

THE SEA-SHORE

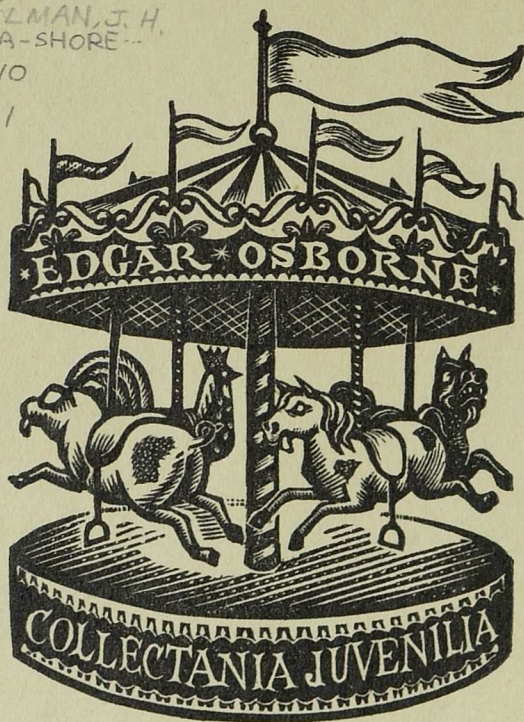


SHOWN TO THE CHILDREN

MS
KELMAN, J. H.
SEA-SHORE...

1910

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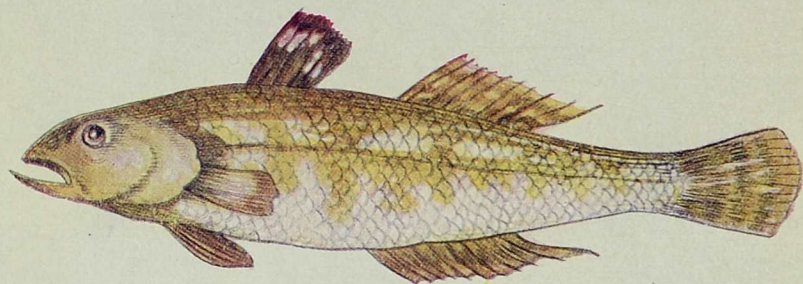
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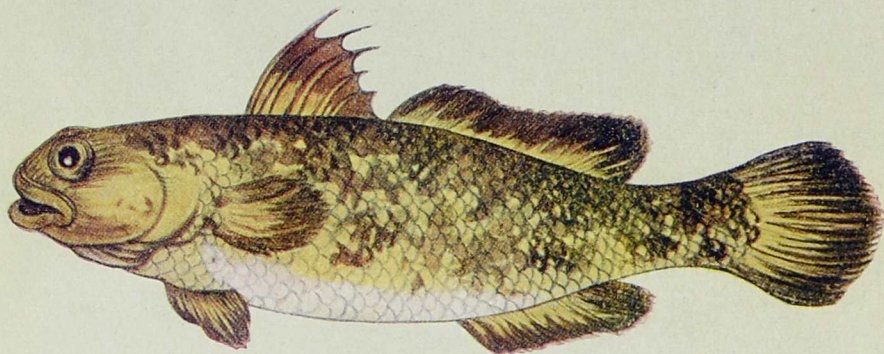
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THE SEA-SHORE

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2



1. and 2. THE GOBIES

The Sea-Shore

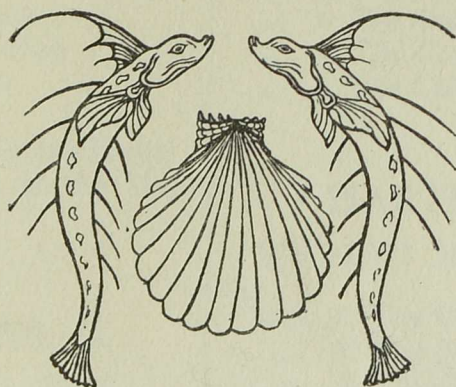
SHOWN TO THE CHILDREN

BY

JANET HARVEY KELMAN

DESCRIBED BY

REV, THEODORE WOOD



FORTY-EIGHT COLOURED PICTURES

LONDON & EDINBURGH

T. C. & E. C. JACK, LTD.

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ABOUT THIS BOOK

THIS book is intended to help little boys and girls to use their eyes. The world is full of beautiful sights and wonderful creatures; and some of the most beautiful and wonderful of all are to be seen on the sea-shore. So I have tried to tell boys and girls, who are fortunate enough to visit the sea-side, what they ought to look for, and where they ought to look for it. And I can assure them that if they will only take the trouble to see what there is to be seen, they will find fresh objects of interest as often as they go down upon the beach, and that a sea-side holiday will prove ten times as delightful as ever they found it before.

THEODORE WOOD.

THE SEA-SHORE

CHAPTER I FISHES

PLATE I

THE GOBIES (1 and 2)

IN this little book I want to talk to you about some of the strange and wonderful creatures which you may find when you go to stay by the sea-side. And first of all I should like to tell you something about the fishes. A great many of these, of course, live in the deep water, where you cannot catch them, or even see them. But there are a good many others which you can find very easily indeed. All that you have to do is to wait until the tide has gone out, and then to go down and look into the pools which are left among the rocks. There you are almost sure to see a number of shadowy forms darting to and fro through the water. Some of these, most likely, will be shrimps and prawns, which are always very common in the rock-pools; but the others will be tiny fishes. And even if you have not got a net you can often catch them quite easily.

Just bale out the water with a small pail, or even with your hands, until the pool is nearly empty, and you will be able to seize them with your fingers.

Among the fishes which can be caught in this manner are several kinds of Gobies. You can easily tell them from all other fishes by the curious way in which their lower fins are made. These fins are placed close together, so as to form a kind of cup-shaped sucker or soft pad, by means of which the little creatures can cling so firmly to the rocks that even a wave will not wash them from their hold. And if you take them home alive and put them into a basin full of sea-water, they will cling to the sides and stare at you in a most inquisitive way! Owing to this habit the gobies are often called "rock-fishes."

The commonest of these odd little creatures, perhaps, is the Black Goby. But the Spotted Goby is very nearly as plentiful. It is rather hard to see, because it is coloured just like the sand at the bottom of the pool, on which it is very fond of resting. But if you scoop out the water from a shallow pool you will often find, not only the goby, but its nest as well. For this little fish makes a most curious nest in which to place its eggs. First of all it hunts about till it has found half an empty cockle-shell, lying at the bottom of the water with its hollow side downwards. It then scoops out the sand from underneath it, so as to form a little chamber about as big as a marble.

You would think that the walls of this chamber would very soon fall in, wouldn't you? But the fish smears them all over with a kind of slime, which very soon sets and becomes quite hard, just like cement. It then makes a tunnel leading into the chamber by means of which it can go in and out; and last of all it covers the cockle-shell all over with loose sand. So unless you look very carefully at the bottom of the pool you will not see the nest at all. But if you notice a kind of lump in the sand, and find that half a cockle-shell is buried underneath it, you may be pretty well sure that you have discovered the home of a spotted goby.

This nest is always made by the male fish, and when it is quite finished his mate comes and lays her eggs in it. Then for eight or nine days he remains on guard outside the entrance, so as to prevent any hungry creature from finding its way in and devouring them. At the end of that time the eggs hatch, and a number of baby gobies make their appearance; and although they are so small that one can hardly see them, the father-fish seems to think that they are quite able to take care of themselves. So he swims away, and leaves them to their fate.

If you catch these little fishes with your fingers you must be careful how you handle them, for they have rather long and sharp teeth, and can give quite a smart bite.

PLATE II

THE SMOOTH BLENNY (I)

This fish, which is sometimes known as the Shanny, is also very common in the rock-pools. But you are not likely to see it unless you bale out all the water from a pool, for it always hides during the daytime in the crannies among the rocks, or underneath sea-weeds. Or it will even burrow down into the sandy mud beneath a big stone, so that you will not find it at all unless you dig for it.

When it is fully grown this fish is about five inches long, and it is quite a remarkable creature in several different ways.

In the first place, it varies a great deal in colour. Sometimes it is partly green and partly yellow, sometimes it is olive brown nearly all over, and sometimes it is almost black. But you can always tell it by the ring of bright crimson which surrounds each eye.

In the second place, it can remain for quite a long time out of the water. Some fishes die almost at once if they are taken out of the sea. But a blenny can live on dry land for twenty-four hours at least. The reason is that its gills are made in such a way that they remain damp for a long while after the fish leaves the water; and as long as the gills are moist it is able to breathe.

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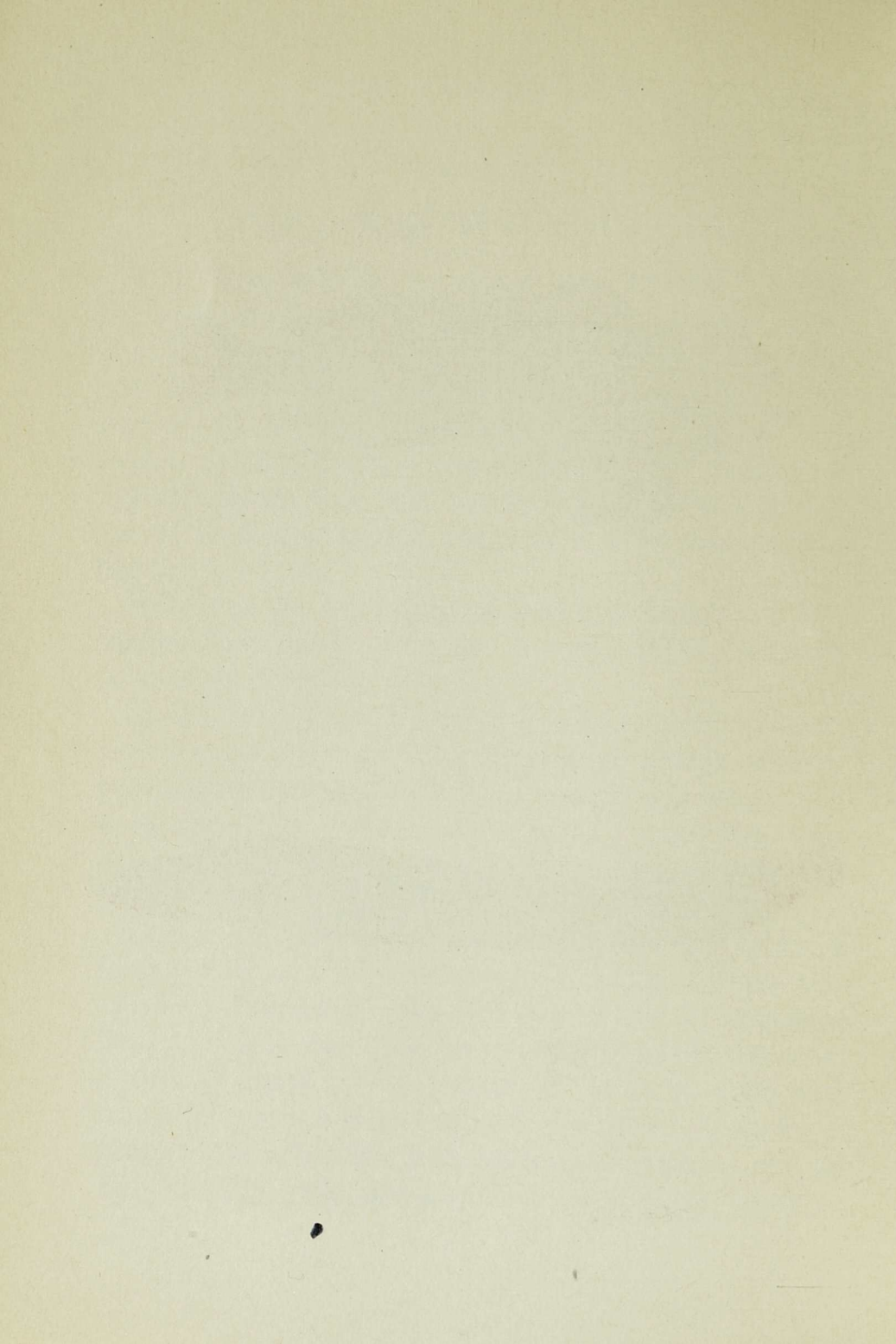


2



1 THE SMOOTH BLENNY.

2. THE SPOTTED GUNNELL



So very often indeed a smooth blenny will hide in a crevice which is left quite dry when the tide begins to fall, and will stay there till it rises again, perhaps eight or ten hours later.

But the oddest thing about this little fish is that it can move one of its eyes about without moving the other! Have you ever seen a chameleon? If so, you must have noticed how it will turn one of its curious eyes, first in one direction, and then in another, while the other eye remains quite still. And the blenny can move its eyes in just the same way, so that very often when one of them is looking out in front the other will be looking out behind. And then one will twist round and look upwards, while the other twists round and looks down!

If you succeed in catching a smooth blenny, you can always tell it from the other fishes which live in the rock-pools by the deep notch in the middle of the fin which runs along its back.

PLATE II

THE SPOTTED GUNNELL (2)

Another small fish which is very common in the rock-pools is the Spotted Gunnell. It is often known as the "butter-fish," and if you try to catch it you will very quickly learn the reason why; for it will slip between your fingers just as if it had been smeared all over with butter.

Nearly all fishes are slippery, but the spotted gunnell is the most slippery of all, for its whole body is covered with such a thick coat of greasy slime that it is really hardly possible to hold it.

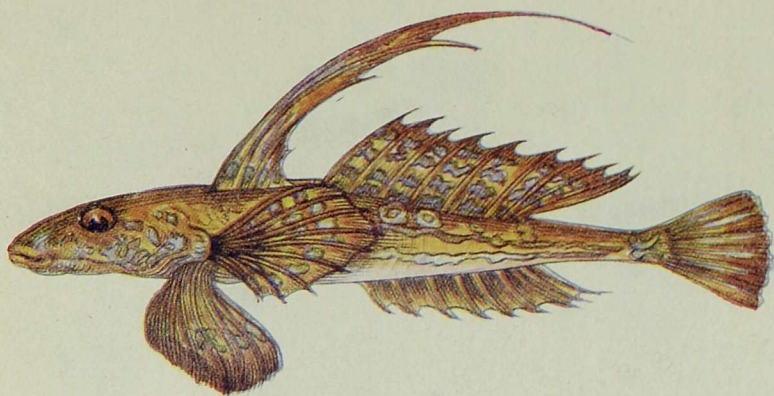
Sometimes the spotted gunnell is light brown in colour, and sometimes it is dark brown. But you can always tell it by its shape, which is very much like that of an eel, for its body is long and flat, and is of almost the same width the whole way along, from the head to nearly the tip of the tail. Then instead of having two fins on its back quite separate from one another, as most fishes have, the spotted gunnell has one very narrow fin which runs the whole length of the body. So, you see, it is very much like an eel indeed. But you can always tell it by the row of black spots, bordered with white, on the lower edge of the back fin. When fully grown it is about six inches long.

PLATE III

THE DRAGONET (I)

You will not find this little fish in the rock-pools nearly so often as the gobies and the gunnells, for it generally lives at the bottom of the sea at some little distance from the shore. But now and then it comes swimming up as the tide rises, and gets left behind as it falls again, so that for a few hours, at any rate, it is obliged to stay in the

1



2



1. THE DRAGONET.

2 THE PIPE-FISH.

pools. It is a most beautiful little creature, and, strange to say, the male is much more handsome than the female, for he is golden yellow above and white beneath, with streaks and spots of lilac upon his back and sides, while his mate is reddish yellow all over. Besides this, he has the front spine of his first back-fin drawn out to such a length that it reaches almost to the tip of his tail, while all his other fins are very long and very spiny. He really does look, indeed, very much like a tiny water-dragon. That is the reason, of course, why he is called the "dragonet." The female, however, has much smaller fins. Indeed, she is so very unlike the male that until a few years ago even naturalists thought that she was a different fish altogether, and she was generally known as the Fox, on account of her reddish colour.

If you ever succeed in finding a dragonet in the rock-pools it is almost sure to be a female, for the male hardly ever comes into shallow water.

PLATE III

THE PIPE-FISH (2)

This is a very odd-looking fish indeed—quite the most curious of all the fishes which live in the rock-pools. And as it is very common, you ought to be able to find it without any difficulty.

In the first place, although it grows to a length of eighteen or nineteen inches, its body, even in the largest part, is no bigger round than a slate-pencil. For this reason it is often known as the Needle Fish.

Besides this, its jaws are drawn out to a most wonderful length, and are fastened together all the way along, so that they really form a kind of tube. So, you see, a pipe-fish can never open or shut its mouth, but has to suck in its food through the tiny hole at the tip of the jaws.

Sometimes, as you look down into a rock-pool, you may see one of these fishes feeding; and the way in which it does so is very curious indeed. It suspends itself almost upright in the water, with its tail upwards and its head downwards. It then fills its tube-like mouth with water, which it squirts out again as hard as it possibly can. The result is, of course, that the sand at the bottom of the pool is blown away, and the various tiny creatures which were lying hidden underneath it are uncovered. Then the fish sucks them up into its mouth, and swallows them.

Another curious fact about the pipe-fish is that instead of being clothed with scales, as most fishes are, it is covered all over with hard bony plates, just like a suit of armour. But the strangest thing of all about it is that underneath the body of the male fish is a kind of pouch, into which the female puts her eggs, so that he can carry them

about in safety until they hatch! Isn't that odd? And it is even said that after the little fishes are hatched they will go back into their father's pouch if they are frightened, just as baby kangaroos do into that of their mother, and remain there until the danger has passed away!

PLATE IV

THE FLOUNDER

This is one of the "flat fishes," as everybody calls them, like the turbot and the sole. Yet, really and truly, these creatures are not flat at all. They are thin. For what we always call the back of a sole is not really its back. It is one of its sides. And what we always call its lower surface is not its lower surface, but its other side!

This sounds very strange, doesn't it? But the fact is that when these so-called "flat" fishes are first hatched they swim upright, just as all other fishes do. Then their backs are upwards, of course, and their lower surfaces are downwards, and one of their sides is on either side. For about a month they swim about in this way. At the end of that time a strong desire comes over them to go and lie down on the sand or mud at the bottom of the sea. Now, in order to do this, of course, they have to lie upon their sides. Then three very strange things happen.

In the first place, their colour changes. Until now, both sides of the body have been pearly or silvery white. A white fish, however, lying on yellow sand or brown mud, would be very easily seen, and some hungry creature would be sure to catch sight of it and devour it. So as soon as the little fish lies down the upper side begins to get darker, and in a very short time it is of just the same colour as the sand or mud all round it. If you look into a shallow pool in which some of these fishes are lying you will find it very difficult indeed to see them, for they look exactly like the surface on which they rest.

In the second place, their way of swimming changes. When they first hatch out from the egg these little fishes swim just as other fishes do—upright, by means of their tails. For of course you know that fishes do not swim with their fins, which merely help them to keep their balance in the water. But when they lie down at the bottom of the sea they give up this way of swimming, and wriggle their way, as it were, through the water, still lying upon one side.

But the oddest change of all takes place in the position of the eyes. You can easily see, of course, that if a fish with its eyes in the usual place lies down on one side at the bottom of the sea, one eye is underneath its head, and is quite useless. So you might think that, except when it was swimming, it would only be able to see



THE FLOUNDER.

with one of its eyes. But a very strange thing indeed happens as soon as it lies down on the mud. The lower eye actually begins to move, and slowly travels round the head, till at last it settles down by the side of the other! 'That sounds impossible, doesn't it? It is as wonderful as anything in a fairy story. Yet in every one of these so-called "flat" fishes that strange journey of the eye takes place.

Next time you pass by a fishmonger's shop just look at the soles or the flounders in his window, and you will see that in every one of these fishes the two eyes are quite close together, above the same corner of the mouth. That is because one of the eyes moved right across the head while the fish was quite small, so that it might be able to use them both as it lay at the bottom of the sea.

You can sometimes catch flounders by paddling in the sea in places where the bottom is rather muddy. After a little while you are almost sure to feel one of these fishes wriggling underneath your feet, and all that you have to do is to stoop down and seize it.

PLATE V

THE PLAICE

In its habits the plaice is very much like the flounder, except that it does not like lying upon mud, and always chooses a spot where the bottom

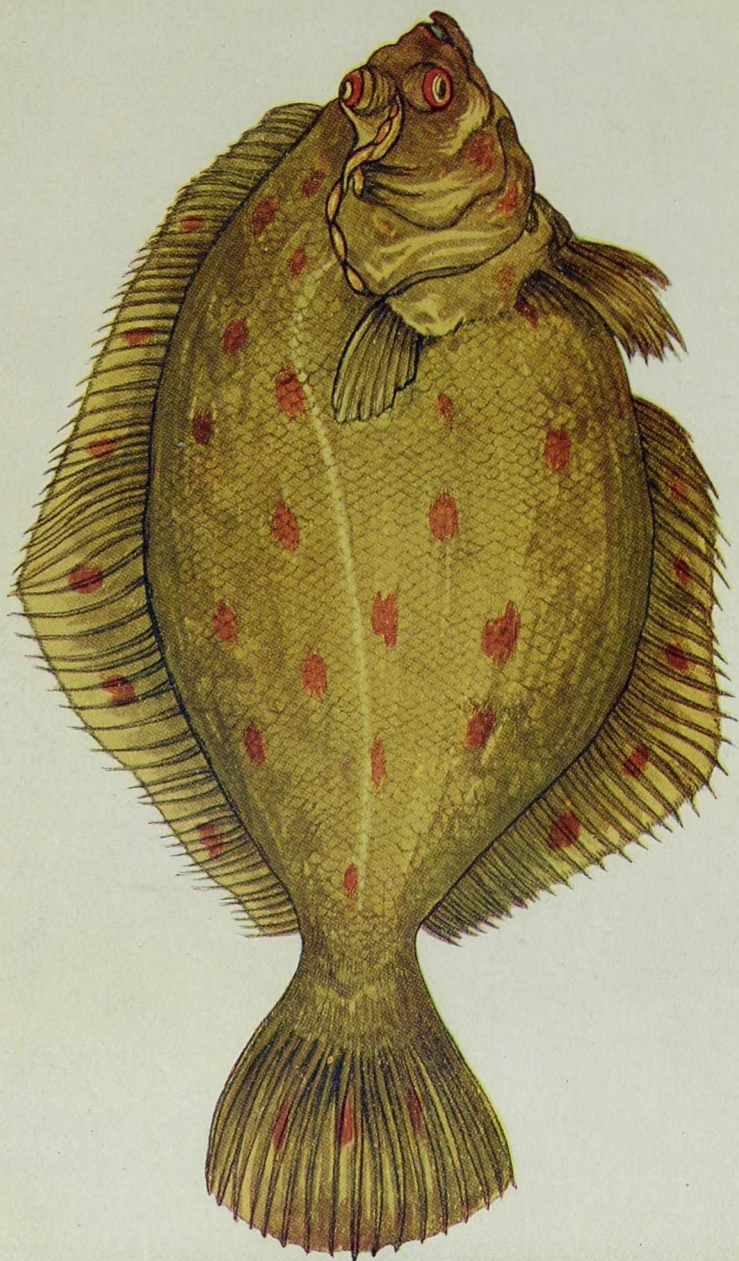
of the sea is sandy. And the skin of the upper side of its body, instead of growing dark brown, like the colour of mud, becomes speckled and spotted like the surface of sand. The fish is always very careful indeed to conceal itself, for even when the sea-bottom is sandy it does not lie upon the surface, but wriggles its way right down into the sand, only leaving just its eyes and a small part of its head above it.

You can always tell a plaice when you see it by the bright reddish-yellow spots upon the upper side of its body and its fins. And besides these, it always has a row of little bony knobs on the upper side of its head. You can catch it just as you can catch flounders, by paddling in the sea. But the plaice which are caught in this way are always quite small ones, for the bigger fish, which sometimes weigh as much as twelve or even fifteen pounds, live in the deeper water at some little distance from the shore.

PLATE VI

THE EGG OF THE SKATE (I)

Very often indeed, as you walk along the sea-shore, you will find a curious object which the fishermen generally call a "mermaid's purse." It is about three inches long and two inches wide, and is made of a black, horny substance, so tough



THE PLAICE

and hard that it is very difficult indeed to tear it. And from each corner there projects a slender tube, about an inch in length. In fact it looks rather like a hand-barrow, with handles in front as well as at the back, instead of wheels.

This is an egg of that very curious fish which we call the Skate, and which looks something like one of the "flat" fishes with a long whip-like tail. So it is sometimes called a "skate-barrow." When it is flung up on the beach by the waves the egg is nearly always empty. But if you happen to be staying by the sea-side in the early spring, and go down for a walk along the beach after a violent storm, you may perhaps find one of these eggs with a baby skate inside it. And if you examine the egg very carefully, you will find that while one end is firmly closed up, the other end has a slit running right across it, and that this slit is made in such a way that it allows the little fish to pass out quite easily when the proper time comes, but quite prevents any other creature from coming in.

PLATE VI

THE EGG OF THE DOG-FISH (2)

On some parts of the coast you may often find an empty egg which is very much like that of the skate, for it is made of just the same horny material, and is of just the same shape. But

at the four corners, instead of having straight projections like the handles of a barrow, it has long, twisted tendrils, just like those of a vine.

This is the egg of the Dog-fish, which is really a kind of small shark. It is not big or strong enough to be dangerous to human beings; but it is a terrible enemy to such small fishes as pilchards and herrings. For a number of these creatures form themselves into a band and go hunting together, just like a pack of wild dogs. And they will follow the shoal about day after day, snapping up the poor helpless fishes in hundreds and thousands.

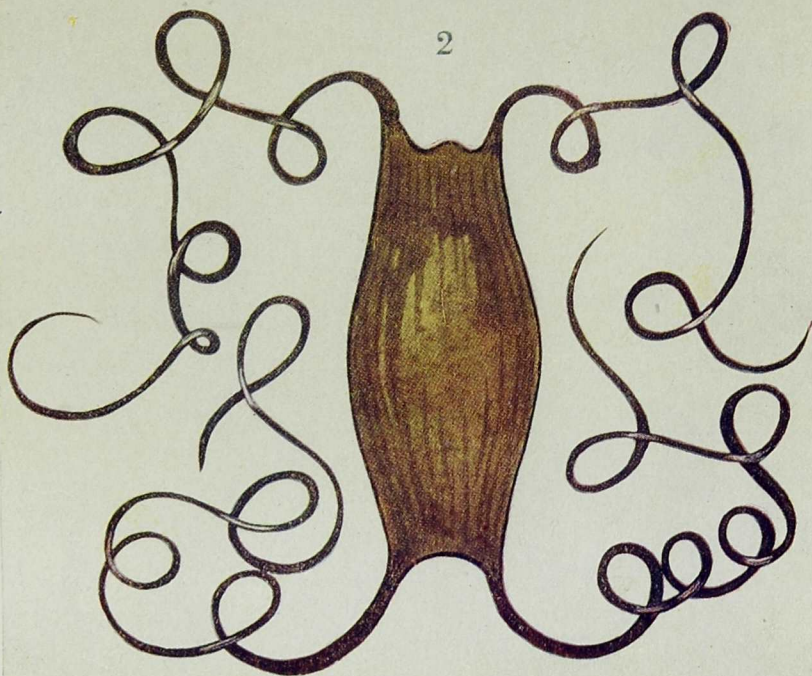
When a dog-fish lays its eggs, it seems to fasten them down by their tendrils to the weeds which are growing at the bottom of the sea; and these hold them so firmly that unless the weeds are torn up with them, they never break away. At each end of the egg is a small hole, allowing a current of water to pass over the little fish inside it. And at one end there is a slit, just like that in the egg of the skate, which can only be pushed open from the inside. So the little dog-fish can get out, while its enemies cannot get in.

Very often, after a violent storm, you may find a dead dog-fish lying upon the shore; and even if you have never seen one of these creatures before you can tell at once what it is, because its skin is so rough that it feels exactly like a

1



2



1. THE EGG OF SKATE.

2. THE EGG OF DOG-FISH.

piece of sand-paper. So this skin is often used for covering the handles of swords, in order to give a firm grip; and sometimes narrow strips of it are fastened to the sides of boxes of lucifer matches.

CHAPTER II

THE MOLLUSCS

PLATE VII

THE CUTTLE (1 and 2)

WE now come to the Molluscs, or Soft-bodied Animals, of which there are a very great many. Some of them live in shells, like the oyster and the whelk, and are often spoken of as "shell-fishes." But they are not really fishes at all, for they have no bones as fishes have, and are made in quite a different way. And there are just a few of them which have no shells at all.

One of these is that very curious creature which we call the Cuttle. You may sometimes find it in the rock-pools, lurking in the crevices among the rocks, or hiding under the masses of sea-weeds which grow round the edges. It has a soft, white, bag-like body, and a big head, on which are two great staring black eyes. Just above these eyes eight long slender arms spring out; for cuttles keep their arms on their heads instead of on their bodies! And another arm which is even longer still, and is flattened out at the end into a kind of oval plate, hangs down on either side.

All these arms are set with rows of round suckers, which are so strong that if even a small cuttle catches hold of you, it will not be very easy to make him let go. So if you do happen to find a cuttle in a rock-pool it will be better to watch him in the water, without attempting to catch him.

Down in the middle of all these branching arms, just where they spring from the head, are two very curious organs. The first of these is the beak, which is very strong, very sharp, and a good deal hooked. In fact, it is rather like that of a parrot. The other consists of two tubes which run downwards into the head, lying side by side together like the barrels of a double-barrelled gun.

These tubes are called the "siphon," and they are used for three purposes.

First of all, they are used for breathing. The cuttle breathes water by means of gills, like those of fishes, which lie inside the head; and the water passes down to them through one of the siphon tubes, and then goes out again through the other.

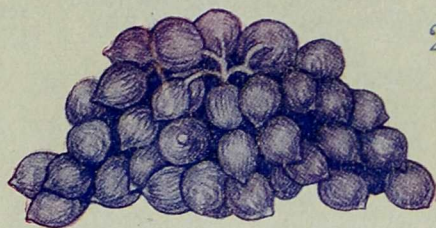
Next, they are used for swimming. When a cuttle wants to swim it gathers all its arms together in front of its head, fills both its siphon tubes with water, and then squirts their contents out again as hard as it can. The result is that two jets of water come rushing out of its head

with such force that the surrounding water cannot give way fast enough before them. So they push the cuttle backwards so swiftly that if it were to dart across the pool you would hardly be able to follow its movements.

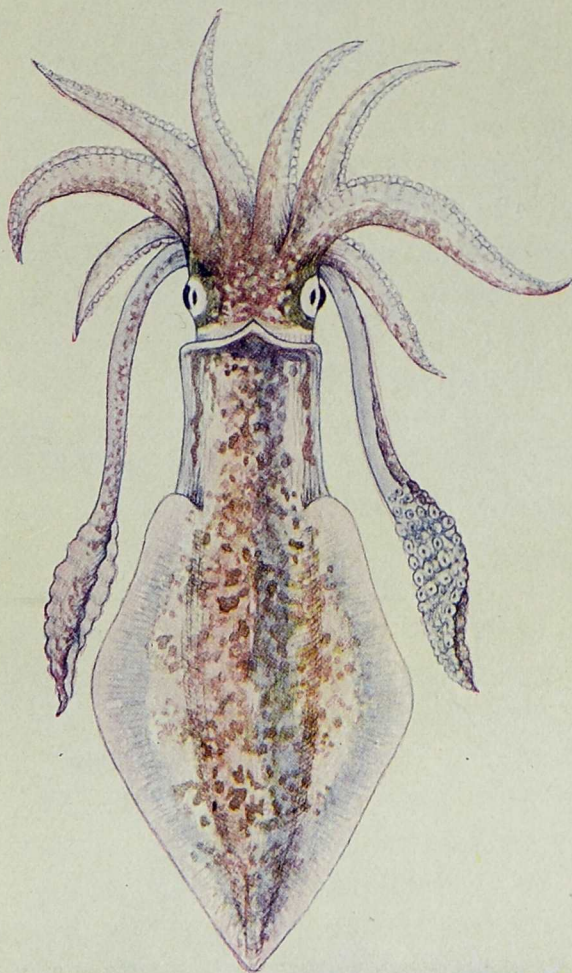
The third use of the siphon tubes is a very strange one indeed. Sometimes while you are looking at a cuttle in a rock-pool, the water all round it will suddenly become quite dark, just as if a quantity of ink had been poured into the pool. And so it has; for inside its body the cuttle has a bag which contains a quantity of a deep black liquid called "sepia." This bag is surrounded by powerful muscles, and opens into the siphon tubes; so that when the animal contracts the muscles, the sepia is squirted out into the pool. It always does this if it is frightened; and under cover of the darkened water it nearly always succeeds in making its escape.

Inside its body the cuttle also has a very curious object which is generally called a "cuttle-bone." It is not really a bone, however, but is made of almost pure chalk, and seems to act as a kind of support for the bodily organs.

Another very odd thing about the cuttle is the way in which it lays its eggs. These look just like purple grapes, and each has a small stalk, by means of which they are fastened together in bunches. Indeed, the fishermen always call them "sea-grapes." You may often find them lying about



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1

1. THE CUTTLE

2. THE EGGS OF CUTTLE.

upon the beach in early spring, and if you open one of them carefully, you will find a little baby cuttle inside it.

PLATE VIII

THE WHELK (1 and 2)

Everybody knows the shells of whelks by sight, and you can hardly take a walk along the sea-shore without seeing hundreds of them lying about on the beach. And great numbers of whelks are caught for human food, and also to serve as bait for fishes.

One very curious thing about whelks is the way in which they lay their eggs. Very often indeed, as you walk along the sandy sea-shore, you will notice round clusters of yellowish white eggs, which often go rolling along before the wind. Each of these clusters is about as big as a cricket-ball, and the eggs of which it is made up are about as large as peas. Now these are the eggs of whelks, and I think that every one who sees them must wonder how these creatures can possibly manage to lay such very big balls of eggs. For each egg-ball is at least two or three times as big as the biggest whelk.

But, after all, the explanation is quite a simple one. When the eggs are first laid they are very

small indeed. Each is no bigger than a tiny pin's head. Instead of having shells, however, these eggs have tough but very elastic skins; and these skins are made in such a way that while they allow water to soak in from the outside, they will not allow it to pass out again. So as soon as the eggs are dropped into the sea they begin to swell; and the result is that before very long each egg is as big as a good-sized pea.

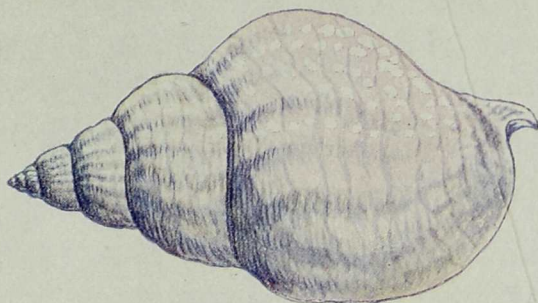
If you pick up a cluster of these curious eggs in the early spring and open them, you will find inside each the shell of a very tiny whelk, which is almost ready to hatch out.

PLATE IX

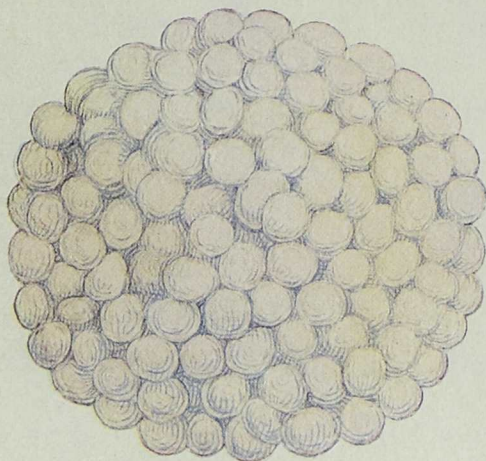
THE DOG WHELK (I)

If you look in the ridges of small pebbles and bits of broken coal which you will meet with here and there on the sandy parts of the sea-shore, you are quite sure to find a number of very small whelk shells. They are brownish yellow outside, and pinkish white inside, and instead of being quite smooth, like those of the common whelk, they are covered with a number of ribs which run down from the peak to the margin. And these ribs are broken up in

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1. THE WHELK.

2. THE EGGS OF WHELK

such a way that they look almost like rows of beads.

These are the shells of the Dog Whelk, and if you wait until the tide is quite low, and then hunt about on the weed-covered rocks close to the edge of the sea, you will very likely find some of the living animals crawling about. They feed upon the sea-weeds by means of a curious organ called the tooth-ribbon. This is just a narrow strip of gristle, set with row upon row of very tiny hooked teeth; and by drawing this backwards and forwards over the leaves of the weeds the animal scrapes off very tiny pieces, which it then swallows.

In the tooth-ribbon of one of these whelks there are about a hundred rows of teeth, with about nine teeth in each row: so that the animal has nearly a thousand teeth altogether. But of course you can only see them by means of a powerful microscope.

PLATE IX

THE STING WINKLE (2)

Although this creature is called a "winkle" it is really one of the whelks. It is very common, and you may often find its empty shell lying upon the shore. It is white, or yellowish white, in colour,

and is generally about an inch and a half in length, with several high ridges running down it from the top to the bottom, and a number of smaller ridges running crosswise between them.

You would not think that this could be a very dangerous creature, would you? It looks as harmless as it can possibly be, and certainly you need not be in the least afraid to pick up a sting wrinkle if you find one crawling about, for it cannot injure human beings. But to other shell-bearing molluscs it is a very terrible foe indeed. I daresay that you have often noticed, when you have been picking up shells on the sea-shore, that a good many of those shells had small round holes bored through them. Well, those holes were pierced by a sting wrinkle. For this animal is a creature of prey, and feeds entirely on other animals which live in shells; and when it meets with one it fastens itself to its victim's shell, and drills a hole right through it by means of its tooth-ribbon. It then pokes the tooth-ribbon through the hole into the body of the animal inside, and draws it back again. As it does so, of course, the sharp hooked teeth drag away little bits of the animal's flesh, which the sting wrinkle swallows. It then pokes its tooth-ribbon down again into the body of the victim, and so on, over and over again, until its hunger is satisfied.

PLATE IX

THE PERIWINKLE (3 and 4)

Of course you know the Periwinkle very well indeed by sight—and very likely by taste, too! So there is no need for me to describe it. But perhaps you did not know that there are two different kinds of periwinkles. One of these is the Common Periwinkle, which is very plentiful indeed on many parts of the coast. You may find it in thousands and thousands if you hunt about on the weed-covered rocks near the water's edge when the tide is out, and no matter how many of them are caught, there always seem to be just as many again next day. This is the periwinkle which is used for food.

The other is the Dog Periwinkle. It is rather larger, and has a stouter shell. If you want to find it, you must look on the rocks about half-way between high and low water-marks, and there you will generally find it crawling about in numbers. But it is not good for food, because it often has a quantity of eggs inside its body, and inside these eggs the shells of the baby periwinkles are already formed, which make it dreadfully gritty. Thrushes, however, as well as a good many of the shore birds, do not mind this

in the least, and they devour so many of both these kinds of periwinkles that it is quite a wonder that any are left alive.

PLATE IX

THE PURPURA (5)

In size and shape this very common creature is rather like the dog periwinkle. But its shell is white in colour instead of bluish black, and generally has two or three bands of light yellowish brown running round it. You may often find it crawling about on the weed-covered rocks when the tide is out.

The purpura is quite a famous creature, because of the use which was made of it by the ancient Romans. I daresay you know that in days of old the colour of purple was very highly valued; and among the Romans only members of the royal family were allowed to dress in purple garments. Now this purple dye was obtained from the purpura. Inside its body this creature has a little bag which contains about a drop of a thick white liquid, rather like milk. Certainly it does not look in the least like purple dye. But if you were to squeeze it out on to a sheet of white paper, and to place it in the sunshine, you would very soon see that it was changing colour. In



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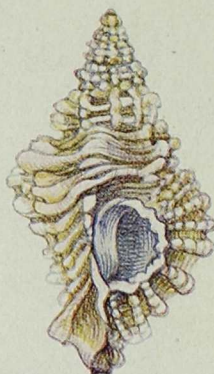
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2

1. THE DOG WHEELK.
3. THE PERIWINKLE.

2 THE STING WINKLE.
4. THE DOG PERIWINKLE

5 THE PURPURA

a few minutes' time it would have turned to yellow. After a little time longer you would notice a blue tinge creeping into the yellow, and turning it to green; and by degrees the blue would become stronger and stronger, till the green disappeared. At last a crimson tinge would creep into the blue and turn it to purple; and this would be exactly the same as the famous purple dye which the ancient Romans valued so highly.

The eggs which are laid by the *purpura* are very curious indeed, for they are fastened down to stones by little stalks; so that each one looks rather like an egg-cup with an egg inside it. And inside each of these eggs are several little *purpuras* instead of only one.

PLATE X

THE SEA SNAIL (I)

This is one of the very commonest of all the shell-bearing molluscs. You may find it crawling about in numbers all over the weed-covered rocks which are left bare as the tide goes down. Its shell varies very much in colour, for it is sometimes bright yellow, and sometimes pale yellow, and sometimes olive green, and sometimes brown, and sometimes almost black. Indeed, you might almost think that there were

half-a-dozen different kinds of these sea snails instead of only one.

These creatures have tooth-ribbons set with hundreds of tiny hooked teeth, just like those of the dog whelks, and they use them in feeding upon the leaves of sea-weeds in just the same way.

PLATE X

THE WENTLETRAP (2)

The Wentletrap is one of the most beautiful of all the shells which are to be found upon the shore. Indeed, I really think that it is quite the most beautiful. For the high ridges which stand out so boldly run round and round it in the most graceful curves, and the whole shell looks just as if it had been carved out of ivory.

The wentletrap is sometimes known as the "staircase shell," because the ridges which run round it are very much like those spiral staircases by which one climbs to the tops of church towers and other lofty buildings. If you want to find it, the best place to look is in the ridges of small pebbles which are washed up here and there on sandy coasts by the waves, and which are generally mixed up with broken coal which has been thrown out from passing



1. THE SEA SNAIL.

2. THE WENTLETRAP.

ships. But it is not very common, and you must not be disappointed if you do not succeed in finding it.

PLATE XI

THE COMMON LIMPET (I)

This is a very common creature indeed, and you can find it in hundreds and thousands on any rocky part of the coast. Numbers of its empty shells are to be found lying about on the beach, and if you go down among the rocks when the tide is out you will often notice that in some places they are so covered with limpets that you can scarcely put the tip of your finger in between them.

These animals cling to the rocks in the most wonderful way. Indeed, if you take hold of a big limpet between your fingers you will not be able to move it in the least, even if you pull at it and push at it as hard as you can. But if you take the animal by surprise, and give it a sharp, sudden blow sideways with a stone, or the end of a stout stick, you can generally knock it off quite easily. And you will very often find that a deep ring-shaped mark has been worn away in the rock by the sharp edges of its shell.

However, limpets do not always remain clinging

to the rocks, for they can crawl about quite as easily as snails can, by means of that soft, fleshy part of the body which we call the "foot." And if you take them home alive, and put them into an aquarium, you may often see them creeping up and down the glass sides, through which you can examine their bodies quite easily.

PLATE XI

THE KEY-HOLE LIMPET (2)

There are a good many different kinds of limpets, of which one of the most curious is the Key-hole Limpet. It is generally found in rather deep water, but you may sometimes find it clinging to the rocks just above low-water mark. You must choose a season of "spring-tide," however, for then the tide goes farther out than usual, and leaves behind it a good many creatures which at other times one hardly ever sees.

The shell of this creature is rather stouter than that of the common limpet, and has a number of ridges running down it from the peak to the margin. Even by these you can tell it at once. But if you look at it closely, you will also find that just at the top of the peak there is a hole shaped rather like a key-hole. Through this hole the animal squirts out the water which has passed

over its gills; so that all the time that it is breathing, if only one could see it, a kind of little fountain is playing under water, spouting out from the top of its shell!

PLATE XI

THE SMOOTH LIMPET (3)

At first sight, perhaps, you would hardly take this creature for a limpet at all, for it is ever so much smaller than either the common or the key-hole limpets, and has a very thin and delicate shell indeed. It varies a good deal in colour, but generally the shell is pale brown, looking almost like polished horn, with eight or nine narrow streaks of bright blue running down from the peak to the margin. It is often called the "bonnet shell," because in shape it is rather like an old-fashioned bonnet.

You may often find the empty shells of this creature lying upon the shore. But if you take them home you will find that as soon as they become dry the beautiful blue streaks begin to fade, and that after a few days you can hardly see them at all

PLATE XI

THE CUP AND SAUCER LIMPET (4)

This is a very curious creature indeed. But if you want to see why its rather odd name was given to it, you must look inside its shell instead of outside. Then you will see that in the upper part is a curved plate which really looks very much like a tiny tea-cup, while the shell itself surrounds it just like a saucer. And if you were to examine the animal which lives inside it very carefully, and to pull out its long tooth-ribbon, you would find at the tip of it a curious little organ which looks just like a tea-spoon. So that we have cup, saucer, and spoon all in one!

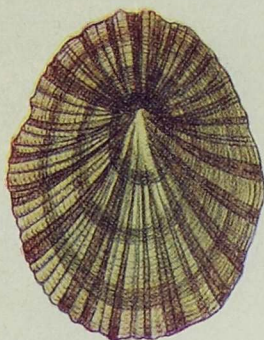
Perhaps you may wonder what the odd little cup is for. Well, the fact is that the muscles by means of which the animal clings to the rock are very strong indeed. So, of course, there must be something else very strong to which they can be fastened, and this cup-shaped plate gives them a very firm hold.

The cup and saucer limpet is not a very common creature, and in many parts of the coast it is never met with at all. But if you stay by the seaside on the south coast of England, you may sometimes find its empty shell lying upon the shore.

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1. THE LIMPET.

2. THE KEY-HOLE LIMPET.

3. THE SMOOTH LIMPET.

4. THE CUP AND SAUCER LIMPET.

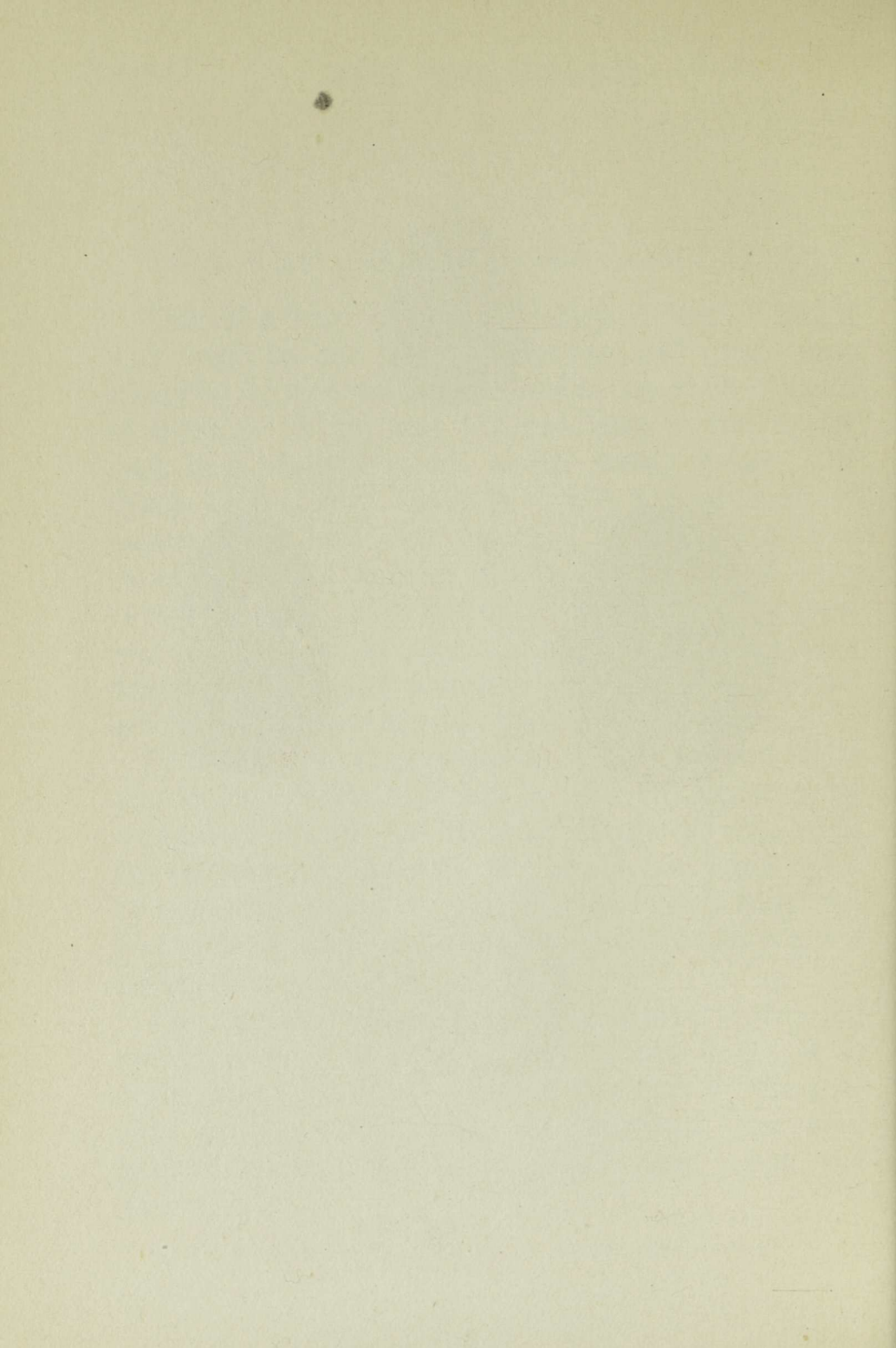


PLATE XII

THE PAINTED TOP (I)

Tops are generally very common indeed on the sandy parts of the shore. You cannot possibly mistake their shells for those of any other creatures, for they are cone-shaped, looking very much like rather flattened sugar-loaves, and are generally very beautifully coloured. So pretty are they, indeed, that they are sometimes strung together and worn as necklaces, or used for ornamenting ladies' dresses.

The painted top is one of the most beautiful of all these shells, for it is covered all over with spots and streaks and blotches of scarlet, and crimson, and pink, and purple, and white, and blue, and yellow! But all this lovely colouring is only on the outer coat of the shell, which is very easily chipped off. The consequence is that these shells are very often damaged by being tossed to and fro by the waves, and though you may often find twenty or thirty in the course of a morning, not more than two or three, perhaps, will be quite uninjured.

Tops are very useful creatures to have alive in an aquarium, for they keep the glass sides clean from the tiny green weeds which so quickly grow upon them. They do this by means of their

tooth-ribbons, and you may see them crawling about on the glass walls and mowing down the weeds, just as a gardener cuts the grass on the lawn with his scythe.

PLATE XII

THE GREY TOP (2)

The painted top is rather a large shell, for it is often nearly an inch in height from the peak to the margin. But the Grey Top, which is even commoner still, is a good deal smaller. It is not nearly so brightly tinted as the painted top, for it is yellowish grey in colour, with zigzag black streaks running round and round it, which give it rather a mottled look. Still, it is a very pretty shell indeed.

If you look at a top shell from underneath, you will always find that there is a small hole in the bottom. This is the entrance to a passage which runs right up into the peak of the shell. In the grey top this hole is just about big enough to admit a rather fine needle.

PLATE XII

THE COWRY (3)

No doubt you have often found this very pretty shell, for on the sandy parts of our coasts it is sometimes very common. You may often find twenty or thirty cowries, indeed, in one of those ridges of pebbles and small coal which are washed up by every tide. But if you were to see the living animals crawling about I do not think that you would ever guess what they were, for their soft bodies come outside their shells, which they cover up so completely that you can hardly see them at all.

If you look on the upper part of the shell, you will see that a pale streak runs across it from one side to the other. This streak marks the line where the edges of the two sides of the body almost meet.

In some parts of the world cowry shells are used instead of money. It seems rather an easy way of getting rich, doesn't it, just to go and pick up shells on the sea-shore? But then fifteen hundred of these cowries are only worth about a shilling, so that you would have to pick up a very great many even if you only wanted to do a day's shopping! And then they are ever

so much bigger than our English cowries, so that it would not be very easy to carry them about. You would have to take several sacks full of cowries with you when you went to make a purchase, instead of just keeping your money in a purse!

PLATE XII

THE CHITON (4)

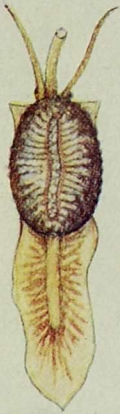
The chiton is one of the oddest of all the shell-bearing molluscs; for it does not look like a mollusc at all. It looks much more like a kind of sea woodlouse, or a very tiny armadillo. For instead of having a single shell like a whelk or a periwinkle, or a double one like a cockle or an oyster, it has eight shelly plates on its back which overlap one another, just like the tiles on the roof of a house. And if you touch it, it will often roll itself up into a kind of ball, just like the pill-millepedes, or "monkey-peas," which are so common in our gardens.

This creature is called the Chiton, and if you want to find it you must go and look on the piles at the end of a pier, or on the rocks which are left bare at very low tides. There you will often find it in hundreds. Generally it is ashy grey in colour, but it varies a good deal in hue, and you will sometimes find examples which

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1. THE PAINTED TOP.
3. THE COWRY.

2. THE GREY TOP.
4. THE CHITON.

are streaked and mottled with pink, and orange, and white, and lilac, and chocolate brown.

Before a chiton reaches its perfect form it passes through a kind of caterpillar stage, and then turns into a sort of chrysalis, just as an insect does. And both the caterpillar and the chrysalis, strange to say, have eyes upon their heads, while the perfect chiton has none. But some chitons have eyes all over their shells instead, and in some of these very odd creatures between eleven and twelve thousand eyes have been counted, the shells being almost entirely covered with them; so that the animals may really be said to see with their whole bodies!

CHAPTER III

BIVALVE MOLLUSCS

PLATE XIII

THE OYSTER (I)

THE "bivalve" molluscs are so called because they live in shells made of two parts, or "valves," which are fastened together by means of a hinge. There are a great many of these, and the Oyster is one of the best known of them all.

This creature is only found in places where the bottom of the sea is muddy, because in sandy places the sand is very apt to get into the hinges of the shells and to prevent them from being closed; and in that case the animal very soon dies from suffocation. So oysters are generally found in the mouths of rivers, or in land-locked bays where there is no sand at all.

The history of these creatures is a very curious one indeed.

In the month of May the mother oyster produces a very large number of eggs—sometimes as many as eight or nine hundred thousand! These are called "oyster spat," and for several weeks

she keeps them in her gills. Then one day she suddenly opens her valves and squirts them out into the water, where they look like a little cloud of the finest possible dust. For a short time after these eggs hatch the baby oysters swim about, and travel backwards and forwards as the tide rises and falls. After a while, however, they sink down and fasten themselves to some object at the bottom of the sea; and when once they have done this they never move again. They always lie upon their left sides, with the smaller and flatter of the two valves uppermost; and there they remain for five years at least before they reach their full size.

Oysters feed, too, in a very odd way. You know, perhaps, that inside the shell of an oyster there is a tufted organ which we call the "beard." This consists of the gills. Hidden away underneath these is the mouth; and the gills do not merely suck out the air which has been dissolved in the water, as those of other animals do, but sift out every little tiny scrap of decaying matter which the oyster can use for food as well. So an oyster's gills enable it to breathe and to catch its dinner at the same time!

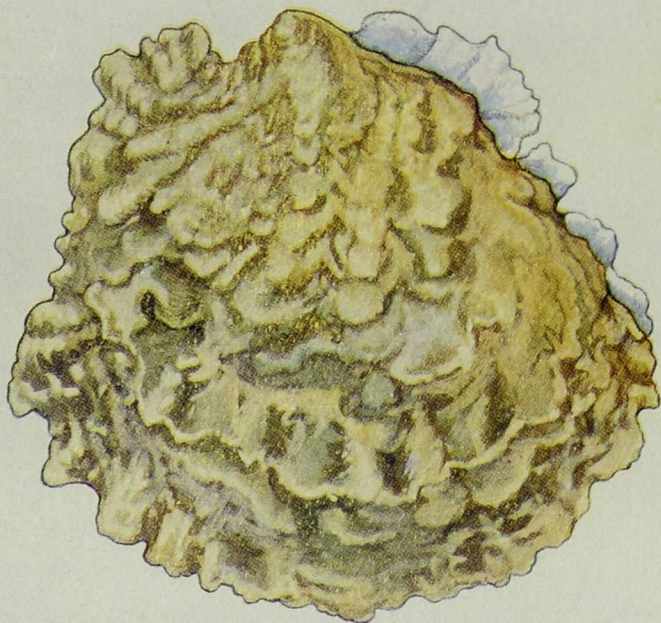
PLATE XIII

THE SADDLE OYSTER (2)

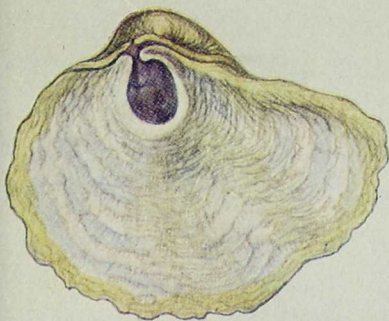
This is a very curious oyster; for in its flat lower valve, just below the hinge, is a large oval hole. Through this hole passes a strong band of muscle, to which is fastened a kind of shelly knob which looks just like a button. By means of this the animal fastens itself down to some object at the bottom of the sea; and very often indeed it is found attached to the shells of other molluscs, looking something like the saddle on the back of a horse. That is why it is called the "saddle oyster."

Another curious fact about this creature is that very often its shape completely alters as it grows older. While it is quite small it looks very much like an ordinary oyster. But as time goes on it generally takes the form of the object on which it rests. So you might easily find half-a-dozen shells of the saddle oyster, not one of which would be shaped like any of the others.

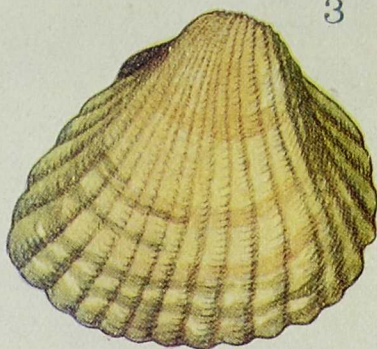
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1. THE OYSTER.

2. THE SADDLE OYSTER

3. THE COCKLE

PLATE XIII

THE COCKLE (3)

This is one of the very commonest of all the creatures of the sea-shore, and you may find its heart-shaped shells lying about on the beach in hundreds and thousands. In many places, indeed, cockle-shells are found in such wonderful numbers that they are crushed up and used for covering pathways instead of gravel.

Yet you may wander about on the shore day after day for weeks together and never see a living cockle. How is this?

Well, the reason is that cockles live buried underneath the sand. If you go down near the edge of the waves when the tide is quite low, and just stand still for a minute or two and watch, you are almost sure to see first one little jet of water, and then another, and then another, come squirting up out of the sand into the air. Now these little jets of water are thrown up by cockles which are lying buried in the wet sandy mud below. For every now and then these creatures draw down a little water into their gills, through one of their siphon tubes, and when they have sucked all the air out of it they squirt it up again through the other.

Would you like to dig one of them up and look at it? Well, just take a wooden spade and try.

You will find that you cannot do it, for the cockle can dig a good deal faster than you can. The fact is that he has a very strong, fleshy organ which we call the "foot," and with this he can burrow down into the sandy mud so quickly that by the time you have dug to a depth of six inches, he will have gone down to the depth of ten or twelve.

The cockle uses this "foot" for another purpose as well, for he can jump with it. And if you did succeed in digging him out of the ground, you would very likely see him skipping about in the most active way, almost like a sand-hopper!

Upon some parts of the coast another kind of cockle is found, which has its "foot" of a bright red colour. For this reason it is generally known as the "red-nosed cockle."

PLATE XIV

THE MUSSEL (1 and 2)

Mussels are almost, if not quite, as plentiful as cockles. If you walk down underneath a pier or a jetty when the tide is out, you will often find that the pillars which support it are covered with great clusters of these creatures; and very often the rocks which are left dry at low-water are covered with them in just the same way. They fasten

themselves down by means of a bundle of very strong threads, which we call the "byssus"; and these hold so firmly, that although the waves may beat upon a bed of mussels day after day all through the year, they never succeed in tearing them away.

At the town of Bideford in Devonshire, indeed, there is a bridge which is only kept standing by means of mussels. This bridge, which is a very long one, with twenty-four arches, runs across the Torridge River, close to the place where it joins the Taw; and the tide runs so rapidly that if mortar is used to repair the bridge it is very soon washed away. So boat-loads of mussels are brought to the bridge from time to time, and these anchor themselves down so firmly by means of their byssus threads that they actually hold the stone-work together!

Sometimes, however, mussels do a great deal of harm, for they will get into an oyster-bed and fasten themselves down upon the shells of the oysters. Their byssus threads then form a kind of thick mat, which collects and holds the mud that is brought up by the tide every time that it rises; and this very soon covers the oysters entirely up, and smothers them to death.

Mussels do not remain fastened down in one place for the whole of their lives, however, as oysters do. They can crawl about quite easily whenever they like. And they do this, also, by

means of their byssus threads. First they move a few of these threads forward, and take a fresh hold with them; then they draw the rest up after them; and then they move the front ones forward once more, and so on over and over again.

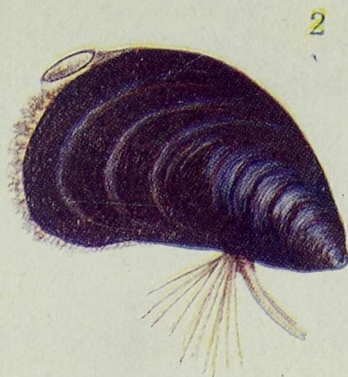
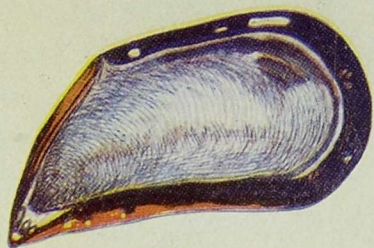
Mussels are very largely used for food, and also as bait for deep-sea fishing. In the Firth of Forth alone, indeed, nearly forty millions of these creatures are collected every year for this latter purpose alone, or one for every man, woman, and child in England and Scotland and Wales!

PLATE XIV

THE HORSE MUSSEL (3)

This is not a very handsome creature, for its shell is covered all over with a rather thick brown skin, which is very much wrinkled. It is quite common in many places, and yet one does not very often see it; for it is nearly always hidden underneath its byssus threads, which grow in thick masses. Besides this, it often burrows underneath the surface of the sand; so that unless you know just *where* to look for it, and *how* to look for it, you are not likely to find it.

But if you go down to the pools at the very edge of the water when the tide is quite low, and scrape away the sand which is heaped up



1. INSIDE OF MUSSEL SHELL.

2. THE MUSSEL.

3. THE HORSE MUSSEL

against the bottom of the rocks, you may very likely come upon quite a large cluster of these curious creatures.

Horse mussels are not used for food as common mussels are, because they have a very strong and unpleasant taste.

PLATE XV

THE VARIABLE SCALLOP (I)

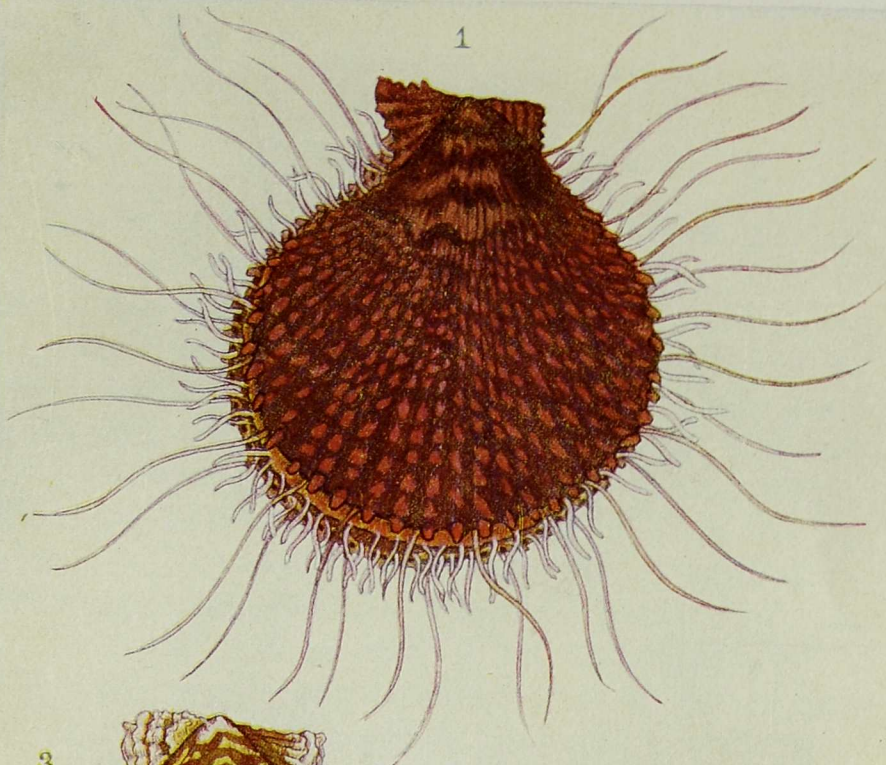
A good many different kinds of scallops are found on our shores. One of them—the Common Scallop—is as large as the palm of a man's hand, and is used for food. You may often see it in fishmongers' shops. But you are not at all likely to find its empty shells lying on the shore, for it lives in rather deep water. You may find those of the Variable Scallop, however, very often indeed in places where the shore is sandy. It is called the "variable" scallop because it varies so much in colour that one hardly ever sees two of its shells which are quite alike. Sometimes they are crimson, sometimes pink, sometimes mauve, sometimes dark yellow, sometimes golden yellow, and sometimes blotched and mottled with different colours. A number of ridges run down the shell from the hinge to the margin, and on each of these is a row of short spikes; so that the animal looks something like a tipsy-cake!

Scallops swim in a rather curious way, namely, by opening and shutting their valves over and over again. As often as they do this a jet of water is squirted out, and this acts on the surrounding water just like the jets which are squirted from the siphon tubes of the cuttle, and drives the animal along with some little speed. As it travels through the water it looks very pretty, for all round the edges of its shell it has a fringe of long feelers, which wave up and down in a most graceful way. By means of these it obtains its food. At the base of these feelers is a row of little black dots, which seem to be eyes.

PLATE XV

THE RADIATED SCALLOP (2)

This is rather a rare shell, and if you find it lying upon the shore you will be fortunate. You may know it at once if you *do* find it, for it only has six or seven ridges running down it, instead of about twice that number. It varies a good deal in colour, but is generally reddish brown, spotted and speckled with white.



1. THE VARIABLE SCALLOP.

2. THE RADIATED SCALLOP.

3. THE HUNCHBACK SCALLOP.

PLATE XV

THE HUNCHBACK SCALLOP (3)

It is very easy to see why this creature is called the "hunchback," for although when it is quite small it is shaped just like other scallops, it alters in form very much as it grows bigger; so that really it sometimes looks as if it had been crumpled up when it was quite soft, and had never recovered from the squeeze. Besides this, the two valves are not alike, as they are in other scallops, for while one is always very deep and rounded, the other is nearly flat. So when the animal is alive it really has a kind of "hunchbacked" appearance; and if you found its two valves lying apart from one another you would hardly believe that they could both have belonged to the same creature.

The colour of the hunchbacked scallop is white, mottled with brick-red.

PLATE XVI

THE SUNSET SHELL (1 and 2)

This is a very "local" shell. That is, it is very common indeed in some places, so that you might pick up hundreds and hundreds in a few

minutes, while in other places it is never found at all. The best place in which to look for it is a part of the beach where sand and mud are mingled together, and there you will be almost sure to find it.

The name of "sunset" shell has been given to it because of the beautiful way in which the inside surface is coloured. Sometimes it is rosy pink all over; sometimes it is orange yellow; sometimes it has crimson streaks upon a whitish ground. But you can never look at it without being reminded of the evening sky after a very bright sunset. The outside of the shell, however, is always white and chalky-looking, and no one who saw the two valves fastened together as they are when the animal is alive would have the least idea how beautiful they really are.

This creature always lives buried in the sandy mud, just as the cockle does. It has a very powerful "foot," by means of which it burrows, and two long and very slender siphon tubes.

PLATE XVI

THE GAPER (3)

This is another of the shell-bearing molluscs which live in burrows in the sandy mud, and it is called the "gaper" because the shells are



1. INSIDE OF SUNSET SHELL.

2. THE SUNSET SHELL.

3. THE GAPER.

always open at the top, just as if the animal were yawning, or gaping. Through this opening the siphon tubes project. These tubes are used in breathing, just like those of the cuttle, and are enclosed in a kind of leathery case, which the animal can stretch out or draw back at will; so that when it is lying at the bottom of its burrow it can keep the tips of the siphon tubes just above the surface of the mud, and so draw water down to its gills quite easily.

On some parts of the coast gapers are used as food. But if you want to buy some you must not call them "gapers." You must call them "old maids"; for by that name they are always called by the fishermen. Some of the sea-birds are very fond of them too, and dig them out of their burrows with their long beaks. And in the far North millions and millions of them are devoured by walruses, and also by Arctic foxes, which prowl about the shore in search of them every day when the tide goes down.

PLATE XVII

THE PIDDOCK (I)

Now we come to one of the most wonderful of all the creatures which live in the sea; namely, the Piddock. You can find its empty

shells lying about in numbers on almost any part of the shore where the cliffs are made of chalk or limestone. And if you look at the rocks which are left dry when the tide goes down you will see the entrances to its burrows—large, oval holes, several of which you may often find quite close together. For the piddock is a boring shell, which drives its tunnels through and through the rocks, until very often they are quite honeycombed by its tunnels. Sometimes you may meet with a big block of chalk which only weighs about half as much as it should, because all the rest has been cut away by piddocks. And if you could split it open you would find several of these creatures lying in their burrows.

But how they manage to cut their way through the hard chalk, or the still harder limestone, nobody quite knows. Most likely, however, they do so partly by means of the soft part of the body which we call the "foot," and partly by means of the shell, which they turn first a little bit to one side, and then a little bit to the other side, just like a man who is using a bradawl. Every now and then, of course, the burrow gets choked up with the material which has been scraped away. But the piddock knows quite well what to do in order to clear it. It just squirts out a jet of water from the siphon tubes, by means of which it breathes, and so washes the burrow out.

Now let me tell you why I said that the piddock is one of the most wonderful of all the creatures which live in the sea.

First of all, then, remember that the sea, acting by itself, has very little power to wash away chalk. For as soon as the waves begin to beat upon the face of a chalk cliff, they leave on it the spores, or seeds, of sea-weeds. Very soon those spores begin to grow, and before long the surface of the cliff is covered with masses of weed, so that the sea hardly touches the chalk underneath them at all. The waves might beat upon the cliffs for hundreds and hundreds of years without breaking it down.

But the piddock comes and burrows into the chalk just below high-water mark. Backwards and forwards it goes boring on, till at last only thin dividing walls are left between its tunnels. Then the sea washes in, and breaks down these walls, so that the whole foundation of the cliff is cut away. The result is, of course, that before very long there is a landslip. Hundreds of tons of chalk come tumbling down into the sea. Then the piddocks begin work again a little farther back, and by and by there is another landslip.

You can see the effects of the piddock's work upon any part of the coast where there are chalk cliffs. Just look at the beach when the tide is out. You will notice long spits of weed-

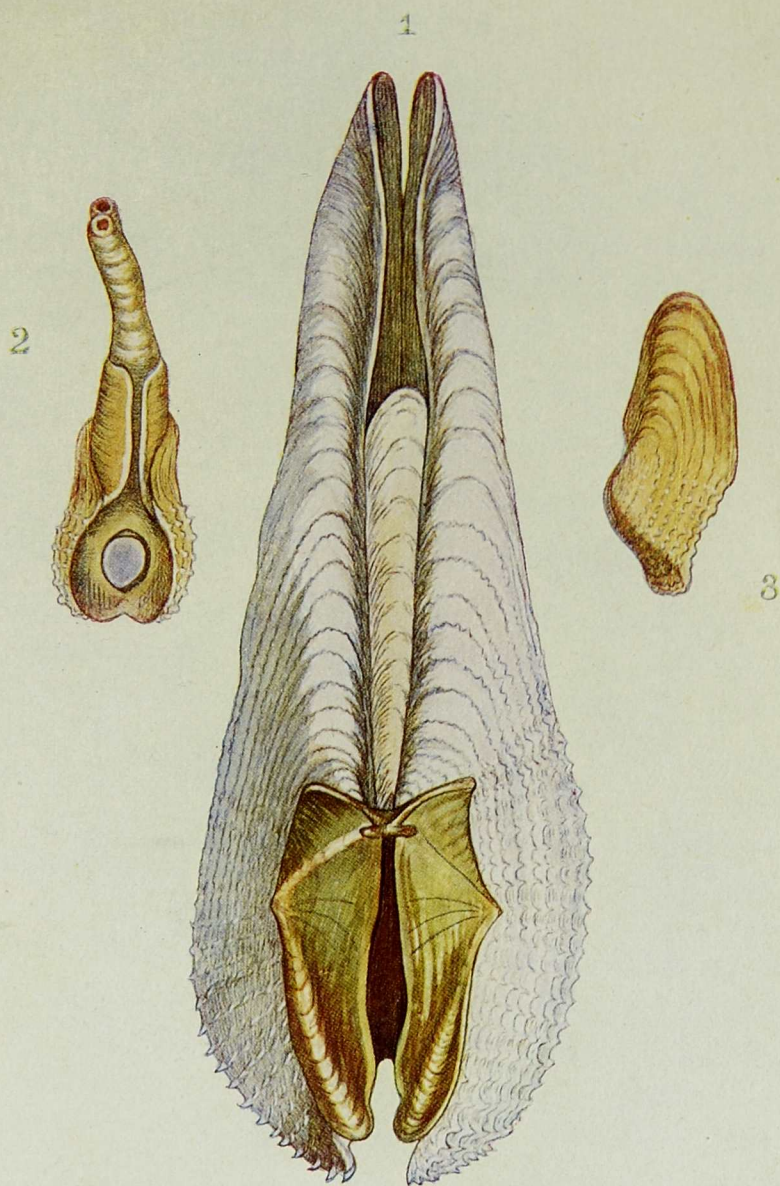
covered rocks, which sometimes run far out into the sea. Well, those rocks were not always rocks. They were once the bottoms of cliffs. But the piddocks and the sea, working together, cut the cliffs down ; so that the sea gained, yard by yard, upon the land.

Indeed, I think that it may be said, quite truly, that if it had not been for the work of the piddocks Great Britain would not be an island ! At any rate we do know this, that once, a great many hundreds of thousands of years ago, Great Britain was not an island at all, but was joined to the mainland of the Continent of Europe. And we also know that the sea, acting by itself, could not possibly have cut a passage through what we now call the Straits of Dover. The piddocks helped it to do so ! They kept on cutting away the foundation of the cliffs by boring backwards and forwards through the solid chalk, just below the level of the waves ; and the sea finished the work which the piddocks had begun, by breaking down the thin dividing walls between their burrows.

PLATE XVII

THE LITTLE PIDDOCK (2 and 3)

The common piddock grows to a length of from three to five inches, and is almost always white in colour, though sometimes it is stained by the



1. THE PIDDOCK.

2 and 3. THE LITTLE PIDDOCK.

rocks in which it lives. But there is another kind of piddock which is very much smaller, for its shells hardly ever measure more than an inch and a half in length, and are a good deal narrower in proportion to their size. This creature is called the Little Piddock. It is generally of a brownish yellow colour, and you may often find its burrows in great numbers in limestone rocks.

PLATE XVIII

THE SHIPWORM (1 and 2)

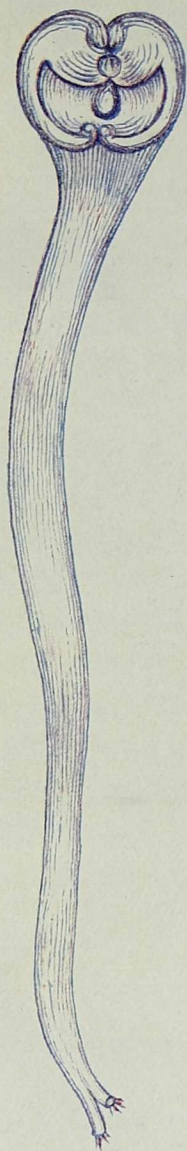
This creature certainly does not look in the very least like a mollusc; and I do not think that anybody who had never seen it before would ever guess that it is really quite a near relation of the piddocks. It looks much more like a kind of worm, for it has a soft round body no larger than an ordinary drawing pencil, though it is often as much as ten or even twelve inches in length. But if you were to look at the head end of its body you would see its bivalve shells, though they are so very small that they might easily be mistaken for jaws. And these would show you that the animal is really a shell-bearing mollusc.

The shipworm is a most mischievous creature, for instead of burrowing into chalk or limestone

rocks, like the piddocks, it bores into timber, such as the hulls of ships, and the posts which support jetties and piers. Very often it cuts away more than half the wood in a great beam, leaving only the thinnest walls between its tunnels. And as it works along it lines these tunnels with a curious shelly substance, which strengthens them and prevents them from breaking down.

By burrowing into timber in this way the shipworm often does most terrible damage. But it seems to dislike the taste of iron rust very much indeed. So when a beam of timber has to be protected from its attacks, a number of iron nails with very broad, flat heads are driven into the surface, with only the space of an inch or two between them. The salt water acts upon these very quickly, and the result is that the whole of the beam is very soon covered over with a thin coating of rust, so that no shipworm will attempt to touch it.

When the shipworm is quite small it is not in the least like the perfect animal. Indeed, if you were to see a baby shipworm, I do not think that you would ever guess what it was. It is really a kind of shipworm caterpillar. In shape it is nearly round, and is covered almost all over with tiny hair-like organs, by means of which it swims in the water. But the odd thing about it is that it keeps on changing its form. After about thirty-six hours it becomes oval. A few hours later, if



1 THE SHIP-WORM.



2. WOOD BORED BY SHIP-WORMS.

you were to look at it again, you would find that it was almost triangular. A few hours later still it would be round again, just as it was when it first hatched out of the egg. And during this time of its life it has a strong fleshy "foot," like that of a snail, so that if it becomes tired of swimming it can settle down and crawl about on the surface of the rocks.

Have you ever been through the Thames tunnel? If you have, you will be interested to know that it is made just like a shipworm's burrow, for a kind of boring instrument, called a "shield," was made, which enabled the workmen to line the walls with masonry as fast as the earth was cut away. In this way the walls were prevented from falling in, and water from the river above was kept from breaking through the roof and flooding the tunnel. And Brunel, the great engineer who constructed the tunnel, admitted that the idea had come to him one day when he was examining the burrow of this wonderful mollusc.

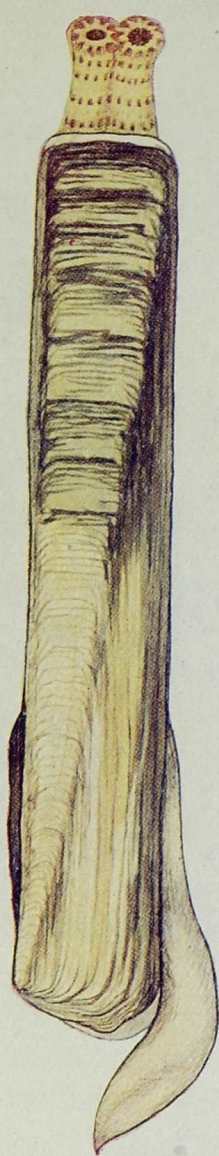
PLATE XIX

THE RAZOR (1 and 2)

If you walk about very quietly, when the tide is out, on the stretch of wet, sandy mud which lies just above low-water mark, you may often

see a very curious object resting at the surface, and looking just like a little keyhole. And if you step heavily anywhere near it, it is almost sure to squirt up a little jet of water into the air and disappear. Then you may be quite sure that you have found the burrow of a Razor Shell.

This is a very long, narrow creature with bivalve shells, which are shaped almost exactly like the handle of a razor. It is generally about four or five inches in length and half an inch in width, and the object which looks so like a keyhole consists of its siphon tubes, the tips of which rest just above the surface of the sand when it is lying at the mouth of its burrow. It digs by means of its strong, fleshy "foot," just as the cockle does, and its burrow, which goes straight downwards just like a well, is often as much as two feet deep. So it is not a very easy thing to get a razor out of its tunnel. But if you want to do so I can tell you how to manage it. Just take a good big pinch of salt, and drop it down into the hole. Now the razor does not like salt at all, even though most of its life is spent at the bottom of the salt-water, and it comes up to the mouth of its burrow in a great hurry to get rid of it. Then if you make a *very* quick stroke with a spade you can dig it out before it has time to get down to the bottom again. But if you should fail to get it up at the first attempt it is of no use to try again,



1. THE RAZOR.

2. TOP OF RAZOR FROM FRONT.

3. THE SABRE RAZOR.

for even if you pour down a whole handful of salt the animal will never come up a second time.

The razor is very good to eat, if its tough leathery skin is slipped off, and on some parts of the coast it is often used for food. The fishermen use it for bait, too, and catch it by means of a slender iron rod with a barbed tip, which they thrust into its body as it lies at the bottom of its burrow.

PLATE XIX

THE SABRE RAZOR (3)

There are several different kinds of Razors, and one of them is called the "sabre razor," because its shells are curved, just like the scabbard of a sabre. It is fairly common, but you are never likely to find its burrows, unless you go to look for them just at low-water after a spring-tide, because it almost always lives below the ordinary low-water mark. But after spring-tides—which come twice in every month, once when the moon is new and once when it is full—the waves retreat much farther than they do at other times. Then, if you go right down to the water's edge, you may often find creatures which you will never meet with higher up on the beach. And one of these is the sabre razor.

PLATE XX

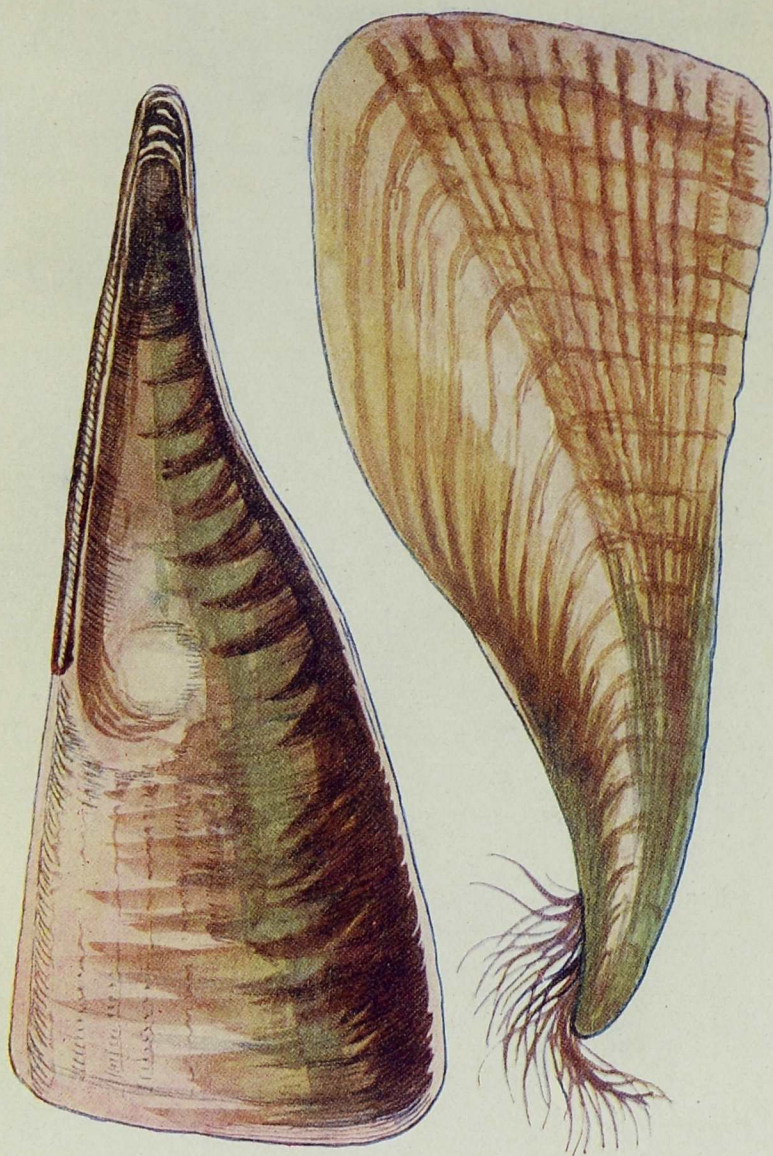
THE PINNA

This is the largest of all the shell-bearing molluscs which live in our British seas, for it has been known to reach a length of nearly two feet. It is found chiefly on our southern coasts, and always lies upright, half buried in the mud at the bottom of the water, with its shells partly opened. And it always fastens itself down by a bunch of "byssus" threads, like those of the mussel, which are so strong that it takes a very hard pull indeed to tear them away from their hold.

In the British Museum you may see a pair of gloves which have been made out of the byssus threads of a pinna, and if these creatures were more plentiful their threads would no doubt be used in this way very largely indeed.

Now why do you think that the pinna always rests at the bottom of the water with its shells partly opened?

Well, the reason is a very odd one. It is setting a trap for fishes! For fishes, as perhaps you know, are very inquisitive creatures. They always want to know all about everything, and whenever they see a hole they think that they must find out what is inside it. So when a little



THE PINNA

fish comes swimming past a pinna, and catches sight of its gaping shells, it is almost sure to venture in between them. Then the shells close tightly, and it finds itself in a prison from which there is no escape; and very soon it is killed and devoured.

In colour, the shells of the pinna are very pale brown, and a number of ridges run down it from the smaller end to the larger. When the animal is full-grown it is sometimes not at all easy to see its shells, for they are covered almost all over with barnacles and the tubes of sea-worms.

CHAPTER IV

CRABS

HOW CRABS GROW

IF you hunt about in the pools among the rocks when the tide goes out, and look behind the masses of sea-weeds which cover them, you are quite sure to find a good many crabs of several different kinds. Before I tell you about these, however, I think you would like to know something about the way in which these curious creatures grow.

Remember, then, in the first place, that what we always call the "shell" of a crab is not really a shell at all. That is, it is not in the least like the shell of an oyster, or a periwinkle, or a cowry, or a whelk. In these creatures the shell grows together with the animal inside it, and is never thrown off all through their lives. But the "shell" of a crab never grows at all. It is really a kind of crust of lime on the outside of the skin, which will not even stretch in the very least degree. So the only way in which crabs can grow is by throwing off their

"shells," in order that the soft bodies underneath may increase in size.

So once in every year, until it reaches its full size, every crab has to cast off its shelly covering and get a new one in its place. A few days before the change takes place it always goes and hides away in some dark crevice among the rocks, or behind an overhanging mass of seaweed, where none of its many enemies are likely to find it. It knows perfectly well, you see, that while it is without its coat of mail it will be quite helpless; for its claws will be so soft that it will not be able to use them, while its body will be quite unprotected. Then a very strange thing indeed takes place. Something like a third part of its flesh turns into water! If you were to catch the animal at this time and to shake it, you would be able to hear the water swishing about inside its shell! Then it gets very restless indeed, and begins to wriggle about a good deal, turning and twisting from side to side, and rubbing its legs against one another, till it is quite tired out. It then rests for a little while, and begins to wriggle and twist about again. The fact is that it is trying to get loose, as it were, inside its "shell." After a time it succeeds in doing this, so that the "shell" is no longer fastened to its body at all. Then, quite suddenly, a rent opens right across its back, and the crab gathers itself together and

leaps, with a mighty effort, right out of its old coat! And as soon as it has done so the rent closes up again, so that unless you look very carefully indeed you cannot see it. You might really think that two crabs were lying side by side together.

For about a couple of hours the crab now lies perfectly still; and if you were to feel it you would find that its body was hard and knotted all over. That is because its muscles are cramped after the violent efforts which it has been making. After a time, however, the cramp passes off. Then the animal begins to grow. It grows very fast indeed. In fact it grows so fast that you can almost see it growing, and in less than twenty-four hours it is sometimes nearly half as big again as it was before. A new "shell" then begins to form upon the skin, and in about a couple of days more the animal is able to leave its retreat, clothed once more in a suit of good stout armour.

That is the way in which crabs, and lobsters, and shrimps, and prawns all grow. Once in every year at least they get new "shells"; and every time that they do so they increase in size. But after they reach a certain age they grow no more; and the coats of mail which they are wearing then are kept to the end of their lives.

HOW CRABS SEE

Perhaps, too, you would like to know something about the eyes of crabs; for these creatures see in a very odd way. On each side of the head is a kind of stalk, something like those which you may see on the heads of slugs and snails, only very much smaller. And at the tip of each stalk is a small black spot. Now if you were to put one of these little stalks under the microscope, and to look at the black spot, you would find that it was made up of hundreds and hundreds of very tiny eyes, very much like those of insects, except that instead of being six-sided they are square. So that altogether, perhaps, a crab may have three or four thousand eyes, or even more!

That sounds a very large number, doesn't it? But then, you see, a crab cannot move its eyes up and down, and from side to side, as we can. They are fixed, and cannot be moved at all. Each eye, however, looks in rather a different direction from all the rest. Some eyes look upwards, some look downwards, some look forwards, some look backwards, and some look out on either side. So without moving its head at all the crab is able to see all round it.

Think of it in this way.

Suppose that you take a telescope and look through it. You can only see the objects at which the telescope is pointed, not the objects above it, or below it, or on each side. But if you had four thousand telescopes, fastened together in two bundles of a couple of thousand telescopes each, all pointing in different directions, *and if your eyes were made in such a way that you could look through all the telescopes at once*: then you would be able to see all round you, though you would only be able to look in any special direction through just one or two of the telescopes.

Now that is very much like the way in which the eyes of crabs are made. Each of these four thousand eyes is really a kind of telescope. And as they all point in different directions, the crab is able to see above it and below it and on all sides, though it only looks at any special object through one or two eyes.

HOW CRABS HEAR AND SMELL

The way in which crabs hear and smell is almost as curious as the way in which they see, for they have very odd little ears and noses in very odd places.

On its head, as perhaps you know, a crab has two pairs of feelers. We call them the "lesser feelers" and the "greater feelers." Now if you were to look at the first joint of the lesser feelers through a good microscope, you would find on each a little gland, or bag, containing a very tiny drop of salt and water. These are the crab's ears. Of course they are not nearly so good as our ears are. Indeed, I do not think that a crab can hear sounds in the air at all. But water carries sounds much more readily than air does, so that if you were to dive into a lake, or into the sea, on a calm, still day you could easily hear the beat of the oars in a boat half a mile away. And the ears of the crab are made in such a way that they can hear sounds in the water quite well, even though they may be deaf to sounds in the air.

Then if you look at the first joint of the greater feelers through the microscope, you will see two other tiny glands. These are the crab's noses, by which it can smell odours in the water just as we can smell odours in the air. It always seems to find its food by scent, and if one of those basket-like traps which we call crab-pots is baited with a few pieces of decaying fish and lowered into the sea, crabs will smell the bait from quite a long distance away, and come hurrying up to obtain a share in the banquet.

And they seem to do so by means of those odd little noses on the lower joints of their greater feelers.

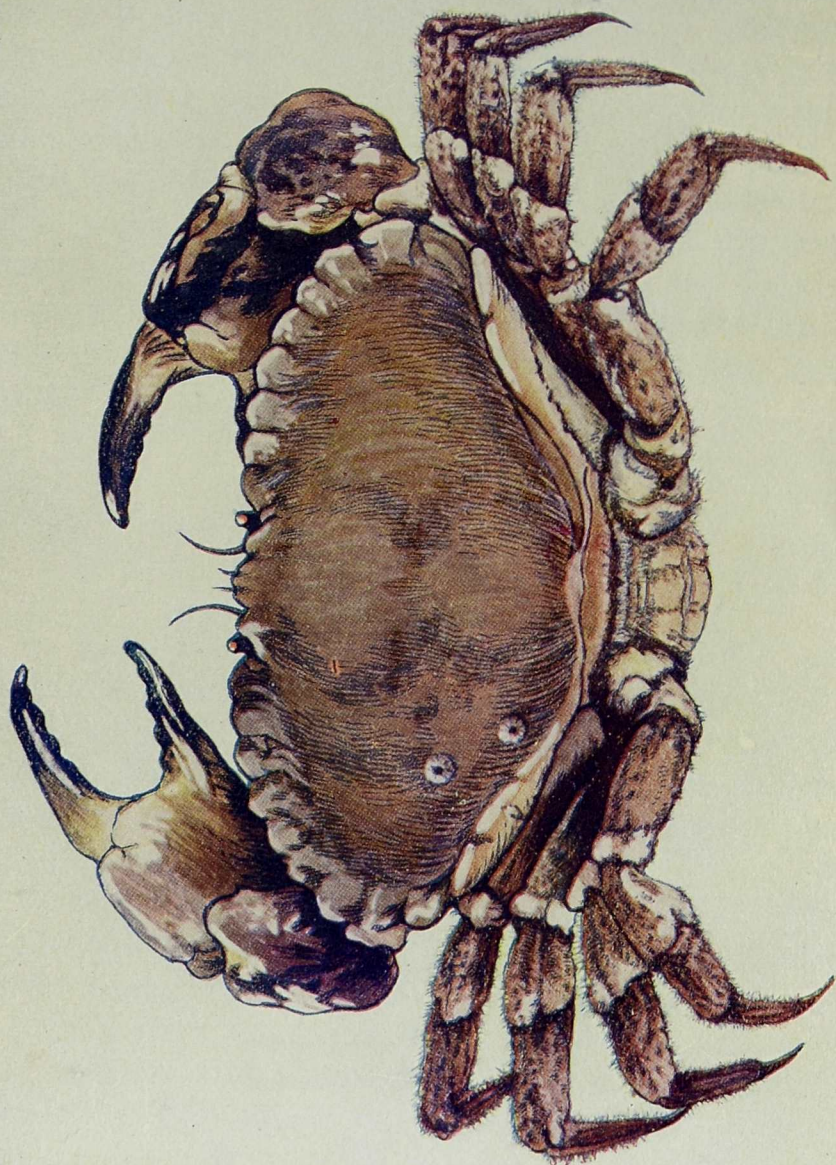
PLATE XXI

THE EDIBLE CRAB

Now let me tell you something about the different kinds of crabs which you may find on the shore.

First of all, of course, there is the Edible Crab. This is the crab which is so largely used for food, and which you may see in any fishmonger's shop. Sometimes it grows to a very great size, and has claws so big and strong that if it were to seize a man by the wrist he would find it very difficult indeed to set himself free. You will not find crabs as big as this among the rocks, for these giant creatures always live in rather deep water. But one often discovers a crab four or five inches across hiding in a rock pool, and even he is quite big and strong enough to give one a very sharp nip.

It is rather amusing to get one of these crabs out on to the open sand, and then to stand just in front of him. He will at once raise both his great claws and hold them in readiness to strike at you if you attempt to seize him. Then if you walk slowly round and round him he will turn



THE EDIBLE CRAB

round and round too, so as to keep facing you, over and over and over again. And if you put your hand anywhere near him he will snap at it so quickly that it is really not at all easy to avoid his stroke.

Edible crabs often have their shells covered with barnacles and the tubes of some of the sea-worms. Old crabs, indeed, which no longer change their coats of mail every year, are often so covered with these creatures that one can hardly see their shells at all.

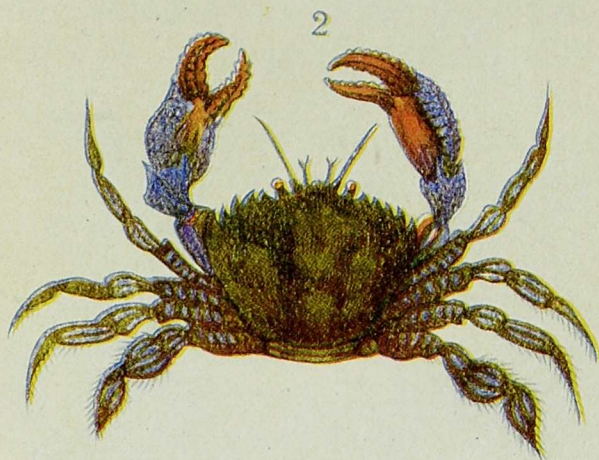
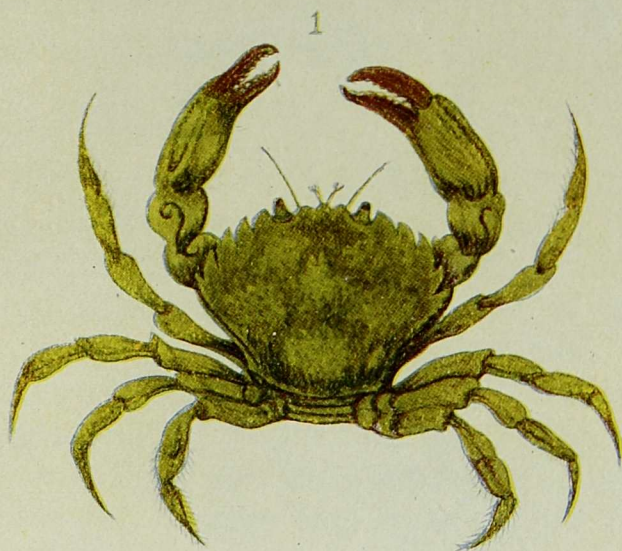
PLATE XXII

THE SHORE CRAB (I)

This is sometimes known as the Green Crab, because it is generally more or less green in colour. But you may often find examples, which are deep brown all over, while others are bright yellow, with black markings upon their backs. It does not grow to nearly such a great size as the edible crab, and although its flesh is quite good to eat there is so little of it that the animal is hardly ever used for food. But it is wonderfully strong, and if you find a green crab hiding beneath a big stone or behind a mass of seaweed, you must be very careful not to get a nip from its claws.

The green crab spends a great part of its life out of the water, for its gills are made in such a manner that they will keep moist for a very long time. And as long as its gills are damp a crab can breathe quite as easily on land as if it were in the sea. It is very active, and if you go down near the water's edge while the tide is coming in you may often see it hunting sandhoppers and even flies, creeping up to them very carefully until it is only a few inches away, and then pouncing upon them so suddenly that they have no time to escape. And it is often very troublesome to fishermen, for it will seize their bait with its strong nippers, and pull it off the hooks before a fish is able to take it.

This crab is very easily kept in confinement, and will soon become quite tame, so that it will even come and take food from your fingers just like a dog. But you must be careful to pile up a few stones in the water in which you keep it, so that it may sit upon them and take an airing whenever it feels inclined. And it will even enjoy an occasional run about the room.



1. THE SHORE OR GREEN CRAB.

2 THE FIDDLER CRAB.

PLATE XXII

THE FIDDLER CRAB (2)

The crabs about which I have been telling you live in the sea, though they often leave it for some little time and run about on the shore. But none of them can swim, and if they are thrown into deep water they just sink to the bottom with their legs sprawling, feeling about for some object to which they can cling. Sometimes, however, if you look into one of the pools which are left among the rocks when the tide goes down, you may see a small crab swimming through the water with some little speed. This is quite sure to be a Fiddler Crab, and if you catch it and examine its hinder legs, you will find that instead of being quite slender, with hooked claws at the tips, as they are in most crabs, they are flattened out into broad, oval plates. And you will also find that these plates have a fringe of rather long hairs growing all round them.

Now these are the paddles with which the crab rows itself through the water, and it is called the "Fiddler Crab" because the movements which it makes with them are rather like those of a man who is playing the violin. You can easily keep it in an aquarium, and a very

interesting little pet it makes. But you must remember that it is a very savage little animal, and will certainly do its best to kill any other creatures that you may put into the same vessel. Even if you put two fiddlers together they are almost sure to fight; and the one which wins the battle will kill and eat the one which loses it.

When the Fiddler Crab is alive it is really a very handsome little creature, for its blackish shell is covered all over with soft, short down, looking rather like velvet, while its legs are striped with blue, and its claws are partly blue and partly scarlet.

PLATE XXIII

THE MASKED CRAB (I)

The broad shelly shield which covers the back of a crab is called the "carapace," and there are certain markings upon it which are rather like the features of a human face. But there is one crab in which these markings are so deep and strong that it looks just as if it were wearing a mask. So it is always known as the "Masked Crab." It is found on the southern and western shores of England and Wales, and you may always know it if you meet with it, not only because of the face-like markings upon its back,

but also because its carapace is a good deal longer than it is broad, whereas in other crabs it is nearly always broader than it is long. Besides this, the great claws are not really "great" at all, for they are very long indeed and very slender, with quite small nippers at the tips, while the greater feelers are quite as long as the claws. So altogether the masked crab is a very odd-looking crab indeed. But if you want to find it you will have to look for it very carefully, for it has an odd way of burying itself in the sand, and only leaving just its feelers and its eyes above the surface.

PLATE XXIII

THE THORNBACR CRAB (2)

This is perhaps the very oddest of all our British crabs.

In the first place, it looks much more like a big spider than a crab; for its body is very small, while its legs are very long and very slender. Indeed, the group of crabs to which it belongs is often called "spider crabs" in consequence. In the second place, its carapace is covered all over with rather long sharp spikes, which project in all directions, so that it strongly reminds one of a tipsy-cake! And, in the third place, the crab

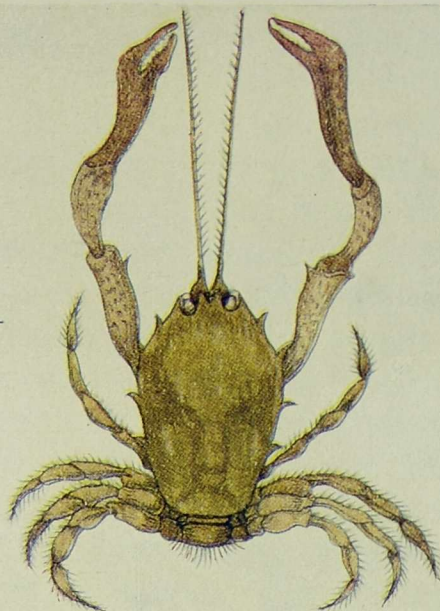
nearly always has a number of tufts of sea-weed or sponge growing upon its back.

Perhaps you might think that these come there by accident. But they do not. The crab himself plants them there! If you keep him in an aquarium you may often see him doing so. First of all he turns one of his long claws over his back and scratches away at the carapace, so as to roughen the surface. Then he pulls up a little sprig of sea-weed or sponge and actually plants it on his shell, pressing the rootlets firmly down. And besides the spikes upon the shell there are numbers of tiny hooks, which help to hold it in position. Then the crab plants another piece of weed or sponge in just the same way, and so he goes on planting piece after piece until his back is completely covered.

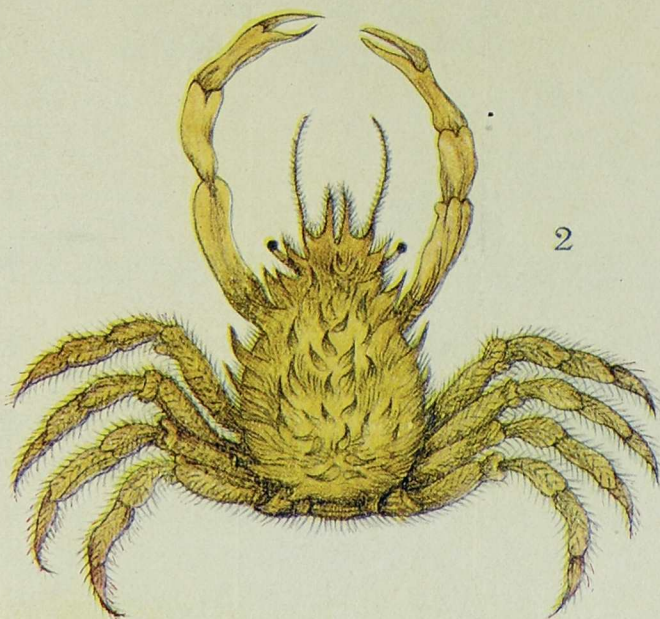
Now why do you think he takes all this trouble?

Well, the reason is that he does not want to be seen; for he has a great many enemies, and he knows perfectly well that if he were to lie among the sea-weeds or sponges at the bottom of the sea they would be quite sure to notice him as they passed by, and then he would almost certainly be killed and eaten. So he clothes himself with either sea-weeds or sponges, as the case may be, and then feels that he is perfectly safe, and that as long as he keeps quite still even the sharpest eye will fail to notice him. And if you catch one of these crabs which is covered with

1



2



1. THE MASKED CRAB.

2. THE THORNBACk CRAB.

THE LONG-BEAKED SPIDER CRAB 71

sea-weeds and put it into an aquarium in which sponges are growing, it will very soon strip the weeds off its back and cover itself with sponges instead; while if you catch one that is covered with sponges, and put it into a tank in which sea-weeds are growing, it will strip off the sponges and cover itself with sea-weeds!

The thornback crab often grows to a rather large size. Indeed, next to the edible crab, it is the largest of all the crabs which are found in our British seas, for its carapace is sometimes as much as eight inches long and six inches wide, while its great claws may be fourteen or fifteen inches in length. On some parts of the coast it is used for food, but its flesh is rather coarse and of poor quality.

PLATE XXIV

THE LONG-BEAKED SPIDER CRAB (1)

This crab has an even smaller body in proportion to its size than the thornback, and its legs are so very long and so very slender that they remind one of those of a daddy-long-legs. Its carapace is drawn out in front into a kind of beak, which is quite as long as the carapace itself, and while the crab is alive it is of a most beautiful pink and puce colour. It is not a very

common creature, but is sometimes to be found in the rocky pools near low-water mark on our southern coasts, and is covered, very often, with sea-weeds or sponges, just like the thornback.

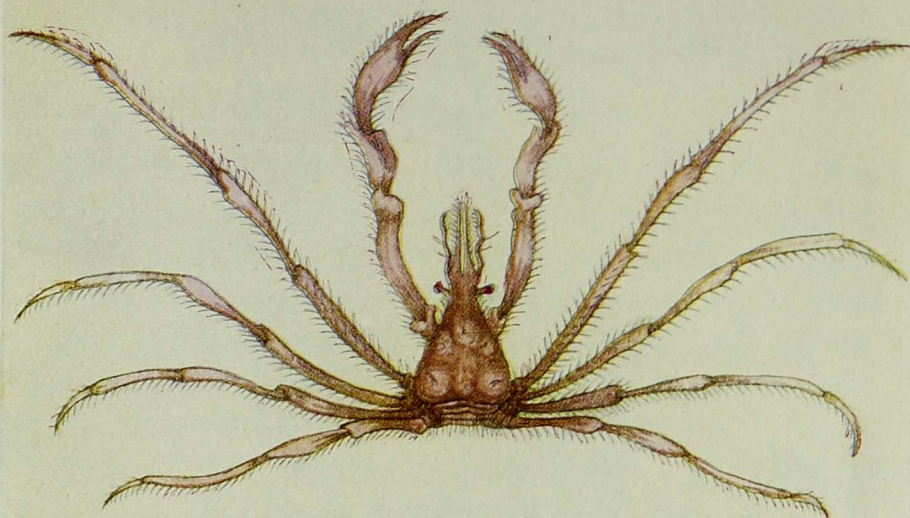
PLATE XXIV

THE FOUR-HORNED SPIDER CRAB (2)

Perhaps this is the commonest of the British spider crabs. Indeed, it is so plentiful at Bognor, and at other places on the southern coast of England, that when a crab pot is taken out of the water as many as twenty or even thirty of these creatures are sometimes found in it. They are called by the fishermen "sea-spiders," and are generally so clothed with those odd sea-weeds called "corallines" that you can hardly see any part of their "shells" at all.

In this crab the carapace is drawn out in front into a very long beak indeed, which has four horns upon it, and the whole upper surface is covered with short, sharp spikes and stout hairs.

1



2



1 THE LONG-BEAKED SPIDER CRAB.

2 THE FOURHORNED SPIDER CRAB.

PLATE XXV

THE PEA CRAB (I)

This is a very odd crab indeed. In the first place it is extremely small. Even when it reaches its full size it is scarcely ever so much as half-an-inch across, while its body is so round that it really does remind one very much of a pea. Only it is not quite the right colour for a pea, for it is creamy yellow instead of green.

And, in the second place, this crab lives in a very odd place—namely, inside the shells of living mussels, or pinnas, or even cockles! What it does there nobody seems quite to know. It does not appear to injure the animal to whom the shell belongs, although it is very fond of the flesh of mussels, and if it finds one of those creatures lying dead will certainly devour it. Perhaps it only creeps inside its shell for the sake of safety. At any rate, it is a very timid little crab, and if you open a mussel and find a pea crab lying hidden inside it, it will tuck up all its legs quite close to its little round body and lie perfectly still for several minutes in the hope that you will think that it is dead.

On some parts of the coast pea crabs are so plentiful, that three out of four mussels are found to have one of these odd little creatures inside it.

PLATE XXV

CRAB CATERPILLARS (2 and 2 A)

I dare say you did not know that crabs have caterpillars, just as insects have. We call these crab caterpillars "zoeas," and they are not in the least like their parents. There are a great many different kinds, of course, for every crab has its own zoea, just as every butterfly and moth has its own caterpillar, and some of them are not very much like some of the others. But they are always very tiny indeed—they are scarcely as large, in fact, as the smallest grains of sand—and they always have a very long curved horn in front of the body and another one behind, and long waggly tails. And they swim in the oddest way possible—by turning somersaults in the water, over and over again!

These zoeas are very useful little creatures, because they feed upon the tiny scraps of decaying matter which are always floating about in the sea, and so help to keep the water always pure. They belong, in fact, to the great army of what I always like to call "nature's dustmen"—those little animals whose duty it is to clear away the rubbish from the world. There are millions and millions of these busy little workers on the land, and millions and millions of others

in ponds and rivers, as well as in the sea, and so well do they perform their task that both the air and the water are always kept pure.

Another very interesting fact about zoeas is that they form the chief food of no less a creature than the Greenland whale. No doubt you know that whales are of two kinds—those which have teeth, and those which have none. Those which have teeth feed upon fishes, and giant cuttles, and could easily swallow a man. But the whales which have no teeth have throats so small that they would almost certainly be choked if they tried to swallow a herring! So they have to feed on very small creatures indeed, and are very fond of zoeas, which often swim about in such vast shoals that the water of the sea is quite thick with them. And they catch them in a most curious manner.

You have heard, of course, of the very useful substance which we call "whalebone;" and no doubt you know that it has nothing to do with the bones of the whale at all. It is found in the mouths of those whales which have no teeth, and hangs down in great plates from the gums of their upper jaws. Very soon these plates split up; and then each part splits up again; and so on, over and over again, till at their lower ends they form a kind of thick fringe of close, matted hairs.

Now it is by means of this fringe that the

whale catches the zoeas. When it meets with a shoal of these little creatures it opens its huge mouth wide, and swims through them. Then it nearly closes its jaws, and lets down the whale-bone plates, so that the hairy fringe forms a kind of strainer all the way round. It then squirts out the water from its mouth through this fringe, which allows the water to pass through it, but keeps back the zoeas; and when it has got rid of all the water it closes its mouth completely and swallows the zoeas, a few thousand at a time, after which it opens its jaws again, and swims through the shoal once more.

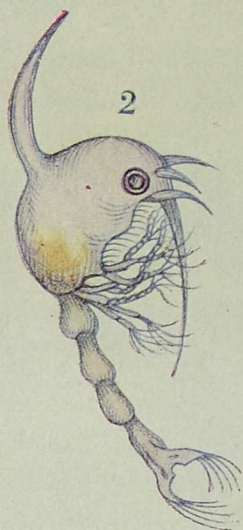
Doesn't it seem strange that the biggest animal on earth should feed on some of the very smallest?

PLATE XXV

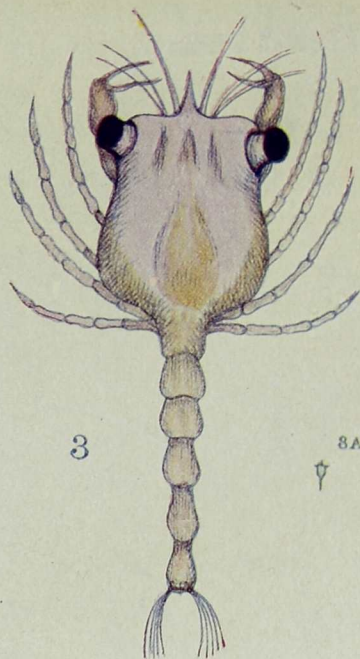
CRAB CHRYSALIDS (3 and 3 A)

When the caterpillar of an insect has reached its full size it throws off its skin and appears as a chrysalis, or pupa. And the caterpillar, or zoea, of a crab does exactly the same thing. It casts its skin, and appears in quite a different form. Only we do not call it a chrysalis, as a rule. We call it a "Megalopa."

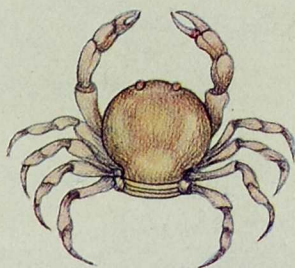
The word "megalopa" means "a creature with big eyes," and it is given to the crab chrysalis



2A
t



3A



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1. PEA CRAB (life-size)

2. CRAB CATERPILLAR (enlarged).

3. CRAB CHRYSALIDS (enlarged).

2A. " (life-size).

3A. " " (life-size)

because it has eyes which are enormously big in proportion to the size of the head. They are set on long footstalks, which project on either side, so that the head looks rather like a hammer. Then the long curved horns which the zoea had are to be seen no longer, and the carapace is shaped much more like that of the perfect animal, while the great claws begin to show, and the legs increase in length. The tail, however, is still quite free, like that of a lobster, and the little animal still swims by turning somersaults in the water, and lives on the same tiny scraps of decaying matter on which it fed as a zoea. After a few weeks it throws off its skin once more, and appears in the world as a perfect crab.

PLATE XXVI

HERMIT CRABS (1 and 2)

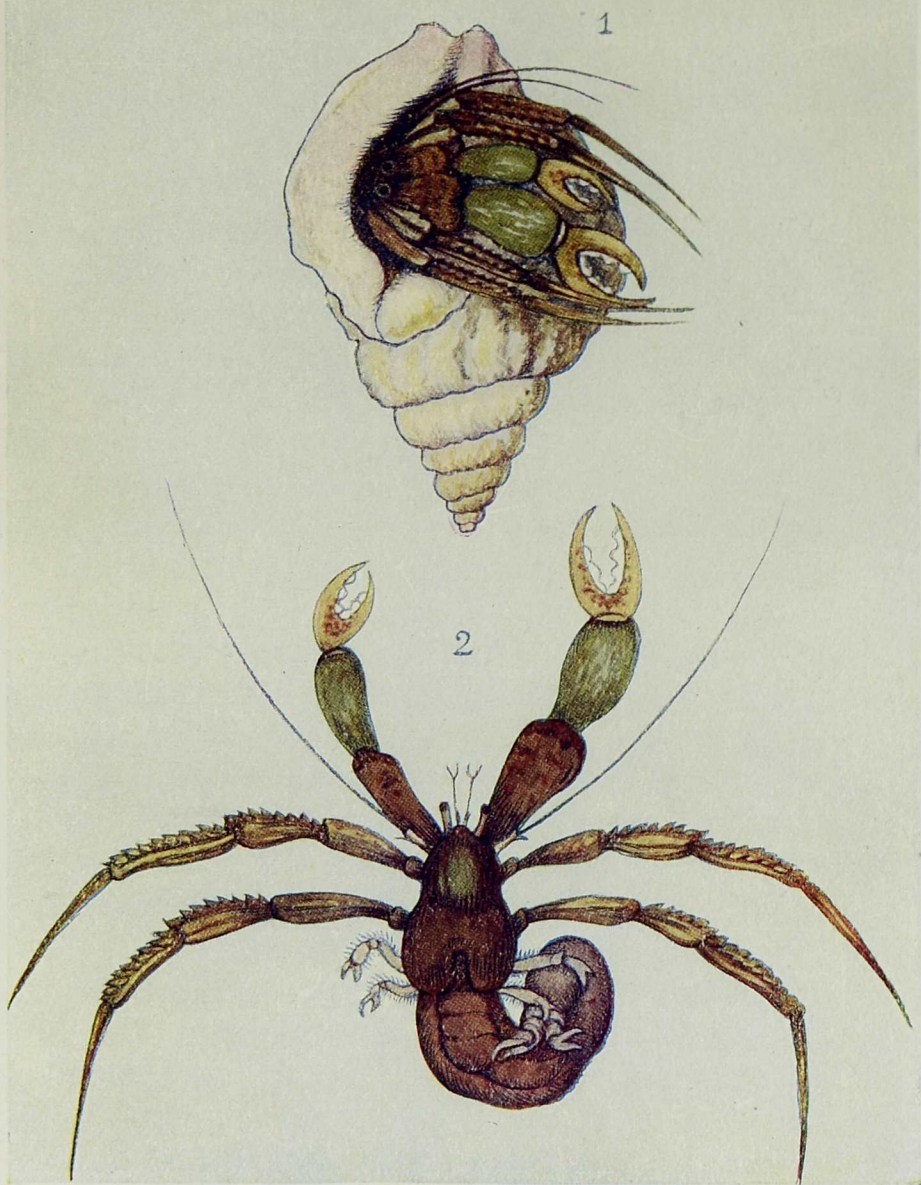
If you go down among the rocks when the tide is out, and hunt about in the pools, you may often find the shell of a whelk in which a small crab is living, with one of his great claws carefully guarding the entrance. This is a Hermit Crab, and a very curious little creature he is. For, in the first place, his long tail is quite free, like that of a lobster, instead of being fastened down to the lower surface of his body; and in

the second place, it is quite soft, without any shelly covering at all. His body and limbs are covered with armour, just like those of other crabs, but his tail has none at all.

The consequence is that the hermit crab always has to take the very greatest care of his tail. He is so dreadfully afraid that one of his many enemies will come up behind and give it a nip when he isn't looking! So he protects it by tucking it away into the empty shell of a whelk. He never leaves this shell, but drags it about with him wherever he goes. And if you take hold of him and try to pull him out, you will find that you cannot do so without injuring him very badly. For at the end of his tail he has a pair of strong pincer-like organs, with which he holds on so firmly that it is very difficult indeed to make him let go.

Indeed, the only way to get a hermit crab out of his dwelling is to put him, shell and all, into the spreading arms of a big sea anemone. That frightens him almost out of his wits, for the arms of the anemone at once come closing in, and he knows quite well that if he stays where he is he will very soon be swallowed. So he skips out of the shell and scampers away as fast as he possibly can, leaving the empty shell in the anemone's clutches.

The poor little animal is now perfectly miserable. He has no protection for his tail, you see,



1. THE HERMIT CRAB IN WHEELK SHELL

2. THE HERMIT CRAB OUT OF SHELL.

and goes hunting about everywhere for some other shell into which he can tuck it. After a while, perhaps, he finds that of a periwinkle. It is not of much use, of course, for it is so small that he can only get just the tip of his tail into it. Still, it is better than nothing, and he goes crawling about with the periwinkle shell on the end of his tail, like a thimble on the tip of one's finger, in search of a bigger one. By-and-by he discovers one. Then he whips his tail out of the old shell and into the new one so quickly that you can hardly see how he does it, and goes off to look for a bigger shell still. And in this way he will change his dwelling perhaps half-a-dozen times before he is really satisfied.

Sometimes you may find a hermit crab with a sea anemone fastened to the edge of the shell in which he is living. That seems strange, doesn't it, when you remember how terribly afraid the little animal is of anemones. But in such a case the anemone never interferes with the hermit crab, and the crab never interferes with the anemone, while both of them benefit by the arrangement. The crab benefits, because no fish will ever touch him so long as an anemone is attached to his whelk-shell. There are plenty of fishes which would be quite ready to gobble him up, whelk-shell and all, if it were not for this creature. But fishes know quite

well that sea anemones can sting, and therefore never think of devouring them, no matter how hungry they may be; so that so long as an anemone is guarding the whelk-shell in which he lives, the hermit knows that he is perfectly safe. And the anemone benefits, because it gets a share of the crab's meals. When a hermit crab finds the dead body of some small creature at the bottom of the sea he pulls it to pieces and devours it; and as he does so a quantity of tiny scraps are sure to come floating upwards, and are seized by the outspread arms of the anemone. So the crab gets the big pieces, and the anemone gets the little ones; and both are perfectly satisfied.

CHAPTER V

LOBSTERS AND THEIR KIN

PLATE XXVII

THE LOBSTER

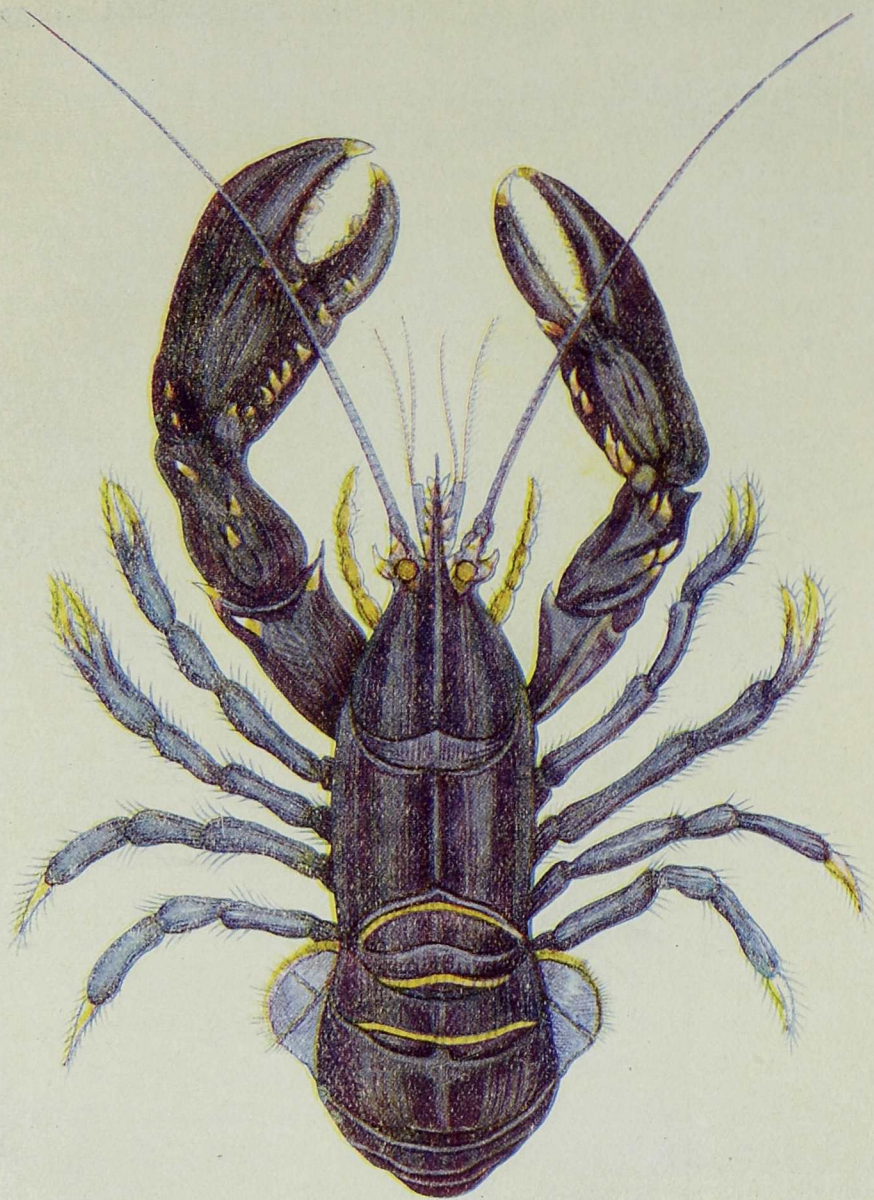
YOU are not at all likely to catch a lobster for yourself, for these creatures live in deep water, and are only to be taken by means of proper lobster-pots. But I must not pass the animal by without mentioning it at all, for at any rate you will be quite sure to see it on the slab of every fishmonger's shop.

Of course you know that a lobster is not red until it is boiled, but is nearly black all over. And of course you know, too, that one of its great claws is always a good deal larger and stouter than the other. Sometimes people think that the reason of this is that at some previous time the animal had lost one of his claws through some accident, and was growing a new one, and that the new limb had not yet had time to reach its full size. However, this is not the case, for one claw of a lobster is always a good deal bigger than the other; and the real reason is that the two claws are used for different purposes. The larger claw is a weapon, with which the animal

fighths, while the smaller one is an anchor, with which he clings to the weeds which grow on the rocks at the bottom of the sea. And very often one is quite twice as big as the other.

Now I wonder whether you know how a lobster uses his tail. He employs it in swimming, and if you look at it you will find that it is made of several broad, flat plates, which can be spread out very much like the joints of a fan. You will notice, too, that these joints have a fringe of hairs growing all round them. Now when a lobster swims he just stretches his body straight out, and then doubles it suddenly up. As he does so the plates of the tail spread out, and form a kind of very broad and powerful oar, which strikes the water with such force as to drive the animal swiftly backwards. With a single stroke of its tail, indeed, a lobster can dart to a distance of forty or fifty feet, and that so quickly that even the swiftest fishes could scarcely overtake him.

Sometimes, however, a lobster swims forwards; and he does this by means, not of his tail, but of five pairs of odd little organs underneath the tail, which we call "swimmerets." They spring from either side of the soft hinges by which the joints of the tail are fastened together, and each consists of two thin oval plates fringed with long hairs. So each swimmeret really consists of two tiny paddles, and by waving them to and



THE LOBSTER.

fro in the water the lobster manages to travel along with some little speed.

These swimmerets are used for another purpose as well, however, for the mother lobster always glues her eggs to the hairs with which they are fringed, and carries them about with her for some little time. Haven't you noticed, when you have had shrimps for tea, that a good many of them had clusters of eggs underneath their bodies? Well, if you had put one of those shrimps under a microscope, and examined it very carefully, you would have found that every one of the eggs was firmly glued down to one of the hairs on its swimmerets, where it would have remained until it was hatched. And lobsters carry their eggs about with them in just the same way.

PLATE XXVIII

THE PRAWN (I)

If you go down among the rocks when the tide is out, and look into the shallow pools which have been left among them by the retreating waves, you are quite sure to see numbers of shadowy forms darting to and fro through the water. A good many of these will be prawns, and if you catch one or two of them in a small net, and examine them carefully, you will find

that they are very much like tiny lobsters. Indeed, if you could magnify a prawn to the size of a lobster, or reduce a lobster to the size of a prawn, it really would not be very easy to tell the one from the other.

But you will be surprised to see how different live prawns look from the dead ones which you may see in a fishmonger's shop. The fact is that, like the lobster, they change colour when they are boiled. When they are alive, indeed, they hardly have any colour at all, and are nearly transparent. That is why it is so difficult to see them in the water. And if you keep them in an aquarium, all that you can see of them, very often, as they dart to and fro is just their glowing eyes, which gleam in the water like tiny balls of fire.

There are two facts about prawns which I am sure you will be interested to know.

The first is that they are extremely useful little creatures, for they feed upon the bodies of the various small animals which die in the sea, and so prevent them from becoming putrid and poisoning the water. And the second is that they always take the greatest possible care to keep themselves clean. If you take a few live prawns home, and put them in an aquarium, you may often see them performing their toilets. Their front legs are covered with stiff little hairs which stand out at right angles, so that these

limbs really form a pair of brushes. And with them the prawn will clean its body most diligently, rubbing itself all over until every little speck of dirt has been removed. And if any object should cling to its body which these tiny brushes cannot rub away, it will pull it off by means of the strong little pincers on the second pair of legs.

Do you want to know how to tell a prawn from a shrimp?

Well, all that you have to do is to look in front of its head. There, projecting from the edge of the "carapace," or shield which covers the back, you will see a long spike, something like a beak. Just put your finger upon this, and feel the edge. If it is set with sharp little teeth, like those of a saw, the animal is a prawn. But if the spike is perfectly smooth, it is a shrimp.

PLATE XXVIII

THE ÆSOP PRAWN (2)

This is a much prettier creature than the common prawn, for its transparent body is covered with scarlet lines, while its long thread-like feelers have rings of the same colour round them at regular distances apart. It is called the "Æsop" prawn because it has a big hump

on its back, just like the writer of the famous fables.

If you want to catch an *Æsop* prawn you must look for it in the summer, for it always spends the rest of the year in deeper water. But as soon as the weather becomes really warm it travels up and down with the tide, and you may find it in plenty in the pools which are left among the rocks at low water.

PLATE XXVIII

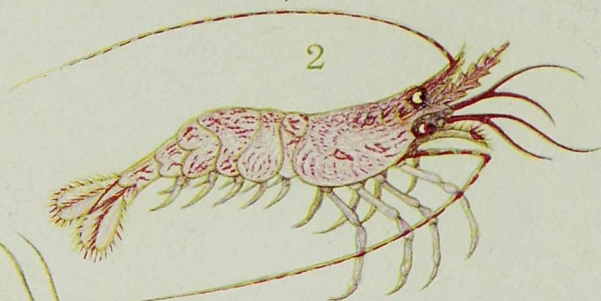
THE SHRIMP (3)

I told you that a good many of the shadowy forms which you may see darting to and fro in the rock-pools are those of prawns. The rest are quite sure to be shrimps, which are very much more common. Indeed, in most of the rock pools you will find at least ten shrimps for every prawn. But they are very difficult to see, for they are partly transparent when they are alive, so that they are scarcely visible when they are swimming. And when they are resting at the bottom of the pool their speckled bodies look almost exactly like the sand on which they lie. Besides this, they have a way of nearly burying themselves, by scooping out a kind of furrow with their hind limbs, sinking into it,

3



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1 THE PRAWN.

2 THE ÆSOP PRAWN.

3. THE SERIMP.

and then covering themselves with sand by means of their feelers. So the fishermen often call them "sand-raisers."

PLATE XXIX

THE SANDHOPPER (I and I A)

Commoner even than the shrimps are the Sandhoppers. On any sandy part of the shore you may find them in thousands and thousands. If you walk along the beach where the sand is dry, and step rather heavily, you will see their holes opening all round you. If you walk along it where it is damp, you will find that it is honeycombed with their burrows. If you turn over a stone, or lift up a piece of sea-weed which has been thrown up by the waves, twenty, or thirty, or forty of them will come skipping out like so many tiny kangaroos. And if you walk near the edge of the water when the tide is coming in you may often see them leaping about in such vast numbers that they look just like a thick mist rising for a foot or eighteen inches into the air.

Yet sandhoppers have so many enemies that it really seems wonderful that any of them should be left alive at all. Nearly all the shore birds feast upon them, and so do many of the land birds. Indeed, when the tide is rising, you may often see a long line of birds standing closely

side by side together a few feet in front of the water's edge and gobbling up the active little creatures in thousands. Then the shore crabs are very fond of them, and destroy thousands more. And even when they are buried deeply in the sand they are not safe, for there is a little beetle which goes down their burrows after them, and catches and eats them there very much as a ferret catches a rabbit in its hole.

But it is just as well that they do not all get eaten, for sandhoppers are very useful little creatures indeed. They feed upon the masses of decaying sea-weed which are constantly flung up on the shore by the waves. For they, too, belong to the great army of "Nature's Dustmen," like the "zoeas" of the crabs and lobsters, and help to clear away all kinds of rubbish which would poison the air and the water if it were left to decay. Indeed, they will eat almost anything, and if you were to tie up a number of sandhoppers in your handkerchief, and leave them there for a few minutes, you would never be able to use the handkerchief again; for you would find that their sharp little jaws had nibbled it into holes.

If you watch a sandhopper carefully when it is skipping about, you will find that it leaps by doubling its body up, and then straightening it out again with a sudden jerk.



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1. SANDHOPPER (enlarged).

1A. ,, (life-size)

2. SAND SCREW (enlarged).

2A. ,, (life-size).

PLATE XXIX

THE SAND SCREW (2 and 2 A)

If you follow the tide as it goes out on a still day, you will notice that it leaves the sand quite smooth behind it. But if you come to the same spot about half-an-hour later, you will often find that it is marked by numbers of winding tracks, which look just as if they had been made by worms. These, however, are the work of the Sand Screw, a curious little creature which in many ways is very much like a sandhopper. But instead of sinking its burrows almost straight downwards into the sand, as sandhoppers do, it drives them along almost as a mole does, just below the surface.

If you stand quite still for a few minutes near the water's edge, when the tide is going out, you may sometimes see this odd little creature at work; for as it pushes its way along it raises the sand into a kind of low tunnel, which generally falls in behind it, and so forms a groove. And if you suddenly turn over the sand in front of the tunnel you will find the little animal which was making it, and will see at once why it is called the "sand screw." For instead of skipping about like a sandhopper, it will lie on one side and

wriggle its way along with a curious "screwing" movement, just as though it were trying to bore its way into the sand.

PLATE XXX

ACORN SHELLS (I)

If you examine the rocks which are left dry when the tide goes out, you will often find that they are covered almost all over with small shells which look rather like those of tiny limpets. Only at the top of each shell there is a little hole, from the margin of which a number of ridges run down to the bottom. And these ridges are so sharp, that if you happen to slip when you are wandering about among the pools, and catch at a rock to save yourself, they will cut your fingers almost as if they were knives.

These creatures are generally known as "Acorn Shells," and I dare say that you might think that they must be very closely related to the limpets. But in reality they are much more closely related to the shrimps and sandhoppers, though they look so very unlike them, and lead such different lives. For while shrimps and sandhoppers are always swimming or skipping about, the little animals which live inside these acorn shells never move at all after they are a few

days old, but spend their whole lives fastened down to the surface of the rocks. But there is this great difference between the two. When the eggs of a limpet hatch, out come a number of very tiny limpets, just like their parent in everything except size. But when the eggs of an acorn shell hatch, the little creatures which come out from them are not like their parents at all. They are "zoeas," in fact, or acorn shell caterpillars; and they do not reach their perfect form for some little time.

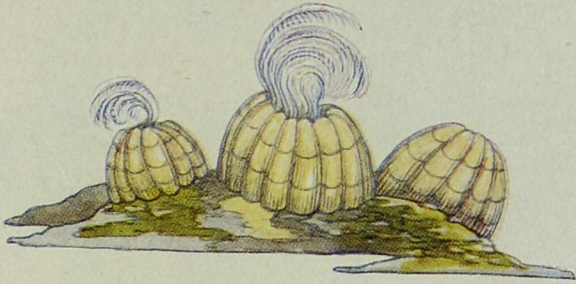
When these little "zoeas" first make their appearance in the world they are able to swim about by means of three pairs of tiny feathery legs, with which they paddle their way along through the water. And they also have a round black eye in the middle of the body, with which they can see quite well. Every two or three days they throw off their skins, just as caterpillars do, and appear in new ones, which have been gradually forming beneath. And each time that they do this their shape changes. At last they are ready to take their perfect form. Then each of the little creatures clings to the surface of a rock by means of its feelers, and pours out a kind of cement, which hardens round them, and anchors it firmly down. It then throws off its skin once more, and appears in the form of an acorn shell just like its parent. And, strange to say, it throws off its eye at

the same time, and is perfectly blind for the rest of its life!

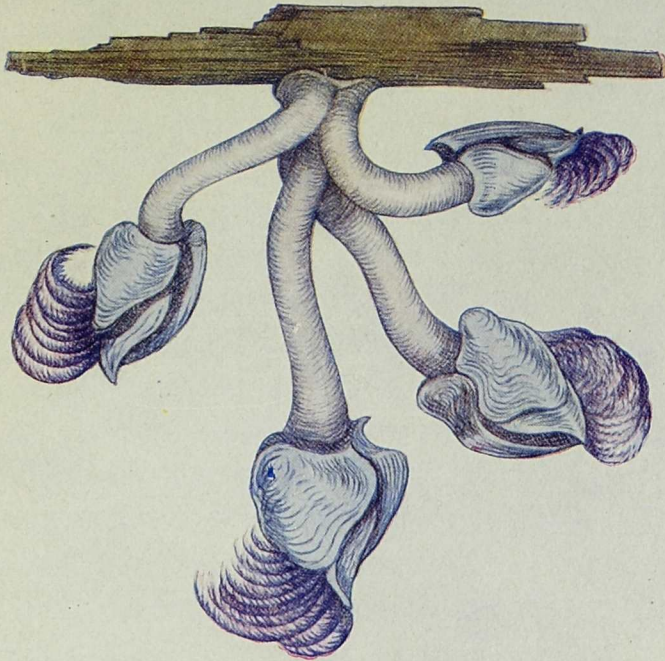
If you look down into a shallow pool, the rocky sides of which are covered with these acorn shells, you may often see a very pretty sight. You may see the little animals fishing. Out from the hole at the top of each shell comes a kind of little net, which sweeps through the water, and is then drawn back into the shell. This net is really formed by the limbs, which are fringed with long hairs, and as it passes through the water it collects the little tiny scraps of decaying matter on which the animal feeds.

You may find these acorn shells in great numbers, not only on the rocks which are left dry when the tide goes out, but also on the wooden beams which support piers and jetties. Indeed, these beams are often so closely covered with the odd little shells that you cannot see the surface of the wood at all. And very often they fasten themselves to the shells of limpets and oysters, and even on the backs of crabs.

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2



1. ACORN SHELLS.

2. SHIP BARNACLES.

PLATE XXX

SHIP BARNACLES (2)

These creatures are first-cousins, so to speak, of the acorn shells, and they are called "Ship Barnacles" because they are so very fond of fastening themselves to the bottoms of ships. Even after two or three months, indeed, the hull of a vessel is often quite covered with them below the water-line, and they check her speed so greatly that she has to be taken into dock to have them scraped off before she can set out upon another voyage.

You may generally find quite a number of these barnacles on the pieces of timber which are so often flung up by the waves after a storm. And you will notice that each of them grows, as it were, upon a kind of stalk, instead of being fastened down to the surface of the wood, as the acorn shells are upon the rocks. This stalk consists of the pillar of cement with which the little animal covered its feelers just before it changed its form for the last time.

There are a good many other kinds of

barnacles, some of which are found in very odd places. There is one, indeed, which always lives on the backs of whales, and somehow manages to sink itself quite deeply into their skins!

CHAPTER VI

THE SEA WORMS

PLATE XXXI

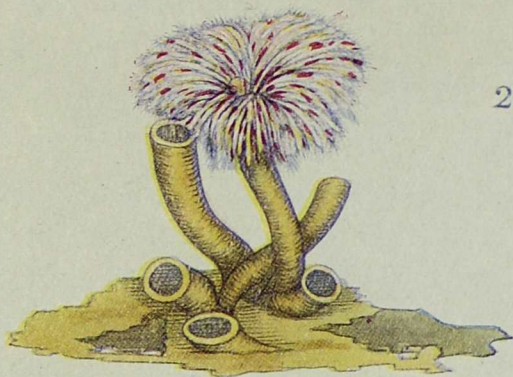
THE SEA MOUSE (I)

IF you go down among the rocks when the tide is out, and hunt in the muddy pools near low-water mark, you will be almost sure to find a very odd-looking creature indeed. It is generally between three or four inches long, and although it is called a "Sea Mouse" it looks very much more like a hairy slug; for its whole body is covered with a matted coat of bristles. But it is really a kind of sea worm. And it looks just about as dull and dingy as any creature can possibly be.

Yet in reality it is one of the most beautiful animals which are found in the sea, and if you want to see its beauty, all that you have to do is to wash it. For the bristly coat which covers its body is a kind of filter, which strains out the mud from the water which passes to the gills; and it soon becomes so choked with mud that you cannot see what the animal is really like at all. All that it wants, however, is a really good bath: so just take it to a pool of

clear sea-water, and rinse it thoroughly. Then take it to another pool, and rinse it again. Then take it to a third pool, and rinse it again; and go on rinsing it till every atom of mud has been washed out of its hairy coating. And then, if you look at it in the bright sunshine, I am quite sure that you will be astonished to find what a lovely creature it really is. For all the colours of the rainbow, and ever so many more besides, seem to be chasing one another over its bristles, and altering with every movement and every change of light. Doesn't it seem strange that an animal so beautiful as this should live with all its beauty covered up, so that hardly any eye can ever see it?

But these bristles have another use besides that of a filter. Each of them is really a kind of long, slender spear with a barbed tip, which can be used as a weapon of defence. If you were to look at one of these bristly spears through a good strong microscope you would see that it was edged on both sides with sharp little hooked teeth, looking very much like those of a shark. But you need not be in the least afraid to handle a sea mouse, for although these slender spears look so formidable, they are not nearly strong enough to pierce your skin.



1. THE SEA MOUSE.

2. THE SABELLA.

PLATE XXXI

THE SABELLA (2)

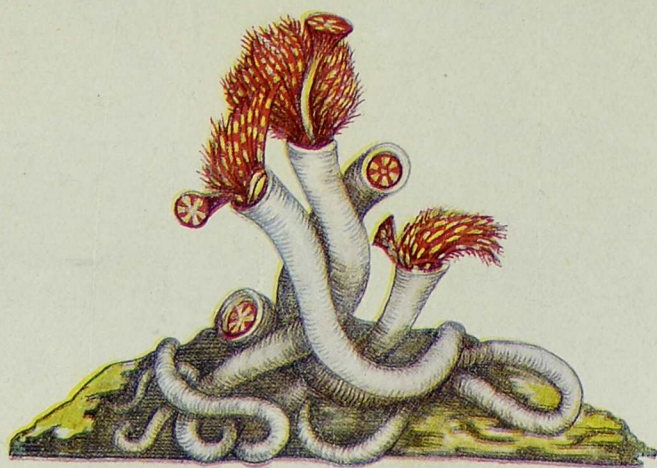
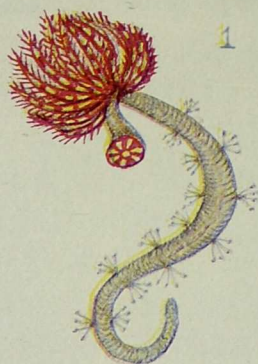
A good many different kinds of worms live on the sea-shore, and one of the most curious of these is the Sabella. For it lives in long, narrow tubes made of tiny grains of sand, which it sticks together with a kind of natural glue. You may find these tubes in great numbers just about low-water mark, and hundreds and hundreds of them are often twisted up together in great masses, which are sometimes several feet in diameter. The worms can travel up and down these tubes by means of tufts of stiff little bristles on each side of their bodies; and sometimes they will leave them altogether, crawl about on the sand for a little while, and then make new ones. And if you keep them alive in a glass vessel filled with sea-water, with a little sand at the bottom, you can watch them building their wonderful tubes, carefully choosing grains of sand of just the proper size, arranging them in position just as a bricklayer lays bricks, and then sticking them firmly together.

PLATE XXXII

THE SERPULA (1 and 2)

If you look down into the pools among the rocks when the tide is out you may often see a number of long, twisted tubes fastened to the surface of the stones at the bottom. These are the dwellings of a very curious sea-shore worm called the *Serpula*, and if you lift one of the stones out of the water, and look down into the tubes, you will nearly always see a bright scarlet object lying just beneath the entrance. And then you may be quite sure that the animal is alive.

Now suppose that you carry the stone home with you, just as it is, and put it into a vessel of sea-water. After an hour or two you will find that the little scarlet objects have been poked out of the tubes, and that they are really tiny stoppers, just like little corks, which exactly fit the entrance when they are pulled inside. And you will also find that a plume of feathery objects, which are also bright scarlet in colour, is projecting out of the mouth of each tube. These red plumes are the gills of the worms, and they will often remain spread for hours at a time. But if you startle the animals—if your shadow falls upon them, for instance—they will draw themselves down into their tubes in about half a



1. THE SERPULA.

2 SERPULAS IN TUBES.

quarter of a second, and every tube will be corked up by its tiny stopper, just as before.

On the sides of its body the *serpula* has tufts of little bristly hairs, just as the *sabella* has, which allow it to move up and down its tube. But in order to enable it to draw itself back as quickly as possible in moments of danger, it has a row of little hooked teeth on its back, by means of which it can take a firm hold of the lining of its burrow. I think you will be rather surprised when I tell you how many of these teeth there are in the row. Just fancy! Each *serpula* has between thirteen and fourteen thousand!

If you look at the oysters in a fishmonger's shop, you may often see the tubes of these curious worms fastened to the surface of the shells.

PLATE XXXIII

THE TEREBELLA (I)

This is another of the worms which live in tubes. You can generally find its wonderful little dwellings by hunting in the small puddles of sea-water which are left on the sands when the tide goes out. And you can always tell them from those of the *sabella* and the *serpula* by the curious little fringe round the entrance, which is made of the tiniest grains of sand fastened together

into slender threads. The tube itself is made of larger grains, and is so tough and leathery that you can give it quite a hard pull without breaking it. But as it is at least a foot long, and is nearly always carried down underneath rocks or big stones, you will not find it at all easy to dig it up. And the moment that you alarm the little animal inside it always makes its way right down to the very bottom of its tube.

Sometimes a terebella will leave its tube and go for a little swim in the pool, wriggling its way through the water by first doubling its body up and then stretching it out, over and over again. But it very soon gets tired with its exertions, and sinks down to the bottom of the pool to rest. Then, after awhile, it will set busily to work, and make a new tube to live in instead of the old one.

There is another kind of terebella, called the Shell-binder, which makes its tube of little bits of broken shell instead of grains of sand. You may find the ends of these tubes sticking up out of the sand about half-way between high and low water-mark. But they run down so deeply that you will have to dig very hard indeed if you want to get them out of the ground.



1. THE TEREBELLA.

2. THE LUG WORM.

PLATE XXXIII

THE LUG WORM (2)

On any muddy stretch of beach, when the tide is out, you may see numbers and numbers of little twisted casts, just like those which you may find on the lawn in the garden on any warm damp morning. These are made by Lug Worms, or "logs," as the fishermen generally call them, and they really consist of sand which the worm has swallowed during the last three or four hours. For lug worms burrow by swallowing mouthful after mouthful of sand, until they can swallow no more. They eat their way down into the sand, in fact, just as earth-worms eat their way down into the ground. And when their bodies are quite filled with sand, they come up to the entrances of their burrows and pour it out in the little twisty coils which everybody who has walked on the shore knows so well by sight.

If you take a spade and dig down into the muddy sand you can find these worms in great numbers. They are just about as big as earth-worms, and are of all sorts of colours, some being brown, and some dark green, and some purple, and some crimson. But on each side of the body they always have thirteen pairs of bright scarlet tufts. These are the little gills by means of which

they breathe, and if you put them under a microscope they look just like tiny bushes with brilliant red leaves.

You would think, perhaps, that when a lug worm bores its way through the loose sand, the sides of its burrow would fall in behind it as fast as it passed along. But from the surface of its body it pours out a thin, sticky liquid which binds the sand together, and forms a kind of lining to the burrow, like the brickwork of a railway tunnel. The burrow is generally about two feet deep, and the worm always lives in it with its head downwards. The worm itself, when fully grown, is from six to ten inches long.

PLATE XXXIV

THE NEMERTES (I)

This is quite one of the most curious creatures to be found on the sea-shore. It hides under large stones at the bottom of the pools, and looks rather like a tangled boot-lace. But it is really a kind of leech-like worm, and the wonderful thing about it is that it can stretch its body out to almost any length, just as if it were made of elastic. It always does this in catching its prey, which it seizes by means of its sucker-like mouth, which has a kind of beak

inside it. Then it "plays" its victim just as an angler "plays" a fish, sometimes stretching its body out to a length of fifteen or twenty feet, then drawing it in again to a length of three or four, and so on over and over again, until its prisoner is quite exhausted, when it proceeds to devour it.

PLATE XXXIV

THE NEREIS (2)

The Nereis is a very common sea-side worm, and you can nearly always find it by turning over the stones on the shore as the tide goes out. It is brown in colour, with a dark red line along the back; and if you look at it in the sunlight you will see flashes of bright blue playing over the surface of its skin. And underneath it is of the most delicate pink, with a glossy look which reminds one of mother-of-pearl. It is one of the largest of all the worms, for it often grows to a length of nearly two feet.

If you examine the back of a nereis, you will find a row of little tufted organs running right along it. Each of these really consists of two little flaps, which are folded together as long as the worm remains still. But as soon as it

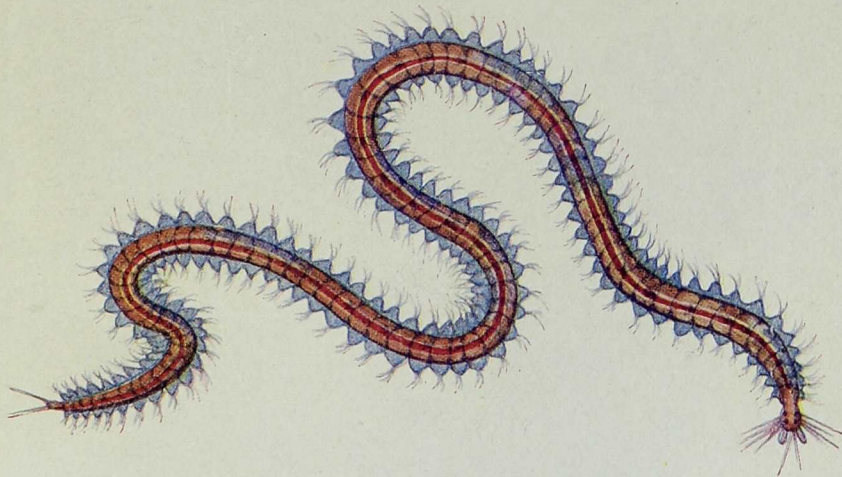
begins to swim they open out and wave up and down in the water; for they are really tiny paddles, by means of which the nereis rows itself along. Altogether there are about four hundred pairs of these little flaps, which move in perfect time together, just like the oars of a well-rowed boat. Perhaps you may have seen a boat-race, and you noticed, no doubt, how all the eight oars rose and fell exactly at the same instant, as regularly as if they were moved by machinery. Well, imagine a very long boat indeed rowed by four hundred little rowers instead of only by eight, and each with two oars instead of one, and then you will have some idea of what a nereis looks like as it goes swimming through the water.

This curious worm does not live only under stones, for it is sometimes found hiding in the whelk shells which are occupied by hermit crabs, the worm and the crab living in the same shell together, and never seeming to interfere with one another.

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2



1 THE NEMERTES

2 THE NEREIS.

CHAPTER VII

STARFISHES

STARFISHES' LEGS

OF course you know starfishes very well indeed by sight, for they are flung up in numbers on the beach by almost every tide. But I wonder if you know where their legs are!

Perhaps you did not know that they have any legs. But they have hundreds and hundreds of them. Only, instead of keeping their legs outside their bodies, as we keep ours, starfishes always keep them inside, and poke them out through little holes in the skin when they are required for use.

If you want to see the legs of a starfish, you can very easily do so. First of all, you must catch a starfish, and make quite sure that he is alive. You can easily find out that by picking him up. If his rays are quite limp and flabby, and hang downwards from the disc, or middle part of his body, so that they look rather like the legs of a table, he is dead, and you can throw him away. But if they stand out stiffly he is alive. Then just put him into a pool of sea-water, and wait. After a few minutes you

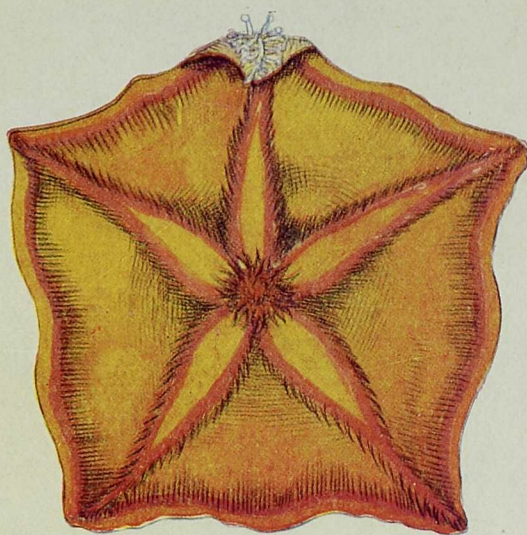
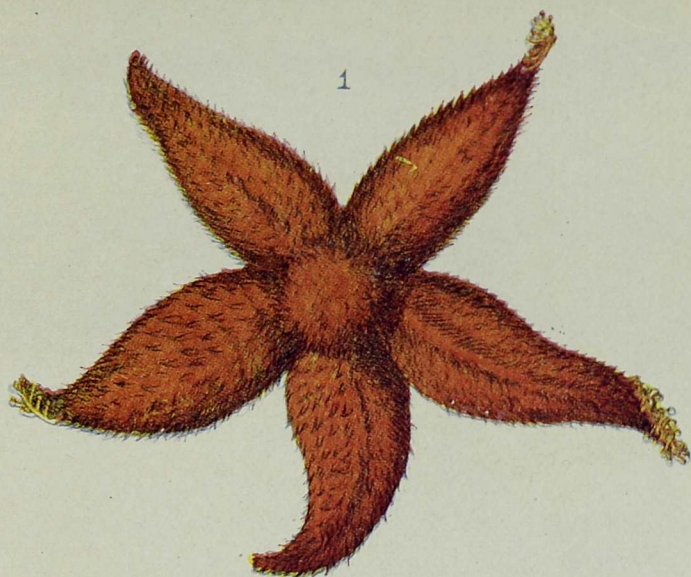
are almost sure to see that he is moving. Very slowly he begins to glide along the bottom of the pool. If he comes to a stone, he glides over it. If he comes to a rock, he glides up it. Then, if you suddenly snatch him out of the water, and turn him upside down, you will see his legs—little white fleshy objects waving about all over the lower surface of his body. And if you look at them through a good strong magnifying-glass, you will see that each one has a kind of little cup at the end of a slender stem.

Now this cup is really a sucker, very much like the suckers of a cuttle, only of course a great deal smaller. And the starfish walks by pushing one or two of its rays forward, taking hold of the ground with the suckers underneath them, and then pulling up the hinder rays and taking hold with the suckers underneath those, and so on over and over again.

PLATE XXXV

THE FIVE-FINGER STARFISH (1)

This is by far the commonest of all the starfishes. You can seldom walk for even a short distance along the shore without seeing it. And no doubt you might think that it must be a very harmless creature indeed, for it does not



1. THE FIVE-FINGERED STARFISH.

2. THE BIRD'S FOOT STARFISH.

look as if it could injure any other animal in any way at all. Yet it is really a creature of prey, and feeds upon shell-bearing molluscs, such as small bivalves, which it always swallows whole. Then, when it has digested their bodies, it returns their empty shells through its mouth. And it can even eat such big creatures as mussels and oysters. Indeed, starfishes are the very worst enemies of the oyster-beds, and in one fishery alone, on the coast of North America, they are said to destroy more than ten thousand pounds' worth of oysters every year!

A very strange fact about the starfish is that if one of its rays is cut off, a new one very soon grows in its place. Stranger still, if one of these creatures is cut in two, each half begins to throw out new rays, and in a few weeks' time there are two starfishes instead of only one! That seems impossible; doesn't it? But yet it is perfectly true.

And another very curious fact about starfishes is that they keep their eyes in very odd places—at the very tips of the rays. And in some starfishes these eyes are furnished with lids, which can be opened and shut!

PLATE XXXV

THE BIRD'S-FOOT STARFISH (2)

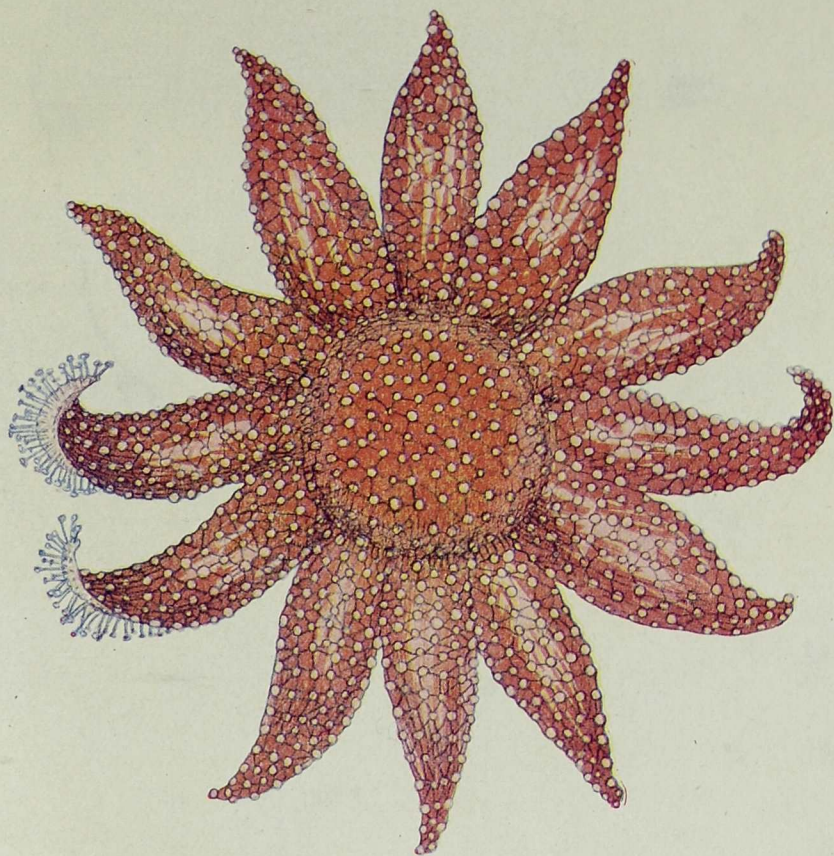
This is a very curious starfish, and a very handsome one as well. It is curious, because its five rays are all joined together by membrane, very much like the toes on a duck's foot. That is why it is called the "bird's-foot" starfish. And it is handsome, because it has a scarlet centre, a scarlet line all round the margin, and another one down the inner margin of each ray, all the rest of the body being bright orange.

The bird's-foot starfish is not very often seen, for it lives some little way below low-water mark. But sometimes, when there has been a violent storm at a season of spring-tide—and you will remember that spring-tides come whenever there is a new moon or a full moon—it is flung upon the beach by the retreating waves, and you may find it lying on the sand when the tide is out.

PLATE XXXVI

THE SUN STARFISH

Sometimes you may find a very much larger and handsomer starfish lying upon the shore. It has twelve rays instead of five, and is often



THE SUN STARFISH.

as much as eight or ten inches across. In fact, it looks very much like a big sunflower. Generally it is bright scarlet in colour, but just now and then one finds a sun starfish with a violet tinge; and sometimes, while the middle part of the body is vermilion red, the rays are pale rose-colour, or even pink.

Like most of the starfishes, this animal has a very curious way of protecting its eggs for some little time after they are laid. It heaps them all up together into a pile, and then bends its rays downwards in such a way that it stands upon their tips, looking just like a little table with twelve very stout legs! It turns itself into a sort of cage, in fact, with the eggs inside it, and so guards them carefully until they hatch.

PLATE XXXVII

THE BRITTLE STARFISH

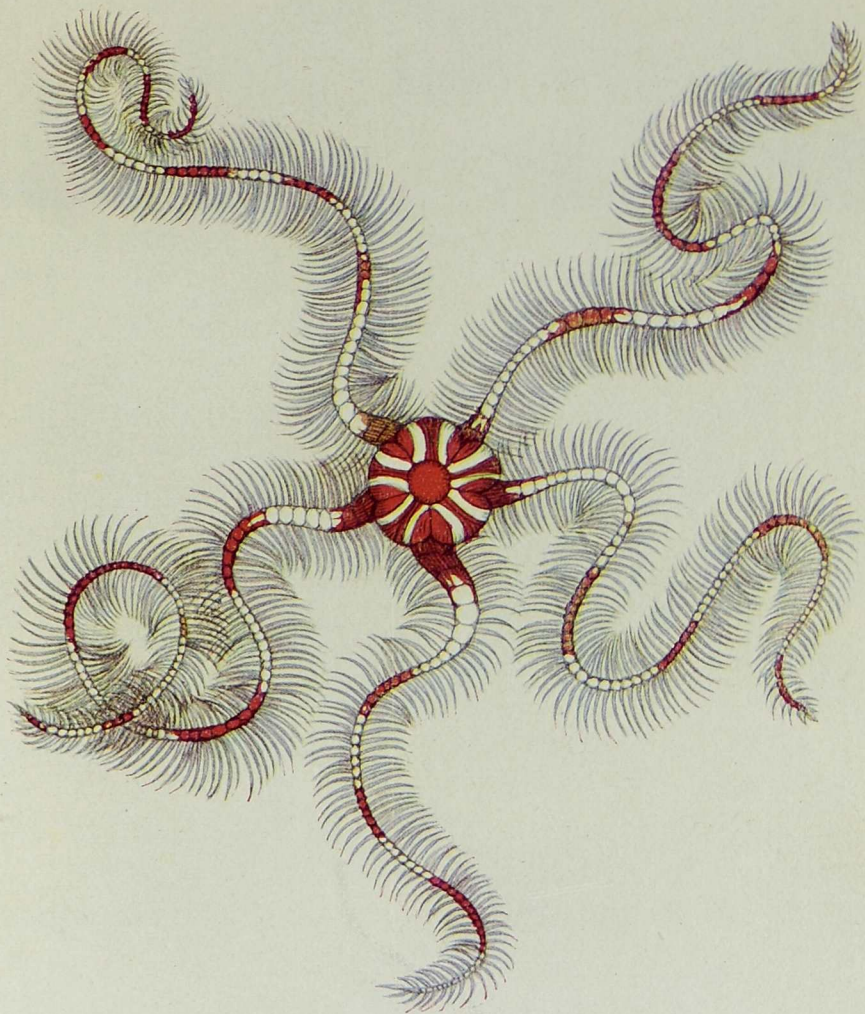
The Brittle Starfish is certainly the very oddest of all odd creatures, for it not only grows new rays if the old ones should be torn off, but actually breaks itself into pieces if it is startled or alarmed! And it is such a timid animal that a slight touch, or even a shadow suddenly falling upon it, will alarm it! Then it gives a kind of shudder, and shatters itself into little bits,

nothing being left but the central disc and a heap of fragments! However, it does not appear to suffer any pain, or to lose any blood, and the five wounds on the disc very quickly heal. Then after a few days five little buds begin to show themselves, which quickly grow into new rays, and in a few weeks' time the brittle starfish is as perfect as ever!

So ready are these creatures to break themselves up, that it is most difficult to obtain a perfect brittle starfish for a museum.

Brittle starfishes are very active animals, and when they are alive their long slender rays are always wriggling and coiling and twisting about, hardly ever seeming to be still for a single moment. Indeed, one naturalist compares a brittle starfish to five very long and active centipedes stitched to a tiny pin-cushion!

There are several different kinds of these very curious animals, most of which live at some little distance below low-water mark, and are hardly ever caught except by means of the dredge. But sometimes you may find one of them lying on the sand at the bottom of a pool among the rocks.



THE BRITTLE STARFISH

PLATE XXXVIII

THE SEA URCHIN (1 and 2)

The "urchin," as of course you know, is a common country name for the hedgehog; and the Sea Urchin is so called because it is covered all over with long spikes, just as a hedgehog is. These spines, however, are very easily broken off, and when the animal dies, and its empty shell is tossed to and fro by the waves, they are knocked off in a very short time; so that when you meet with a sea urchin's shell lying upon the shore you nearly always find that it is covered with nothing more than hundreds of very tiny pimples.

Now it is upon these little pimples that the spines grow. If you were to examine one of the spines with a magnifying-glass you would find that its base was hollow. This hollow base is just large enough to fit over one of the pimples, to which it is fastened by a strong but rather elastic muscle. So a sea urchin is able to move its spines about quite freely. Indeed, it sometimes walks with them as well as with the little sucker-feet, which it pokes out through tiny holes in the shell just as a starfish does, moving a few forward at a time, and so hitching

its way along over the sand at the bottom of the sea.

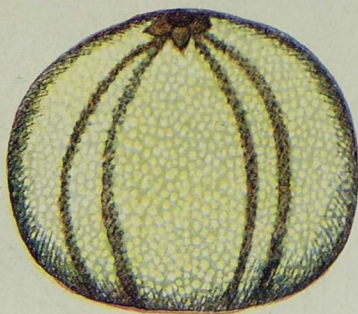
If you succeed in finding a live sea urchin—and you can generally do so without very much trouble, by hunting in the pools among the rocks when the tide is out—you will notice that it has a very big mouth, with five perfectly enormous teeth. They are so huge, indeed, that if you had teeth as big, in proportion to your size, they would be about as large as good big carving-knives!

On some parts of the coast sea urchins are eaten as food, being scooped out of their shells with a spoon, just as we eat a boiled egg at breakfast. For this reason they are sometimes known as “sea eggs,” and those who have tried them say that they are very good indeed.

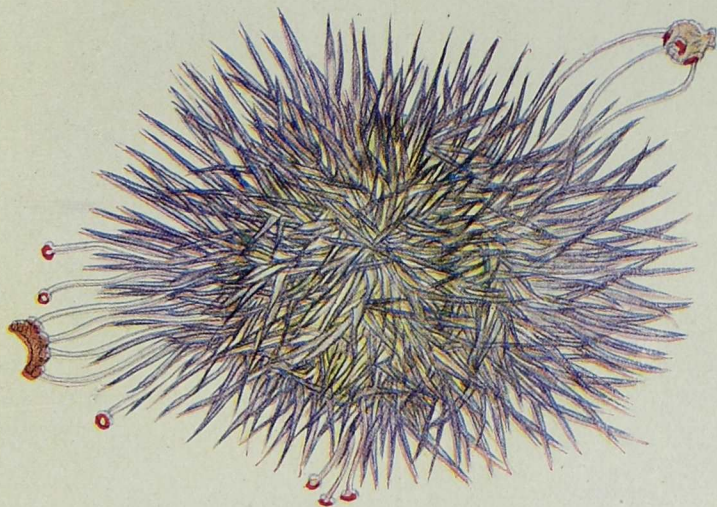
You would hardly think, perhaps, that a sea urchin and a starfish could be related to one another, for they do not look in the least alike. But if you take an urchin which has lost its spines, and examine it carefully, you will see that it is really a kind of rolled-up starfish, and you will be able to count its five rays quite easily.

There is just one more thing that I must tell you about these very curious creatures, and that is that they are very fond of covering themselves all over with small stones, and little bits of broken shell, and tiny pieces of sea-weed, in order that they may not be noticed. They do this in a very odd way. I told you that they have numbers

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2



1. THE SEA URCHIN WITHOUT SPINES.
2. THE SEA URCHIN WITH SPINES.

of little sucker-feet, which they poke out through tiny holes in their shells when they are required for use, just as the starfishes do. Well, when they want to disguise themselves, they just push out two or three hundred of these slender sucker-feet between their spines, and take firm hold with them of any small objects that may be lying within reach. In this manner they soon succeed in covering themselves all over, and you might easily look at one of them as it lay at the bottom of a rock-pool without recognising it at all.

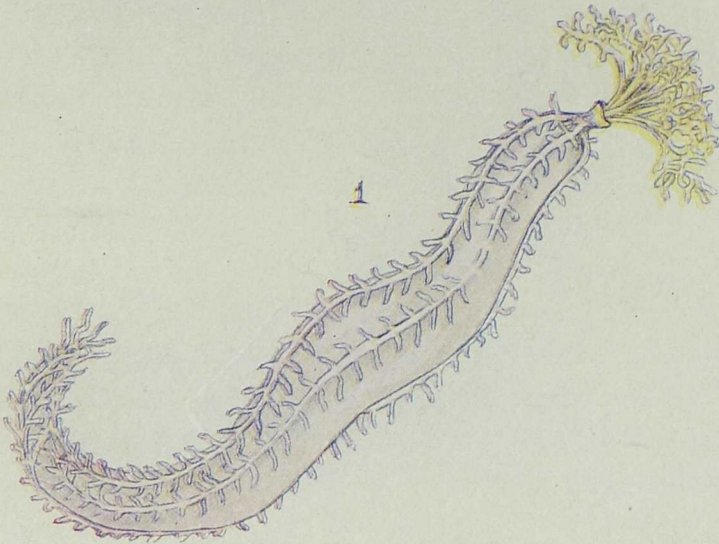
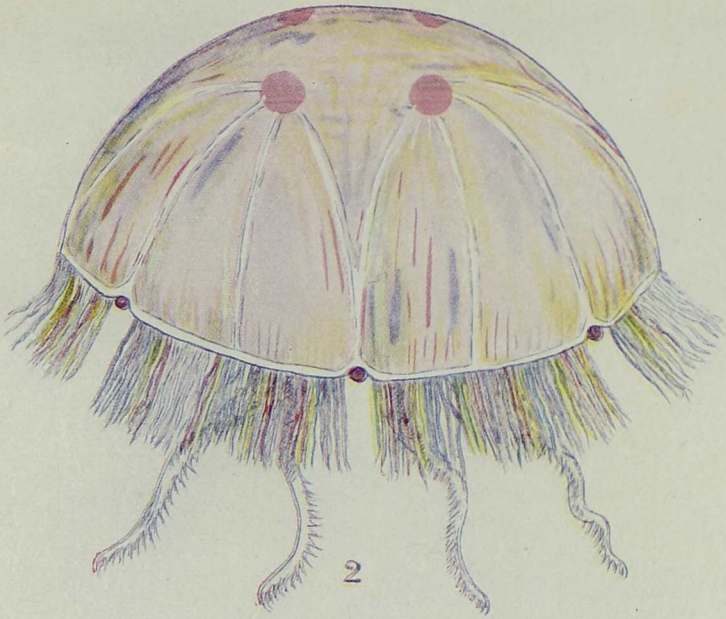
CHAPTER VIII

SEA CUCUMBERS AND JELLYFISHES

PLATE XXXIX

THE SEA CUCUMBER (I)

IF you grope about in the dark nooks and corners of a rock-pool, quite close down to the water's edge, when the tide is out, you may perhaps find a curious little creature which looks rather like a greyish-white cucumber, with an odd feathery tuft at one end of its body. This is a Sea Cucumber, or Sea Gherkin, and is chiefly remarkable because it seems to suffer very much at times from eating something which does not agree with it. Then it cures itself in a very odd way indeed. It gets rid of almost all the inside of its body, reducing itself to very little more than an empty bag of skin, with just a little tuft at one end! It throws off its teeth, it throws off the lining of its throat, it throws off all its digestive organs. You would think that it would kill itself by doing this, wouldn't you? But it does not. And before very long new teeth, a new throat lining, and new digestive organs grow in the place of the old ones, so that in a few



1. THE SEA CUCUMBER.

2. THE COMMON JELLYFISH.

weeks' time the animal is just as perfect as it was before!

It seems rather hard to believe that an animal can treat itself in such a manner as this, and yet continue to live, doesn't it? But remember that "truth is stranger than fiction," and that some of the strangest animals of all are found among those which live in the sea.

PLATE XXXIX

JELLYFISHES (2)

Jellyfishes are among the very oddest creatures which are found in the sea; for their bodies are made up almost entirely of sea-water! It is quite true, of course, that if you cut them in two the water does not run away. But then if you cut a cucumber in two the water does not run away; and yet cucumbers are made almost entirely of water. And the reason why it does not run away is just the same in each case. Both in the cucumber and in the jellyfish the water is contained in a very large number of very tiny cells; and if you cut either of them across you only divide a very small number of the cells, so that only a very small quantity of water escapes. But if you leave a jellyfish lying on the beach in the hot sunshine, and come back to look for

it two or three hours later, you will not find it. All that you will find will be a ring-shaped mark in the sand, showing where the jellyfish had been lying, with just a few threads of animal matter in the middle. All the rest will have evaporated, because it was nothing else but water.

All the same, jellyfishes are very wonderfully made; and perhaps the most wonderful thing of all about them is the fringe of long, slender threads which hangs down from the edges of their bodies. For these are the fishing-lines by means of which they catch their prey. Jellyfishes feed on all sorts of tiny creatures—the fry of fishes, and the zoeas of shrimps and prawns, for instance—and if you were to see one of these swim up against those terrible threads, you would notice that it at once became paralysed, and that in a very few moments it would be dead. The fact is that all the way along these threads are set with hundreds and hundreds of tiny oval cells, each of which has a very slender dart, with a barbed tip, coiled up like a watch-spring inside it. And the cells are made in such a way that as soon as they are touched they fly open, and the little darts leap out. So, you see, if any small creature swims up against the threads numbers of darts at once bury themselves in its body. And, as these darts are poisoned, it dies in a very short time.

Jellyfishes can swim through the water by spreading and contracting their umbrella-shaped bodies, and you may sometimes see them traveling about in such enormous numbers that the water is perfectly thick with them.

PLATE XL

THE STINGING JELLYFISH (1)

Sometimes, after a strong south-westerly wind has been blowing for a day or two in the early part of the autumn, you may find a brownish yellow jellyfish lying upon the shore. It has a circular body about as big as a soup-plate, fringed all the way round with great masses of long yellow hairs. And if you find one of these creatures you are almost sure to find another before very long, and then another, and then another; for they nearly always swim about in shoals together.

Now, if you do meet with one of these jellyfishes, be very careful not to touch it with your bare hands. And if you should happen to be bathing, and to see one floating in the water near you, just get out of its way as fast as you possibly can. For those long yellow threads which hang down from the margin of its body sting just like nettles, and the least touch from

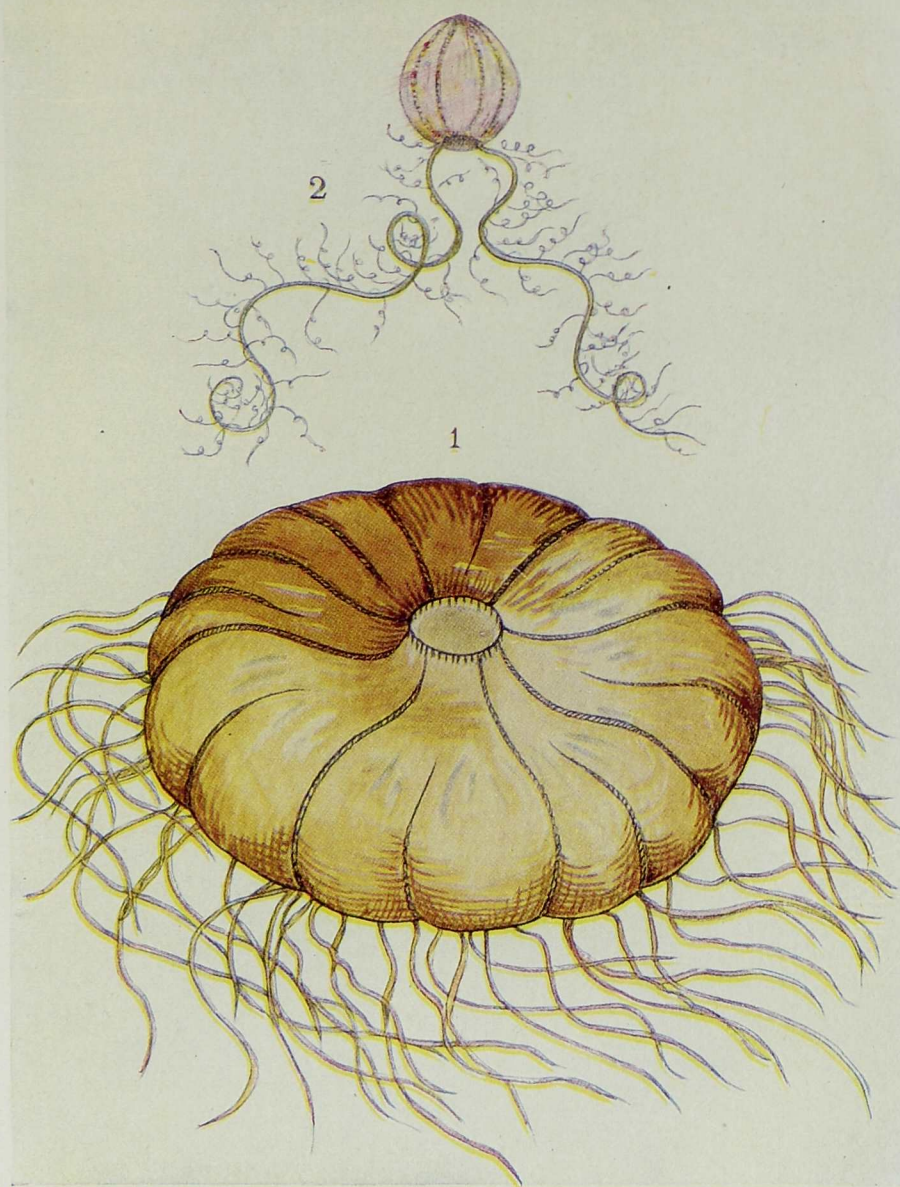
them will cause a great deal of pain. If you have a thin skin, indeed, the sting of this terrible jellyfish may make you very seriously ill, and several weeks may pass before the effects of the poison pass away.

Yet the fishing-threads of this jellyfish are scarcely thicker than hairs, and the little darts which do so much mischief are so slender that you cannot see them at all without the help of a good strong microscope. Doesn't it seem strange that such tiny weapons can be so dreadfully poisonous?

PLATE XL

THE SEA ACORN (2)

This is a very common jellyfish indeed; yet hardly anybody ever sees it. That is because it is very small and very transparent, so that as it swims about in the water it is almost invisible. And if it is flung up on the beach it dries up in a very few minutes. But if you want to look at it, you can very easily do so. On a warm, still day, when the sea is quite smooth, just dip a small net into the water, and work it gently to and fro. Then lift it out and examine the sides carefully, and you are almost sure to see three or four little lumps of jelly, not much bigger than peas. These are



1. THE STINGING JELLYFISH.

2. THE SEA ACORN.

sea acorns, and if you put them into a glass vessel of perfectly clean sea-water, you will very soon find that they are swimming about. For though you cannot see the animals themselves, which are quite as transparent as the water, you will notice little flashes of coloured light, sometimes blue, sometimes green, sometimes yellow, and sometimes red, which just gleam out for about half a quarter of a second, and then disappear. You might almost think that a tiny rainbow had been dissolved in the water.

The fact is this. Running round the oval body of the sea acorn are eight narrow bands, and on each of these are a number of very tiny scales, placed one above another, which keep on rising and falling again, like so many little trap-doors. These scales are really paddles, by means of which the animal drives itself through the water, and as they move up and down they catch the rays of light and break them up, just like that triangular piece of glass which we call a "prism." And though you cannot see the jellyfish itself you can see these little flashes of coloured light, and so can trace the course of the little creature as it travels slowly along.

This curious jellyfish has only two fishing threads, which hang down from the lower part of its body. But from each of these a number of little side-threads spring out, just like the

"snoods" on the lines which fishermen use in the sea. And the animal is always throwing these out and drawing them in again, so that it really "fishes" for the tiny little creatures on which it feeds.

CHAPTER IX

SEA ANEMONES

HOW SEA ANEMONES ARE FORMED

THE most beautiful of all the creatures which live in the sea are undoubtedly the Sea Anemones, which are just like living flowers of all sorts of lovely colours. But I do not know why they are called sea "anemones," for they are much more like asters, or dahlias, or chrysanthemums.

These anemones are made in a very curious way. You will notice, as you look down into a rock-pool, that their soft fleshy arms, or "tentacles," are all spread out like the petals of a flower. If you touch them, however, they at once come closing in and disappear, so that in two or three moments the creatures look like mere lumps of coloured jelly. But if you wait for a little while they will push out their tentacles again, and spread them just as before.

The fact is that the body of a sea anemone is a kind of double bag. Suppose you take a

paper bag, twist up the mouth, and push it downwards, so that the sides of the bag surround it all the way round. You will then have two bags, as it were, one inside the other, the space between the two being filled with air. Now that is just the way in which the body of a sea anemone is formed, with this difference, that the space between the outer bag and the inner one is filled with water. It forms, in fact, a kind of water-jacket.

Next, remember that all those spreading tentacles are really tubes, like the fingers of a glove, closed at the top, but opening at the bottom into this water-jacket. And remember also that the outer walls of the body are formed of very strong muscles. So, you see, when the anemone wants to spread its tentacles, all that it has to do is to contract these muscles. The water is then squeezed up into the tube-like tentacles, which of course expand. When it wants to close them it relaxes the pressure, and the water flows out of the tubes again and back into the water-jacket, so that they all come folding in.

The lower part of an anemone's body is called the "foot," and is really a big and strong sucker, by means of which the animal clings so firmly to the surface of a rock or a stone that it almost seems to be growing out of it. But these creatures do not spend the whole of their lives

without moving, as oysters and barnacles do. Sometimes they will creep slowly along over the surface of the rock, in order to find a more comfortable situation, or one where they will have a better chance of catching prey. And sometimes they will loose their hold of the rock altogether, rise to the surface of the water, turn upside down, and hollow their bodies in such a way that they form little boats, which can float along over the waves for quite a long distance.

PLATE XLI

THE SMOOTH ANEMONE (I)

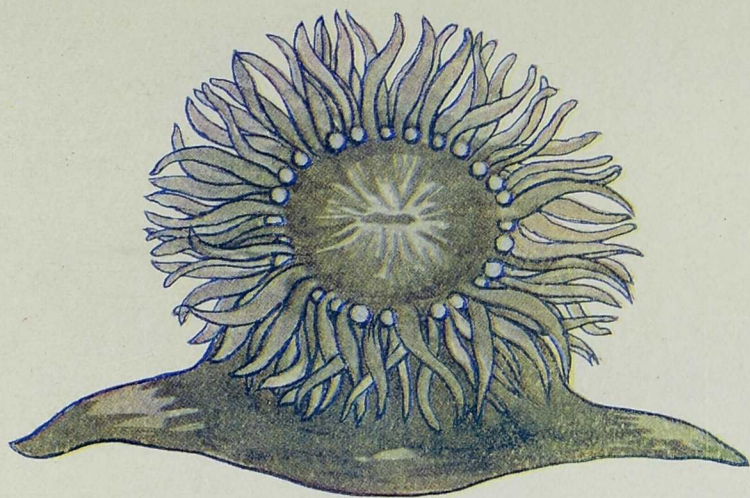
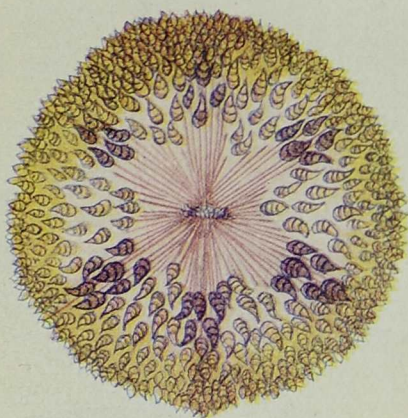
This is by far the commonest of all the sea anemones, and you may find it in hundreds and thousands by going down among the rocks when the tide is out, and looking into the pools. You are almost sure to see that their rocky walls are dotted all over with lumps of brown or dark green jelly, some only about as big as peas and some as large as plums. These are Smooth Anemones, with their fleshy feelers, or "tentacles" closed. And just here and there you may see one of them open, and you will notice that all the way round the edge of its body, between the roots of the tentacles, it has a row of little

bead-like objects of the most beautiful turquoise blue. For this reason the smooth anemone is sometimes known as the "beadlet."

You can easily keep these anemones in captivity, for they are very hardy, and are no trouble at all to feed. Indeed, they will go without any food at all for three or four months together, and seem all the better for their long fast. But if you put a tiny dead crab, or a shrimp, or a sandhopper, into the midst of their spreading arms, you will see the tentacles close round it, and push it down into the mouth, which lies just in the very middle. For about forty-eight hours the animal will then remain closed up. But as soon as it has digested its dinner out will come the tentacles again, bringing with them the empty shell of the victim.

Every now and then, like other anemones, this animal changes its skin, and when it leaves its position on the side of a rock-pool and crawls to a new one, it nearly always leaves a cast skin behind it.

2



1

1. THE SMOOTH ANEMONE

2. THE DAISY ANEMONE.

PLATE XLI

THE DAISY ANEMONE (2)

This is not nearly such a common creature as the smooth anemone, but you may sometimes find it in the rock-pools at low-water on our southern and western coasts. It is pale greyish yellow in colour, and has an odd way of altering its shape from time to time, so that sometimes its body is long and slender, and sometimes it is short and stout, while the disc may be long and narrow one day, and almost round the next. You can always tell it at once, if you should happen to meet with it, by looking at its fleshy feelers, or tentacles, which are marked with rings of grey and white.

PLATE XLII

THE THICK-ARMED ANEMONE (1)

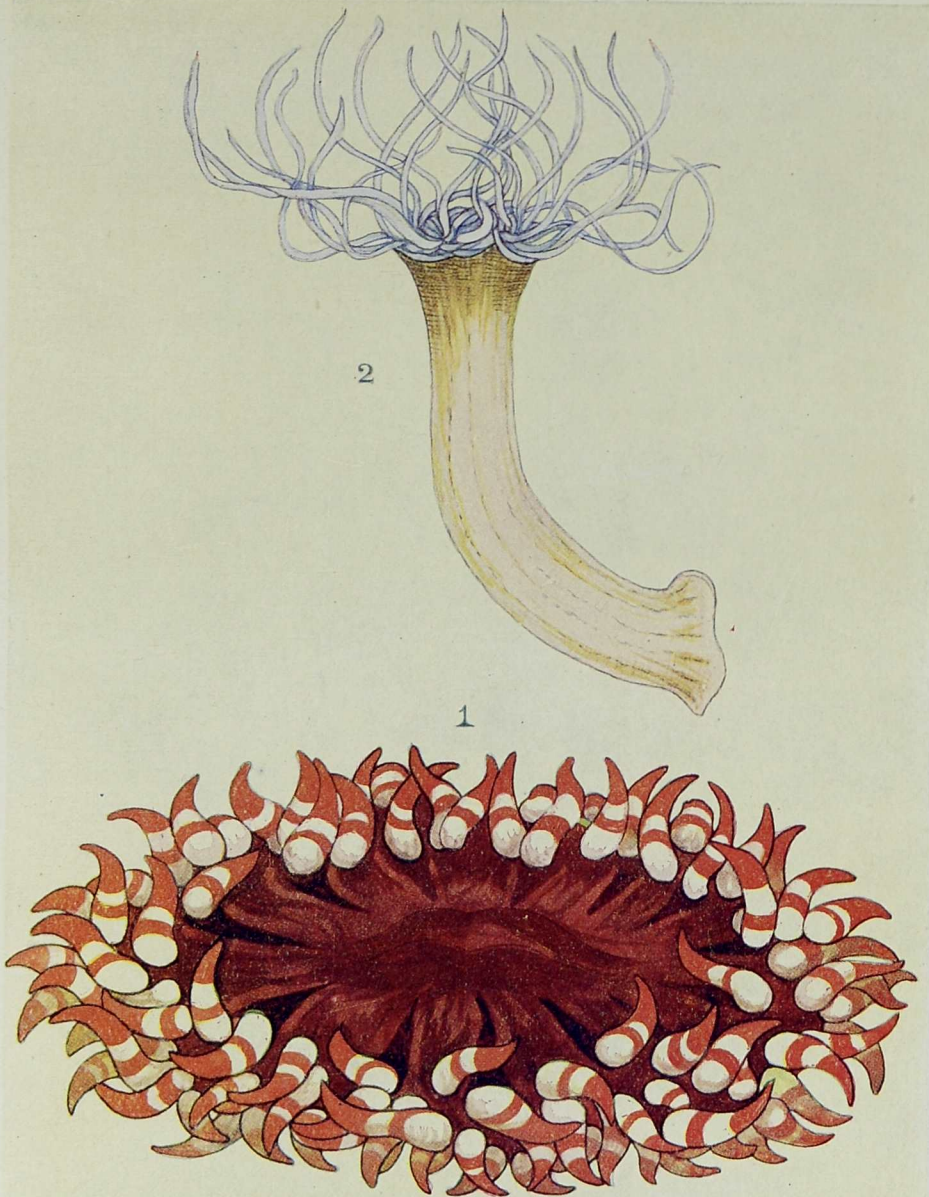
Where the coast is sandy and rocky too this anemone is often rather common. Yet very few people ever see it, because it nearly always fastens itself quite low down on the rocks which border the pools, so that at least half of its body

soon becomes covered up with sand. Besides this, it has a great number of very tiny sucker-feet, not unlike those of the starfishes and the sea urchins, and with these it clings to tiny stones and bits of broken shell, which often quite conceal its upper surface, so that one really cannot see the anemone itself at all. But it is quite one of the very handsomest of all the British sea anemones, for when it is fully grown it is over five inches in width; and sometimes it is pearly white in colour, and sometimes it is green, and sometimes it is purple and brown, and sometimes it is crimson, while its tentacles are banded with scarlet and white. These tentacles are rather stout in proportion to their length, and when they are fully spread the animal looks very much like a cactus dahlia.

PLATE XLII

THE SNAKE-LOCKED ANEMONE (2)

This is also one of the prettiest of these very pretty creatures. But it is not in the least like the thick-armed anemone, for instead of having a broad, stout body it has a long slender one; and instead of short, thick tentacles, like the petals of a dahlia, it has a bunch of almost thread-



1. THE THICK-ARMED ANEMONE.

2. THE SNAKE-LOCKED ANEMONE.

like arms, which really rather remind one of little white snakes. And when they are spread these long arms are hardly ever still, but are always waving about in the water.

When the snake-locked anemone closes up, however, you would never know it for the same creature, for it not only draws its long tentacles back into its body and tucks them away out of sight, but contracts the body itself until it is almost flat. Unless you looked very carefully at the rock to which it was clinging you would never notice it at all.

This anemone is not a very common one, and is chiefly found on the rocky coasts of Devonshire and Cornwall. In colour it is almost white.

CHAPTER X

MADREPORES, CORALS, AND SPONGES

PLATE XLIII

MADREPORES (I)

IN some ways these curious creatures are very much like sea anemones, and if you were to find one with its tentacles spread you would be almost sure to think that it was a small anemone. But if you touched it you would find that you had made a mistake, for instead of closing itself up into an almost shapeless lump of jelly, as the anemones do, it would just draw back its tentacles, and leave a kind of flinty skeleton still standing up. For madrepores are really much more like the wonderful little creatures which make coral. They suck lime, in some strange manner which nobody quite understands, out of the sea-water, and build it up round and underneath their own bodies. And if you startle them in any way they draw themselves down inside this shelly covering, and disappear from sight altogether; so that all that you can see is a number of thin plates standing upright on

their edges, and looking rather like the lower surface of a mushroom turned into stone.

Madrepores feed on very tiny animals, such as the fry of small fishes, and the zoeas of shrimps and prawns. And they catch their victims by means of a number of fleshy tentacles, which are very much like those of the sea anemones, except that they always have little round knobs at the tips. These tentacles are set with numbers of tiny cells containing slender poisoned darts, just as those of the anemones are.

If you want to find madrepores, you must look for them among the rocks near the water's edge when the tide is at its lowest. But they are not very common, and on many parts of the coast they are never found at all.

PLATE XLIII

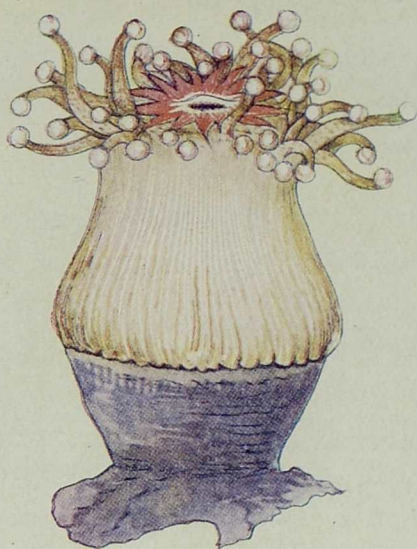
THE SEA FINGER (2)

If you walk along the shore as the tide goes out, you may often find a soft, pink, fleshy object which has been thrown up by the waves. And if you search among the pools at low-water, you are nearly sure to see other soft, pink, fleshy objects just like it growing upon their rocky sides, or upon the stones and shells which lie at the bottom. They are often known as "dead men's

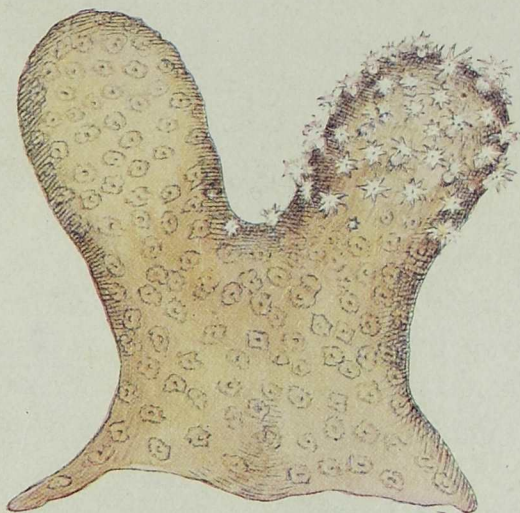
fingers," or "dead men's toes." But as those are not very nice names, we will call these objects "sea fingers."

Now if you pick up one of these sea fingers and look at it carefully, you will see that its surface is pierced all over with numbers of tiny holes. And if you take a good strong magnifying-glass, and look at one of the holes through that, you will see that it is shaped like a little flower with eight petals, or a star with eight rays.

The fact is that the sea finger is the home of a most curious animal; or perhaps one should rather say that it is the home of hundreds of most curious animals. Indeed, it is not at all easy to know which is the right way to describe it. For if you were to take a living sea finger, and to put it into a vessel of clear sea-water, you would very soon notice that a little tiny star-shaped animal had poked itself out of each little star-shaped hole. There would be hundreds of these little animals—or "polyps," as they are called—altogether. But yet they would only have one body between them, for they are joined together in such a wonderful way that the food which is caught and eaten by one polyp nourishes all the others as well as itself!



1



2

1. THE MADREPORE.

2. THE SEA FINGER.

PLATE XLIV

THE TUFT CORAL (I)

Nearly all the coral-building animals are found in the tropical seas, for they can only live in water which is quite warm all the year round. But there are just a very few which are sometimes found off our own shores, and one of these is the Tuft Coral. It looks rather like a tree which has just been "pollarded" by having all the small branches taken away and all the big ones cut quite short; and sometimes it weighs as much as six or even seven pounds.

People sometimes say that the curious substance which we call "coral" is made by "coral insects." But the little animals which make it are not related in any way to the true insects. They are really tiny polyps, very much like those of the sea finger; and they suck up lime out of the water, and build it up underneath and round their own bodies, just as the madrepores do.

If you were to place one of these tuft corals in a vessel of clear sea-water, and to watch it carefully, you would soon see the little polyps poking themselves out, and spreading their tiny fleshy feelers, or "tentacles." The coral which they make is pearly white in colour, with just a faint tinge of rosy red, and the polyps themselves are

partly white, and partly fawn, and partly chestnut brown.

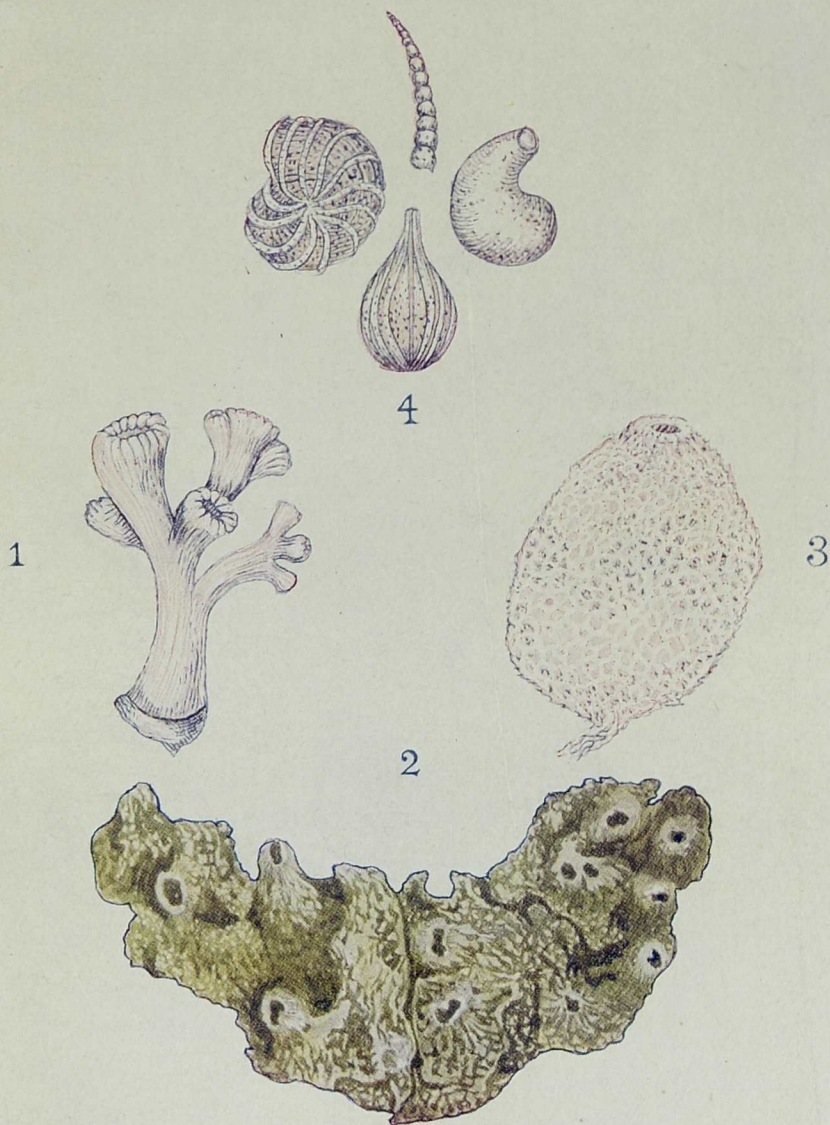
One does not often find a tuft coral, however, for the polyps like to live in rather deep water. But when there is a very high spring-tide, as there generally is about the end of March and the end of September, the waves retreat afterwards a good deal farther than usual. And then, if you go right down to the water's edge, you may perhaps find a tuft coral fastened to the rocks.

PLATE XLIV

THE BREAD-CRUMB SPONGE (2)

I dare say that you will be rather surprised to hear that nearly three hundred different kinds of sponges have been found in the British seas. You will not be able to find very many of these, however, for they nearly all live in deep water, and have to be scooped up by means of the dredge. But the Bread-crumb Sponge is easily found, for it lives in shallow water, and you are nearly sure to find it if you look for it in the rock-pools.

But I hardly think that anybody, on seeing it for the first time, would take it to be a sponge at all. For it is not in the least like a bath sponge. It is just a kind of fleshy crust, some-



1. THE TUFT CORAL.
3. THE GRANTIA SPONGE

2. THE BREAD-CRUMB SPONGE.
4. FORAMINIFERA.

times greenish in colour and sometimes yellow, which grows round the stems of sea-weed, or covers the surfaces of rocks and stones. And the odd thing about it is that when it clings to sea-weeds its surface is quite smooth, with a number of large holes in it, but that when it grows on rocks it is covered all over with little projections which look just like the craters of volcanoes.

It is rather difficult to describe the animal which lives in the sponge, for it really consists of a large number of tiny animals all joined together in one common mass, very much like the polyps of the sea finger. But they are so very small that unless you examine them by means of a good strong microscope they only look like a mass of brownish jelly.

These little creatures obtain their food in a very curious way. If you look at the surface of the sponge through a magnifying glass, you will see that it is pierced by a great many very tiny holes as well as by a number of bigger ones. Now water is always passing in through the small holes and out again through the big ones; and as it does so the little creatures manage to suck out all the tiny atoms of animal and vegetable matter which were floating about in it.

PLATE XLIV

THE GRANTIA SPONGE (3)

This is quite a small sponge, which you may often find by hunting about in the rock-pools just above low-water mark. Sometimes it clings to sea-weeds, and sometimes it hangs down from the surfaces of the rocks; and when you find one you are almost sure to find several others close by.

In appearance, they are rather like little flat white bags, or purses; and when they reach their full size they are generally about an inch long and an inch and a half wide.

PLATE XLIV

FORAMINIFERA (4)

"Foraminifera!" That is rather a long name; isn't it? But if we cut it in two, and strike out one of the letters, we shall see what it means. *Foramin-(i)-fera*. Now the first part of the name is a Latin word which means "a hole," and the last part is another Latin word which signifies "bearers." So "foraminifera" means "hole-bearers," and this title has been given to certain

very tiny creatures which live in the sea because they inhabit shells, which are pierced all over by numbers and numbers of still tinier holes.

These foraminifera are so very small that numbers of them can live in a single drop of water! Yet, strange to say, all the chalk in the world is made of their shells! For in days of old—thousands and thousands of years ago—they were found in the sea in millions of millions of millions. And as they died their empty shells sank down to the bottom of the sea in such enormous numbers that at last they formed a layer hundreds of feet thick. Then suddenly one day there came a great earthquake, and a great deal of this vast layer of shells was forced up above the surface in the form of what we now call chalk. So that “the chalk cliffs of old England” are really made of nothing but shells, so very small indeed that you cannot see them without the help of a very strong microscope!

There are a great many different kinds of foraminifera. But if you look at them through a good microscope you will always see that their shells are pierced by the tiny holes from which they take their name.

CHAPTER XI

SEA-WEEDS

PLATE XLV

THE BLADDER-WRACK (I)

I DARE say that you would like to know something about the sea-weeds which you may find on the shore; so I am now going to describe some of those which you are almost certain to meet with.

First of all, then, and commonest of all, there is the bladder-wrack. Wherever there are rocks on which it can grow you will always see it in great masses. And after every storm enormous quantities of it are torn off and flung upon the beach. Then the farmers send down their carts to carry it away. For after it has been piled up in heaps for some time, so as to allow it partly to decay, it makes a most useful manure; and the farmers are only too glad to be able to spread it over their fields.

This plant is called the "bladder-wrack" because of the odd little oval bladders filled with air which are found in the leaves, and which explode with a slight report if you tread upon them or squeeze them.



1. THE BLADDER-WRACK.

2. THE OAR WEED.

PLATE XLVI

CORALLINE (1)

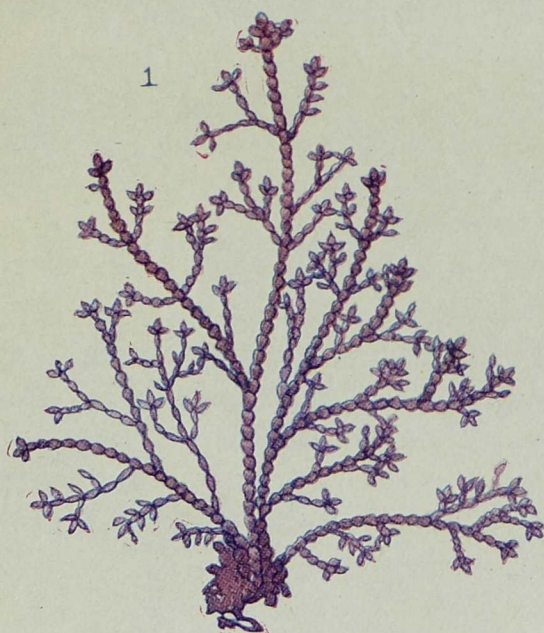
For a great many years naturalists could not make up their minds whether this very pretty sea-weed was really a sea-weed or not. For it possesses the curious power of sucking out lime from the sea-water and building it up round itself, just as the polyps of the madrepores and the corals do: so that when it dies and decays it leaves a kind of chalky skeleton behind it. For this reason it was often supposed to be really a kind of coral. We know now, however, that it is a plant. For if it is placed in acid, which dissolves away this "skeleton," we find that a true vegetable framework is left behind it.

While it is alive the coralline is of a deep purple colour. It is quite a small plant, growing only to a height of four or five inches, and you may find it in quantities on the rocks near low-water mark.

PLATE XLVI

DULSE (2)

This weed is also known as the Dillisk, or Dilloisk. I dare say that you have often seen it, for it is quite common on nearly all the rocky



1. CORALLINE.

2. DULSE.

parts of our coasts, sometimes growing on the rocks themselves, and sometimes on the larger sea-weeds. In colour, it is a deep, dark red, and if you look down upon it on a bright sunny day, as it grows in a pool of clear sea-water, you may see all kinds of lovely rainbow tints playing over its leaves. The leaves or "fronds" as they are more properly called, are about two inches long and a quarter of an inch wide.

The dulse is one of the sea-weeds which are used for food. On many parts of the coast of Ireland it is very largely eaten, both boiled and raw, and some people are so fond of it that they have it for breakfast every day.

PLATE XLVII

THE GREEN LAVER (1)

Another name for this plant is the Sea Lettuce; and certainly, with its broad, bright green, crinkled leaves, it does look rather like a cabbage lettuce. It is a very useful plant to keep in a salt-water aquarium, for its leaves give off little bubbles of oxygen gas, which help to keep the water pure and fit for fishes and other creatures to live in. If you look at it on a bright sunny day you will often find that the leaves are covered

all over with these tiny bubbles, which look just like little drops of quicksilver.

The green laver is found in abundance on most of our rocky coasts, and is often boiled down into a kind of jelly and used as food.

PLATE XLVII

THE PURPLE LAVER (2)

This plant is very much like the green laver, except that it is purple in colour instead of green. It is often boiled down into jelly and used as food, more especially in Ireland, where it is generally known as "sloke," and is cooked and brought to table in a silver saucepan.

PLATE XLVIII

CARRAGEEN MOSS (1)

I do not know why this plant should be called a moss, for it is not in the least like the true mosses, as you can easily see by looking at the illustration. It is very common indeed, growing both in the pools among the rocks and also in deep water. But it is not a very easy plant to describe, for it varies very much in colour, being



1. THE GREEN LAVER.

2. THE PURPLE LAVER.

sometimes green, and sometimes yellow, and sometimes purple. Like the dulse, it is often used for food, being boiled down into a kind of jelly, and then either eaten by itself, or mixed with tea or coffee. It makes very good size, too, and is used a good deal in the manufacture of calico. Farmers use it, too, for fattening calves, and also for mixing with the potatoes or meal with which the pigs are fed. So that altogether it is a very useful sea-weed indeed.

PLATE XLVIII

THE SEA GRASS (2)

This is a very pretty sea-weed, which you may often find growing in great quantities in the pools which are left among the rocks as the tide goes down. When its long, narrow fronds are waving to and fro in the water it really looks most lovely, and you can almost fancy that you are gazing down into fairyland. And as the shrimps and prawns and little fishes dart in and out among its bright green leaves, one might almost imagine them to be the fairies!

The fronds of this pretty sea-weed vary a good deal in width, for sometimes they are like strips of narrow ribbon, and sometimes they are scarcely broader than hairs.

PLATE XLVIII

THE GRASS WRACK (3)

In one way this is the most curious of all the plants which you may find on the shore. For it is not really a sea-weed at all, but is a flowering plant which somehow or other has taken to living at the bottom of the sea. You may often find it in the deeper pools just above low-water mark; and you can tell it at once by its very long, very narrow, bright green leaves. These leaves are often three or four feet in length, while they are only about three-eighths of an inch wide; so that really they do look very much like blades of grass.

The grass wrack is not one of the true grasses, however, for it has real flowers, which grow in a kind of sheath formed by one of the shorter leaves. And its stem creeps along under the muddy sand, and throws up leaves at intervals, very much like that of the common bracken. On many parts of the coast it grows in the greatest abundance. There are large fields of it, so to speak, below low-water mark, which afford refuge for all kinds of small sea-creatures. Indeed, if you want to catch these animals for yourself, the very best way to do it is to wait until the tide is quite low, and then to wade



1. CARRAGEEN MOSS.

2. THE SEA GRASS.

3. THE GRASS WRACK.

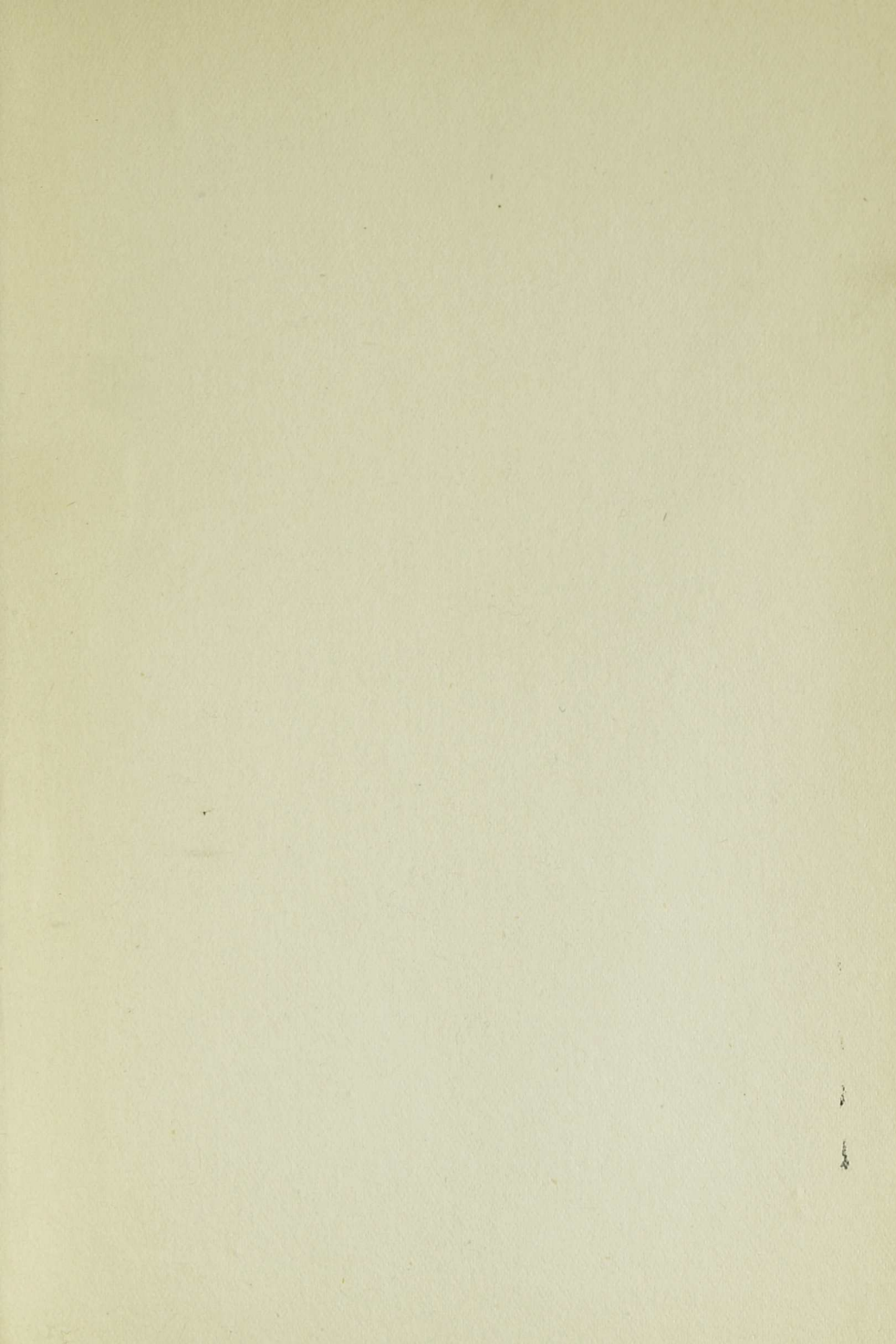
into the water and fish about in the masses of grass wrack with a small net.

Great quantities of the long, narrow leaves of this plant are often flung up on the shore; and when they have been thoroughly dried they are often used for packing glass or china, instead of hay or straw.

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