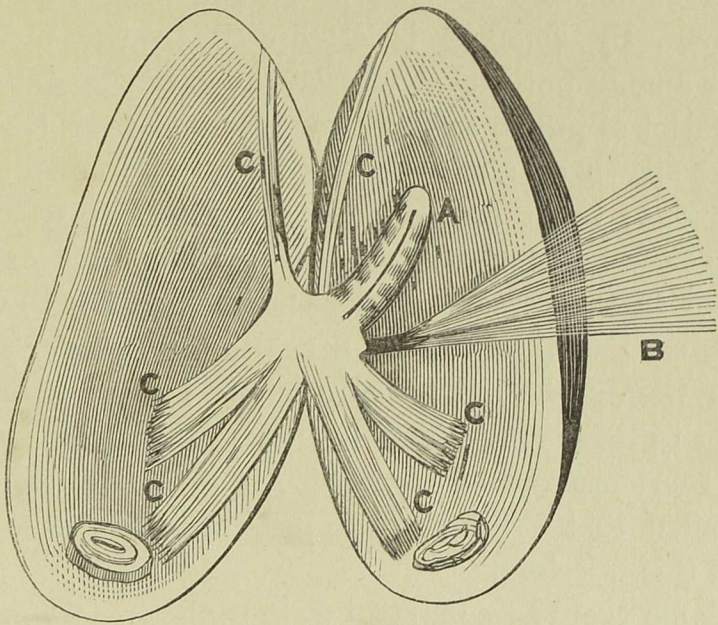
What is it? A learned man
 Could give it a clumsy name.
 Let him name it who can,
 The beauty would be the same.

The tiny cell is forlorn,
 Void of the little living wil
 That made it stir on the shore.
 Did he stand at the diamond door
 Of his house in a rainbow frill?
 Did he push, when he was uncurled,
 A golden foot or a fairy horn
 Through his dim water-world?

Slight, to be crush'd with a tap
 Of my finger-nail on the sand,
 Small, but a work divine,
 Frail, but of force to withstand,
 Year upon year, the shock
 Of cataract seas that snap
 The three-decker's oaken spine
 Athwart the ledges of rock
 Here on the Breton strand!

Here is a small mussel-bed; see how firmly fixed the molluscs are one to the other, each secured by a substance called *byssus*. I will open this specimen; the fleshy tongue-shaped organ is the creature's foot, by means of which he fastens the byssal threads to

any object. The byssus is probably formed by a secretion in the foot; at first it is a mere speck of white transparent matter, which spreads out and immediately hardens like china-cement. This plate serves as a place of attachment, and from the centre of it the mussel secretes very slowly, and by a backward movement, a gluey thread, repeating this process



MUSSEL OPENED, SHOWING FOOT (A), MUSCLES (C), AND BYSSUS
THREADS (B).

ten or twelve times in a circular direction. The threads become horn colour in about twenty-four to thirty hours after being spun.”* Byssus threads vary much in appearance and texture, “being sometimes black as in the mussel, sometimes of a golden-

* “British Conchology,” ii. 107. See also “Intellectual Observer,” ix. p. 53.

brown as in the pinna, sometimes hard and stiff, and sometimes soft and silky.”

Mussels have from time immemorial been a favourite article of food, but as at some seasons they are very unwholesome, many cases of serious illness and even of death having occurred from eating them. “The ‘faculty,’” Mr. Gwyn Jeffreys observes, “seem to be completely at fault as to the nature of this poison. By some it is attributed to the mussels living among putrescent matters, as in docks and near the outlet of public sewers; by others to their feeding on the spawn of star-fish, which are well known to be poisonous; by others to their being too freely eaten, and causing a surfeit, or to a morbid state of the system in the persons eating them; by a few to their imbibing into their tissues a solution of copper; and Delle Chiaje showed that in many instances it was owing to these mollusks being at the time in spawn, and therefore out of season. A strange notion once prevailed that the poor little pea-crab was the author of all this mischief.”

Some years ago mussels were gathered and spread over the fields in Lancashire as manure. One writer tells us that the shell serves as a razor to shave with! I can say with Mr. Gwyn Jeffreys, “I should not like to try the experiment on a frosty morning, or when late for breakfast.” It is stated that “mussels are used at Bideford to fix, by means of their byssus, the stones of a bridge, which is difficult to keep in repair owing to the rapidity of the tide. The interstices of the bridge are filled with them, and it is said that

only their strong threads support the fabric, and prevent its being carried away."

"Oh, papa, do look at this extraordinary-looking creature," said May, "I do not like to touch it." It is a mollusc popularly termed a sea-hare (*Aplysia*). What queer creatures they are! As Mr. G. H. Lewes amusingly says in his charming "Sea-side Studies," "One would fancy them slugs which had been troubled with absurd caprices of metamorphoses, and having first thought of passing from the form of slugs to that of hares, changed their weak minds and resolved on being camels: but no sooner was the hump complete than they bethought them that, after all, the highest thing in life was to be a slug, and so as slugs they finished their development." Do you see, as I handle this specimen, what a quantity of purple fluid it throws out? Though perfectly harmless, the sea-hare has for ages been considered a very poisonous animal. The tongue or palate of the sea-hare is an extremely beautiful microscopic object. I will show you one when we get home again.

And now our last walk is ended; to-morrow we return to Preston; the refreshing sea-air has put strength into our limbs and pure blood into our veins. I hope you will all continue to use your eyes in the examination of those countless forms of plants and animals which surround us on all sides, whether in the country or at the sea-side. It has been well said that "mere amusement will naturally lead us into the solemn temples of philosophy," for the naturalist may be anything, everything. "He may yield to the charm

of simple observation ; he may study the habits and habitats of animals, and moralise on their ways ; he may use them as starting points of laborious research ; he may carry his newly-observed facts into the highest region of speculation ; and whether roaming amid the lovely nooks of nature in quest of varied specimens, or fleeting the quiet hour in observation of his pets—whether he make natural history an amusement, or both amusement and serious work—it will always offer him exquisite delight.” We will take one more look at the sea.

Beautiful, sublime, and glorious ;
 Mild, majestic, foaming free ;—
 Over time itself victorious,
 Image of eternity.

Such art thou, stupendous ocean !
 But, if overwhelmed by thee,
 Can we think without emotion
 What must thy Creator be ?



