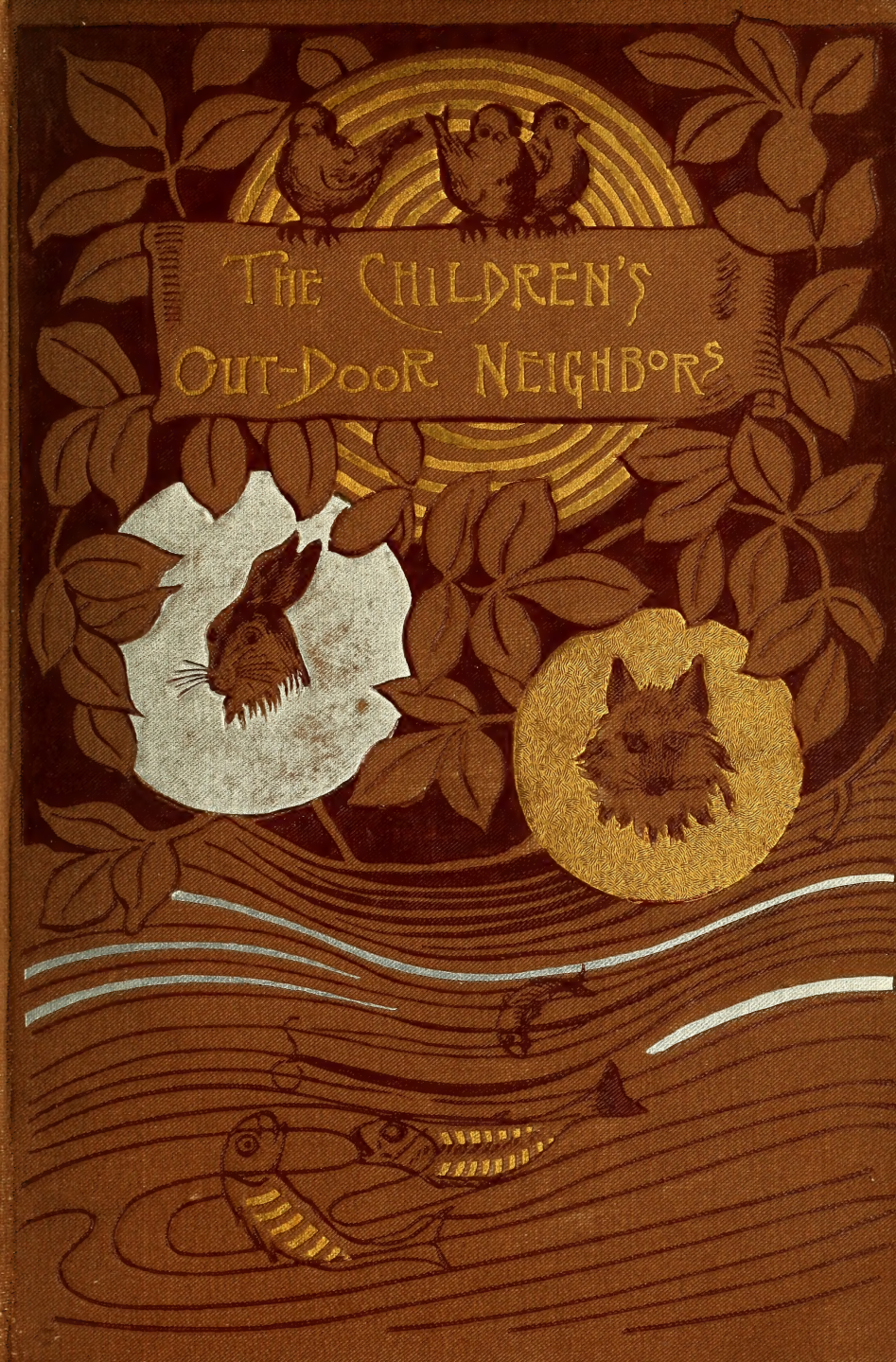
THE CHILDREN'S
OUT-DOOR NEIGHBORS

A Cool Retreat.

CHILDREN WITH THE FISHES

BY

MRS. A. E. ANDERSON-MASKELL

ILLUSTRATED

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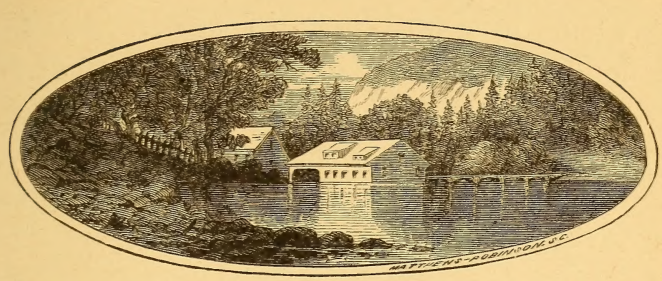


CHAPTER I.

THE FISHING PARTY.

Frank, like almost all boys, was fond of fishing. One day he persuaded Grace and his little sisters to accompany him. The first fish caught was a fine speckled trout.

"Isn't he booful!" exclaimed little Rose, dancing around the tub of water in which the shining creature had been placed.

"You certainly are fortunate," said Grace. "I

didn't know trout were to be found here; but they are found in great quantities in the eastern and western states."

"Thanks to our fish-commissioners that we do find them here," said Frank. "There are more sun-fish, cat-fish and perch than anything else."

Rose was amusing herself by taking up the fish in her hands and commenting on how easily it slipped through her fingers.

"What makes it so slipp'y?" she asked.

"The slime," answered Grace.

"But where does the s'ime come from?" she asked.

"Suppose, Frank, you stop fishing for awhile that we may talk a little. In what way is a fish different from other animals, Rose?"

"'Em haven't any necks nor hair, and 'em's dot lots of scales on 'em. And I tan't see any nose nor ears. 'Em 's dust dot two bright eyes without any winkers, and a dreat bid mouf."

"Their fins are their legs and arms; and now write down upon your papers the names of all the fins. The two fins at the sides which you might almost fancy to be ears, are the *pectoral fins* and

answer the purpose of fore-legs or arms. One fin under the breast is called the *ventral*, the other the *anal*. The fins on the back are called the *dorsal* fins, and the tail is the *caudal* fin. It is with the last named fin that the fish moves through the water, the office of the other fins being to balance and direct the body. In watching a fish swim have you not noticed how gracefully it waves its tail, while the other fins seem just spread out for aids?"

"I have," said Frank.

"But where does the slippery stuff come from?" asked May.

"I am coming to that directly. Do yon notice the line down the sides of the fish? All the scales of this line have tiny holes in them through which the slime escapes to cover the body of the fish so that it can move more easily through the water. There are also tiny mucous holes in the head, surrounding the nostrils, where much more slime escapes than from the lines down the body. This mucous is a sort of defensive secretion which the water always carries backwards over the whole surface of the fish's body!"

"How very strange!" exclaimed May.

"What makes him open and shut his mouf all the time for?" asked little wide-awake Rose, peering down into the tub.

"That is the way he breathes. Air is mixed with the water, and some of it he retains, but the rest of it passes out of the gills with the water."

"Has he really no ears?" asked May.

"None that appear; and most naturalists believe they only *feel* sound. Water is a much better conductor of sound than air, so that fish do not require a development of ears, perhaps. If they had such ears as we, what a tumultuous world it would seem to them! There is within the fish, however, an internal organ serving the purpose of ears, much the same as though our ears were entirely covered over with a thick skin. Do you understand?"

The children thought they did, and Grace continued: "Trout belong to the *Salmonidæ* family."

"Do tell us something about salmon," said Frank.

"Salmon belong principally to the sea, but enter the rivers to deposit their spawn. It is then they are caught in such large quantities for the table. They are partial to clear, rapid rivers with strong bottoms. Male and female both ascend the rivers,

and both unite in forming holes a foot or two deep. After the spawn is placed in these receptacles they are covered up carefully, and the salmon return to the sea lean and emaciated. These myriads of little eggs lie in their holes until the next spring, when they are hatched. The common, or river trout, like the one we have here, resembles the salmon in its habits. September and October are their months for spawning. They are often found under a stone or log. The best bait for trout is flies. Now, Frank, suppose you try your luck, again. You and May fish, while Rose and I talk."

May soon caught a large perch.

"Be careful," called out Frank, "or it will stick its fins into you."

"Is the perch so pugnacious as that?" asked Grace.

"Yes, indeed; see every fin on its back bristling with rage —"

Here Frank interrupted himself by drawing up a good-sized sun-fish.

"I wonder what they call this a sun-fish, for?" he said, as he took it from the hook.

"It is not the true sun-fish," said Grace. "This

is only a species of the perch family. The real sun-fish is found in the Atlantic ocean. It seems all head, and is supposed to be called sun-fish because it is shining and round like the sun."

"Is it a small fish?" asked Frank.

"By no means. Some of them will weigh five or six hundred pounds."

"Our little sun-fishes are pretty if they don't look like the sun," said May.

"Them's dot pitty wed fins," said Rose.

"So has the perch," said May.

"Perch are the hungriest fish I ever saw," said Frank. "If you once get into a school of them, and have plenty of bait, you can catch every one if you are careful."

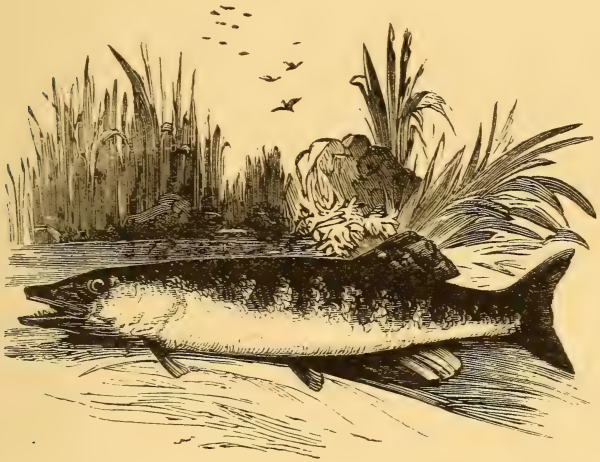
"Are they any hungrier than pike," asked Grace.

"I didn't think of them when I spoke; but a pike daresn't touch a perch. A perch is always ready for him."

"Do you ever catch any pike, here?" asked Grace.

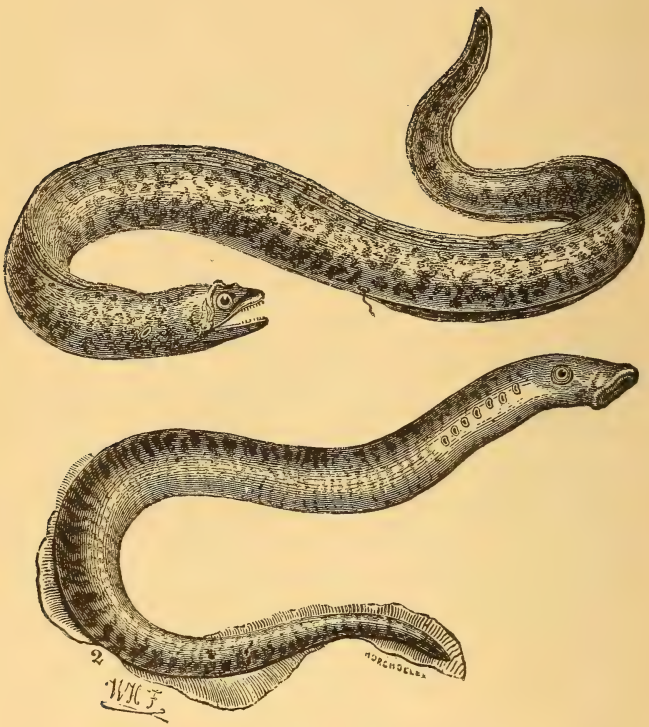
"We catch them down in the mill-pond in winter-time. A hole is cut through the ice and the bait let down. They are so hungry that great numbers are caught. The pike is a long, slim fish."

"The pike," said Grace, "is the biggest eater of all the fish, eating anything it can swallow. Many a time it has choked to death trying to swallow something larger than itself. The pike, as well as the pickerel of the New England states, belongs to the *Esocidæ* family. They have large mouths, sharp teeth and soft fins."



"Is a pickerel as large as a pike?" asked Frank.

"Didn't you know pickerel is the diminutive of pike? I have heard that pike live to be two or three hundred years old. I doubt it though."



1. Muræna (*Muræna helena*). 2. Lamprey (*Petromyzon marinus*).

"How I wish we had some way of catching fish without a hook!" said May. "I think the little sun-fish would look almost as pretty in an aquarium as a gold-fish. He would be just as entertaining, anyway."

"O let's tatch some dold-fish!" exclaimed Rose.

"You would have to go to China to do that," said Frank.

"No," said Grace. "It is true they are natives of China, but they were introduced into England, and from there were brought to the United States. A great number of them are raised in artificial ponds in both countries, until they have become so cheap anybody ean afford to keep one or two. When first hatched the gold-fish is entirely black, afterwards it becomes white, and again changes to a gold color. Some of them are a beautiful red, sprinkled with gold; others are white, like silver, and others white, spotted with red.

"Gold-fish will live a long time upon nothing else than the animalculæ they can collect from frequently changed water. They will, however, eagerly sieze bread crumbs. They belong to the *Cyprinidæ* family. The roach also belongs to this family —"

A startling cry from May, interrupted.

Her hook had suddenly disappeared from sight, and fearing the fish would get away she had given her line a spasmodic jerk, only to feel an eel switching its cold body about her neck. She was nearly frantic with fright. Frank sprang to her rescue.

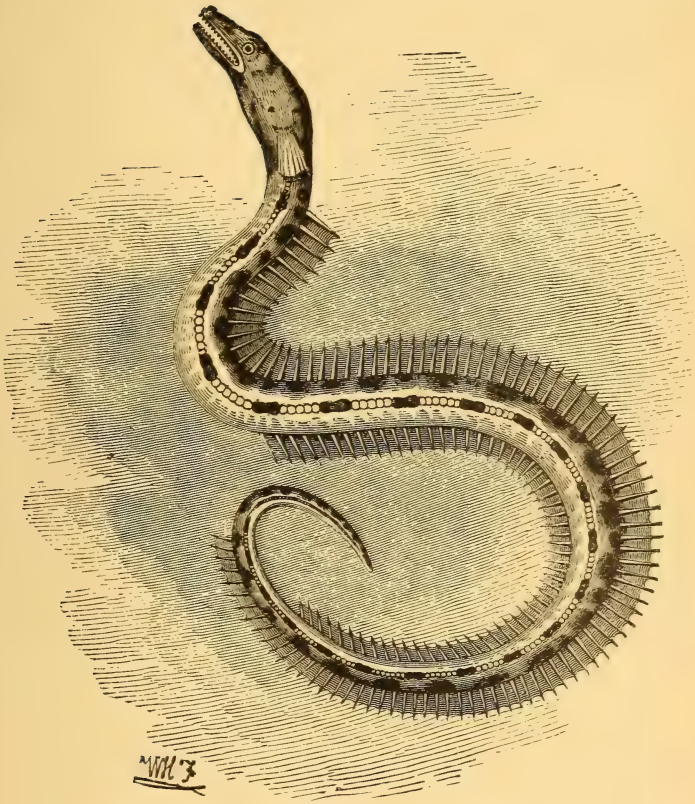
"It is nothing but an eel! Let me get it off the hook. You'll never do it in the world. Well, I declare, if he hasn't swallowed the hook clear down! I'll have to cut his head off to get it."

"Let the hook go, and the horrid creature, too," exclaimed May, in great excitement. "I'll never fish again as long as I live."

"Nonsense!" exclaimed Frank. "Eels are just as good as cat-fish."

"It's a horrid water-snake," exclaimed May. "The very meaning of the word 'eel' is 'serpent'."

"Yes," smiled Grace, "but this is an eel of the *Anguillidæ* family, a fresh-water fish with pectoral, anal and dorsal fins. Then if you will examine him closely you will find scales imbedded in his thick, soft skin. He will be a delicious morsel for our supper, ugly as he looks. The ancients were very fond of eels. They were deified by the Egyptians, and



Sea-Serpent (*Ophisura*).

made much account of by the classic Greeks. There were the *Muræna* and *Lamprey* that figured so conspicuously on the tables of the Romans. They are found in the Mediterranean sea. The *Ophiseridæ* family, the snake-eels, are distinguished by the tail ending in a round fin without a point."

"Cousin Grace, did you ever see a sea-serpent?" asked Frank.

"No; but they are a species of the *Ophiseridæ* family."

"What, the snake-eels?" asked Frank, in surprise.

"Yes; why not?"

"Why, I thought a sea-serpent was something immense — say a hundred feet long."

"There has often been great agitation in various parts of the world over an imaginary sea-serpent. Hundreds testified to having seen these monsters following in the wake of ships; but when sailors were bold enough to thoroughly investigate, the sea-monster was often discovered to be no more than floating sea-weed. There is a real sea-serpent, however, but it belongs to the same family, genus at least, as the snake-eel. The real sea-serpent is not thicker than a man's arm, nor does it measure more

than six feet in length. It has a long and pointed nose, and fins which extend all the way down the back of the animal, as well as nearly all the way under it. It breathes by means of gills, like a fish."

"Cousin Grace, did you ever see a flying-fish?" asked May

"Yes," said Grace.

"Do tell us all about them," said Frank, hauling in his line, and flinging himself down on the grass.

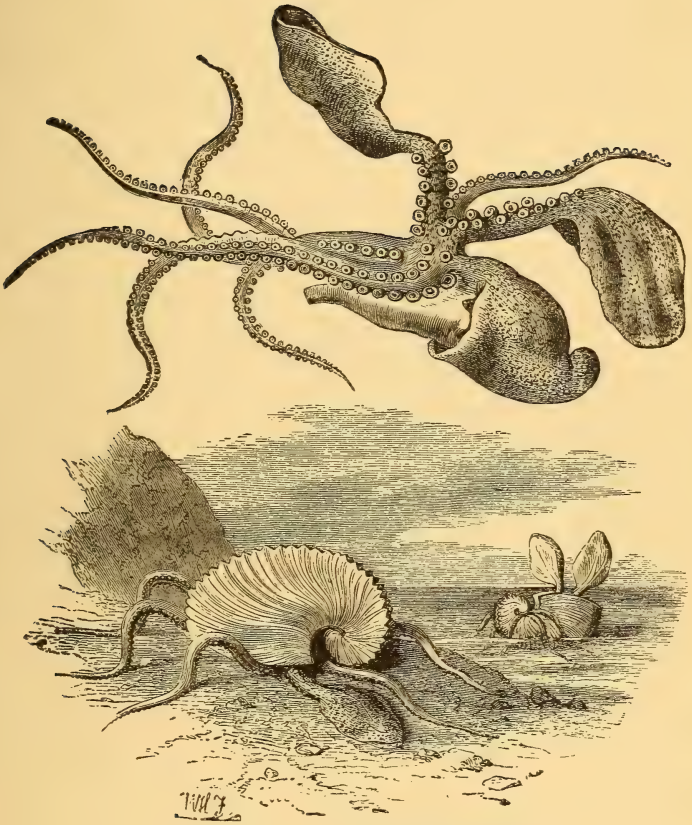
"Of all the fish, I think a fish with wings must be the most interesting," said May.

"Have 'em dot fevvers on their wings?" asked Rose.

"No, their wings are nothing but great long fins. Their pectoral fins are composed of seven or eight ribs, connected by a transparent, glutinous membrane. These little fishes can raise and flap their wings like little birds."

"Are they little?" asked Frank.

"There are many species, ranging from three to twelve inches in length. Swimming in the water they have much the appearance of swallows, only they always swim in straight lines. They have black backs, white stomachs and long forked tails like the swallows."



ARGONAUTA, IN THREE POSITIONS.

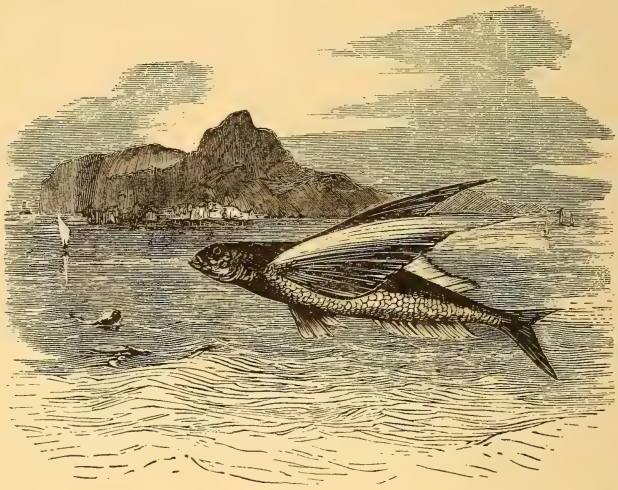
"But what do fish have wings for?" asked Rose.

"Because they have so many enemies, I suppose. They live in large shoals, and the dorado, thunny and many other fish get into a shoal and devour large numbers. The little creatures cannot fly fast enough in the water, so they leap into the air, flying fifty or sixty yards at a time, scarcely ever more, as when their fins become dry they drop back into the water. Sometimes, they plunge beneath, rewet their fins, then continue their flight. But enemies await them here. Sea-birds often pounce upon them, too. The eyes of these fish protrude so that they can see danger from every quarter. Sometimes when flying, they become suddenly exhausted, and fall with such force upon decks of ships as to be killed in great numbers. One of the most singular of the flying-fish is the dragon-fish, or *Pegasus-draco.* It looks something like a crocodile with fan-like wings upon each side. It is three or four inches in length, and belongs to the sea-horse pipe-fish genus. The males carry the eggs in their coat-tail pockets until they are hatched,"

"Now, Tousin Grace, you're jokin', I just know!

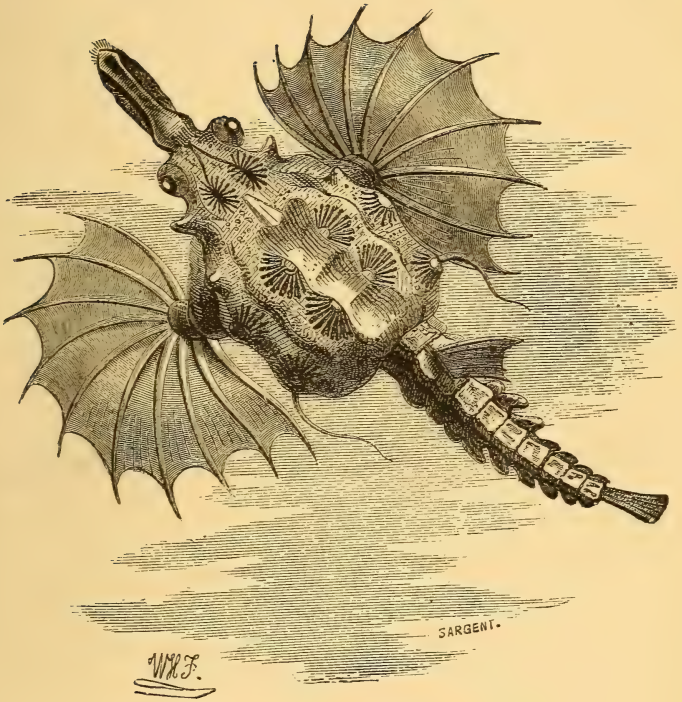
'Tause no little fish have toat-tails. They don't wear toats, at all," said Rose.

"Not cloth ones," laughed Grace, "but shining scaly coats, so thick on the dragon-fish as to form a sort of armor. Their coat-pockets are pouches on their tails — a sort of sack."



"I should think they might call it an angel-fish as well as a dragon-fish, or is it so very ugly?" said May.

"Not near so ugly as a fish that really bears that name," said Grace.



THE PEGASUS DRAGON (*Pegasus-draco*).

"Then there is really an angel-fish?" exclaimed May, delightedly.

"Yes, one of the ugliest of fishes, and it cannot fly at all."

"Perhaps it gets its name from its gentle disposition," suggested May.

"No; it is very fierce, voracious and dangerous. Nobody likes to approach it. It is longer than a man and weighs a hundred pounds."

"O dear! Then what do they call it an angel-fish for?" asked May.

"Just a satire on its extreme ugliness I suppose; or it may be called that from its clumsy, awkward-shaped pectoral fins. It has another name which may be a little more appropriate, and that is *monk-fish*, from the supposed hooded resemblance to a monk's head. It is a very singular-looking fish indeed. It belongs to the *Sycralidæ* family, the same as does the shark and sword-fish."

"I was reading in the morning paper to-day that sharks were unusually thick this season along the Atlantic coast. Some little boys were bathing, when some fishermen came up in a boat, telling them that there were sharks a short distance away.

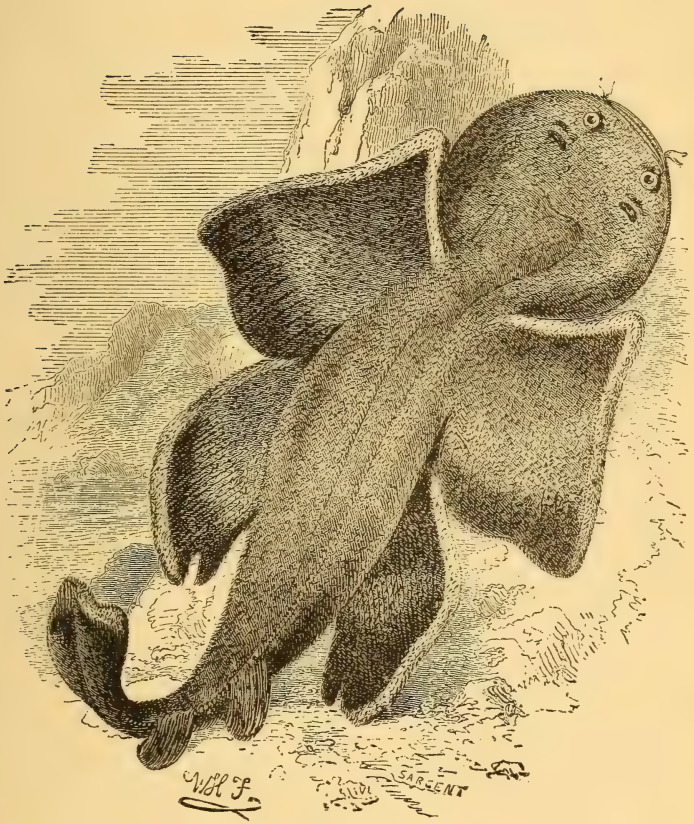
The little boys were so frightened that they couldn't get their clothes on fast enough. I'd like to have seen Pat Ryan scared by such a yarn; and I think I wouldn't mind seeing one myself," said Frank.

"I wouldn't," said May. "They're terrible. They have such great teeth and large mouths that they can just bite a man in two at one snap of their jaws, can't they, Cousin Grace?"

"They are the most dreaded of all the fishes. The white shark is the most terrible, reaching sometimes the length of twenty or thirty feet. The mouth with its six rows of bristling teeth, looks terrible indeed. He will outstrip the swiftest vessel, and his perserverance is indefatigable. One will follow in the wake of a ship for days, to pick up the refuse thrown overboard."

"Don't sailors ever catch them?" asked Frank.

"O yes. A very large hook is baited with a chunk of salt pork and let down from the ship's side. The shark no sooner sees it, than he swims up, throws himself over on his side and gobbles it down, the hook becoming fast in his throat. A harpoon is plunged in his body, and the animal lifted from the sea, and speedily finished with handspikes



SQUALIDA, OR ANGEL-FISH.

and axes. His thick skin is made into sheaths and cases, and his liver yields an oil for dressing skins. Their bodies emit a phosphoric light in the dark. There are more than thirty species of sharks, but none so much dreaded as the one we have just been speaking about. The basking shark, though as large as the white shark, is perfectly harmless. It loves to lie on the surface of the water, sometimes on its stomach and again upon its back, basking, and will allow itself to be patted and stroked. Then there is the blue shark, the fox shark and others. The oddest looking of all the sharks is the hammer-heads. It resembles the white shark, except in the curious formation of its head, which is like a sort of a double-headed hammer, with eyes in each end, giving to the creature an extended power of sight."

Grace then examined the papers of her little class, and found the following facts:

"Fishes are cold-blooded, *Vertebrated* animals, have fins in place of limbs, and breathe by means of *Branchial*, or gills.

"Trout belong to the *Salmonidæ* family, and therefore to the same order as the salmon, *Malacopterygious* fishes.

"Pike and pickerel belong to the *Esocidæ* family, and to the same order as the trout.

"The gold-fish and the roach belong to the *Cyprinidæ* family.

Eels belong to the *Anguillidæ* family. Sea-serpents and snake-eels to the *Ophiscridæ*.

Flying-fish are *Malacoptergious* fishes, and belong to the *Exocœtidæ* family.

Angel-fish and sharks belong to the *Squalidæ* family, and to the *Chondropterygian* order.

CHAPTER II.

CATCHING LOBSTERS.

A favorite place of resort for the little students of natural history and their teacher, was a mossy rock projecting a little way over a clear, sparkling stream of water; and as it was in the vicinity of Pat's home, they often found him there before them.

One day they found him standing ankle deep in the water, and as Frank flung aside his straw hat to meet the cool, gentle breeze, he cried out: "What are you doing there, Pat?"

"Catching lobsters," said Pat, touching his funny home-made cap awkwardly in the direction of Grace and the little girls, who stood in the back-ground,

"How do you catch them?" asked Grace.

"Aisy enough, mum. I jist puts my hand down inter the wather and they takes hold of my finger, mum!"

"Why, Pat, don't they hurt?"

"Hardly a bit, mum. You see I'm always keerful which one of the nippers they take hold with."

"Is there a difference in their two pincers?" asked Grace.

"O yis, mum, one of his pincers is full of teeth loike the edge of a saw; the other one has knobs in place of teeth. When the lobster is eating he uses the pincers with the knobs to hold on by, while he cuts up his food with the one that is full of teeth. I'm always keerful, mum, that the lobster shall use his knobby pincer in taking hold of my fingers. I'll show ye, mum,"

So Pat peered down to find a lobster. "There goes one, mum. Wait a minute and I'll have him," and the next moment Pat did draw up his hand with a lobster clinging fast to the nail of his fore-finger.

HUNTING FOR LOBSTERS.

"I guess it hurts a little," laughed Frank, "the way you show your teeth."

"The pesky thing does hold on uncommon tight!" exclaimed Pat, shaking his hand violently. Not succeeding in making it loosen its hold, he deliberately broke off the claw that was attached to his finger, letting the lobster drop back into the water.

"How cruel!" exclaimed May.

"Pho! that's nothin'," said Pat. "It'll grow on again."

"I dess you's a big stowy teller, Pat Wyan," said little Rose, indignantly, "for didn't Willie Brooks get his finger chopped off — and it never, *never* growed on again!"

"Pat is right," said Grace,

"To be sure I am, mum. Why, sometimes they bite them off themselves — and I kin tell you something quarer than that, I kin. I've been doon here when it thundered, and when a purty hard clap come what did the lobsters be afther doing but shooting up their claws jist as if they were nearly skeered to death, so skeered that their claws dropped off! I've seen their claws drop clane off many a toime; but they always grow on again."

The children looked questioningly towards their cousin.

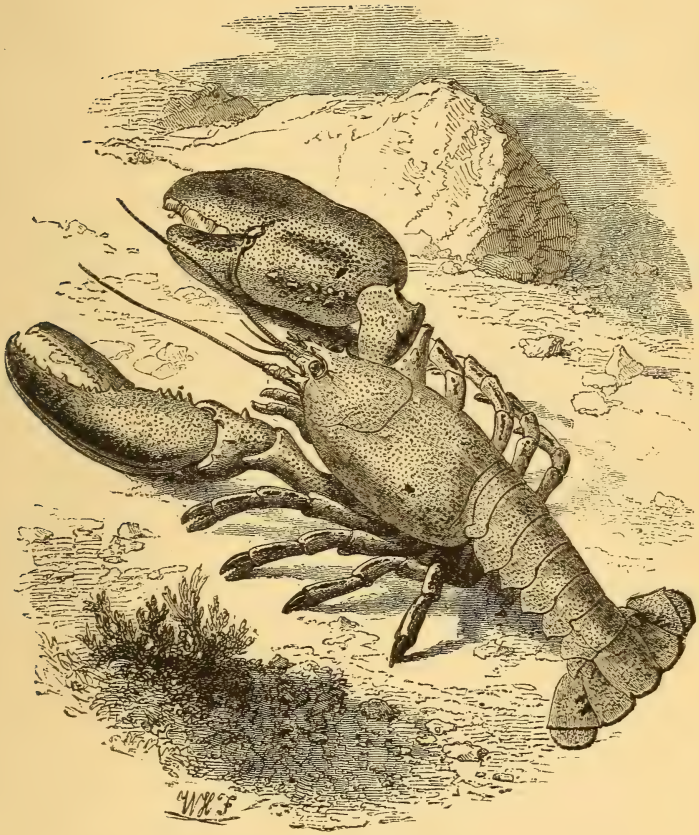
"I think we shall have to let Pat be teacher for to-day," said Grace. "I have read of such things, but never saw them."

"I've laid on this rock and watched them for hours and hours. I've skeered 'em, sometimes, and then, Miss, you ought see 'em jump back'ard. They shid their shells, too, mum, ivery year. They seem to be sick for a while before their old shells come off. For three or four days afther the old shells come off they have to hide under rocks and cracks or else they would git eaten up by fish. Durin' that toime they're growin', too, and when they gits on their nice new shells they're almost as big agin as when they had on their old shells."

"This is all very interesting, Pat," said Grace, seating herself upon the rock with her little cousins around her. "Can you tell me what lobsters feed upon?"

"They ates plants under the wather, and little fish," replied Pat.

"Do they nurse their little ones with milk?" asked Grace.



American Lobster.

Pat looked surprised. "Ye must be afther jokin, Miss. It's thousands upon thousands of eggs they be afther stickin' in the sand to hatch. They carry them under their tails so quare loike 'fore they lay 'em."

"I see, Pat, you are a close student of nature."

"What's the difference between a lobster and a scorpion?" asked Frank. "I've got a picture of a scorpion in my pocket, and it looks just like a lobster."

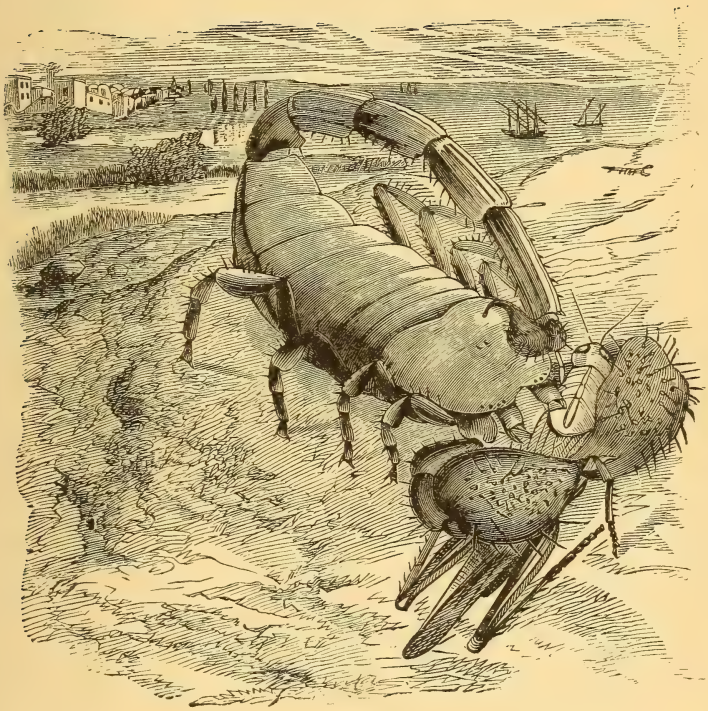
"Not quite I guess. A scorpion does not belong to the crab tribe," said Grace. "He is more like a spider."

Frank drew the picture from his pocket, and the children clustered around him to see it.

"You see the scorpion has a long tail, and in it a curved sting. In your picture he has caught a locust and is preparing to sting it. You can see that the sting is curved. That little, fleshy protuberance near the sting contains the poison. The scorpion is not near so large as the lobster, except in very warm countries, and there it would nearly reach the size of a common lobster. The sting of the larger kind is very venomous, often causing

death. These large ones are sometimes over a foot in length. The most common species are little more than an inch in length. The stings of the smallest are fatal to small animals and extremely so to man, and require the most careful dressing to prevent mortification. Scorpions have claws very much like lobsters'; but their feet are like spiders'. In fact they are more like a spider than anything else, belonging to the same family. Some of the scorpions have six eyes and others, eight. Though it is so ugly and has such a bad name, it is very tender of its young. The scorpion-mother seeks a retreat where her little ones will be out of all danger and for several days carries them upon her back. You see there is scarcely a thing in nature howsoever disagreeable but that has some good trait. But let us go back to creatures of the water. Do you ever catch crabs, Pat?"

"Yis, mum, but there's none in fresh wather. You'll foind them near salt wather, to be sure. I often go with Farmer Hough down to the salt marsh and there's a place they call 'the drownded marsh,' becase the wathers have overflowed it; well, mum, the crabs are thick enough down there."



The Crab.

"How do you catch them?"

"I takes a long line and ties a piece of mate or chicken to the end of it and lets it doon in the wather when, sure, mum, sometimes, two or three will take hold at once and then I puts my crab-net under thim and jist hist thim out aisy loike, mum."

"Are they like lobsters?" asked Frank, very much interested.

"They have pincers like the lobsters, and are covered with a shell; but they are round as a spider. The head is fastened to the brist without any jint and it has little eyes which look as if they was tryin' to pop out of its head. The crabs have eight legs and don't look as if they had any tail at all, as it is bent under the body, in a hollow betwixt the legs."

"Arn't they any larger than a spider?" asked May.

"O yis, they're as big as my hand, and when all the legs are broke off and the shell — the mate is as white and swate to ate as any flesh you iver saw. We boil the pincers, too, thin crack them and suck out the white mate. They shid their shells once ivery yare, like the lobster, and seem to be jist loike the lobster in all their habits. They ate

all koinds of dead flesh that comes in their way. Sometimes they foight loike the nation, breaking off each other's claws in their fury."

"Isn't there a land-crab?" asked Grace.

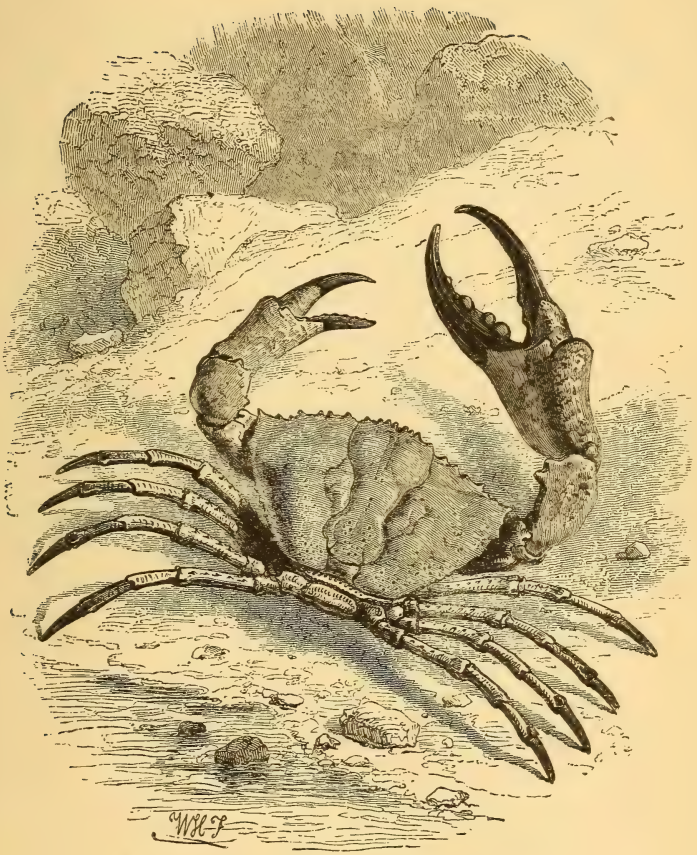
"O yis, mum, there's the little fiddler—he's a land-crab."

"Does he fiddle?" asked Rose, opening her eyes very wide.

"He makes a noise that sounds something like a fiddle, I've heard him mony a time to be sure. They look like a wather-crab only they're not so large, thin they only hev one pincer. They burrow in the sand and live in families."

"But don't land-crabs breathe like fish, same as water-crabs do?" asked Frank.

"Yes, they breathe by means of gills, yet are not aquatic," said Grace. "It is necessary, however, that their homes in the sand contain enough moisture to prevent their gills from becoming too dry. There are several species of crabs, one of which lives in hollow trees, clefts in rocks, and in holes which they dig for themselves in the sides of mountains. But when it comes time for them to lay their eggs, they travel by the million down to the sea-coast. This is



PSEUDOCARCINUS GIGAS.

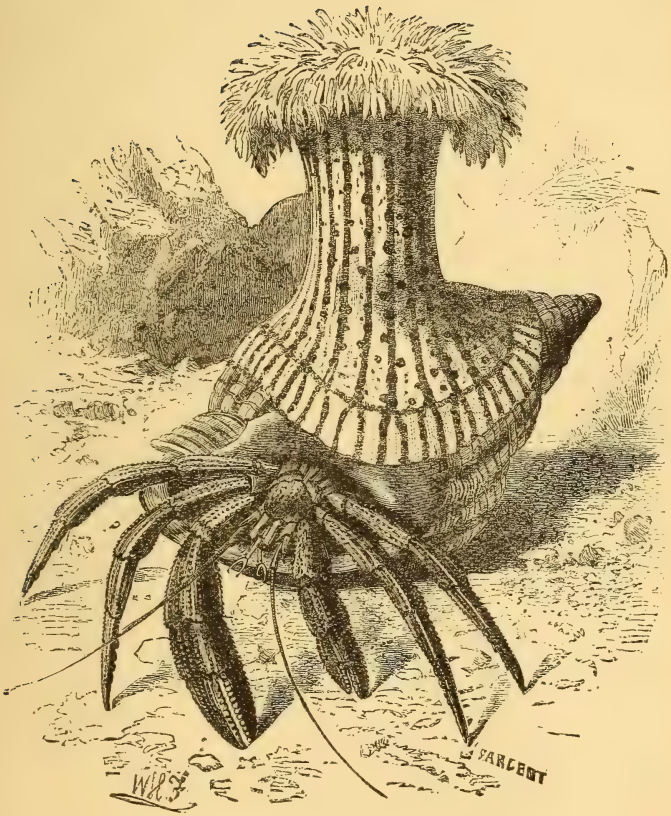
during the months of April and May. The whole ground seems swarming with them, and if they meet any impediment in their way, so straight do they march that though it be the walls of a house they attempt to scale it. They are, sometimes, three months or more in reaching the shore. Their eggs resemble the roe of a herring, and are about as large as a hen's egg. They leave them near the edge of the water to be hatched by the heat of the sun. Not more than one-third reach maturity. After the old ones have deposited their eggs they are feeble and stupid — so much so that they are obliged to dig holes in the ground and remain there for sometime to recuperate. During this time they shed their shells, after which they become very fat. Then they move slowly back to the mountains."

"Have crabs fins?" asked Frank.

"Sure, and it's paddles he has for his hoind legs," said Pat.

"They answer the same purpose as fins," said Grace. "They are flat and green, resembling the jointed branches of a cactus, without the prickles. more than anything else I can liken them to. They can paddle themselves along nicely with such fins

But of all the crabs, the hermit-crab is the queerest. It has no shell of its own, so at once takes possession of a deserted shell of some other animal, making many ludicrous attempts before it can find one that will exactly fit. Sometimes, two fight over the same shell, the strongest one coming off victorious, when he crows over the weaker one by parading back and forth on the shore right before his eyes. Sometimes, a parasite attaches itself to the shell, the hermit-crab has appropriated to itself. This parasite is a sort of a sea-sunflower, so-called because it resembles this flower, though it is more commonly known as the *sea-anemone*, a family of *Polyps*. The hermit-crab makes many efforts to get clear of his burden, but when he finds it impossible he gives up and patiently bears his queer-looking load. But talking of the hermit-crab and his parasite, makes me think of the spider-crab. He is a little sea-animal, looking some like a spider, but much more like a little crab with eight legs, pincers and pop eyes. He plants tiny trees on his own back. He first covers his body with a mucilage from his own mouth, then sticks sea-weeds and marine plants on his back where they grow into a



HERMIT CRAB AND PARASITE.

thick swamp of little trees. Imagine a tiny forest of trees moving along the sea-bed!"

"An' I niver heard the loikes of that, mum!" exclaimed Pat, taking off his cap and scratching his head so funnily that the children burst out laughing.

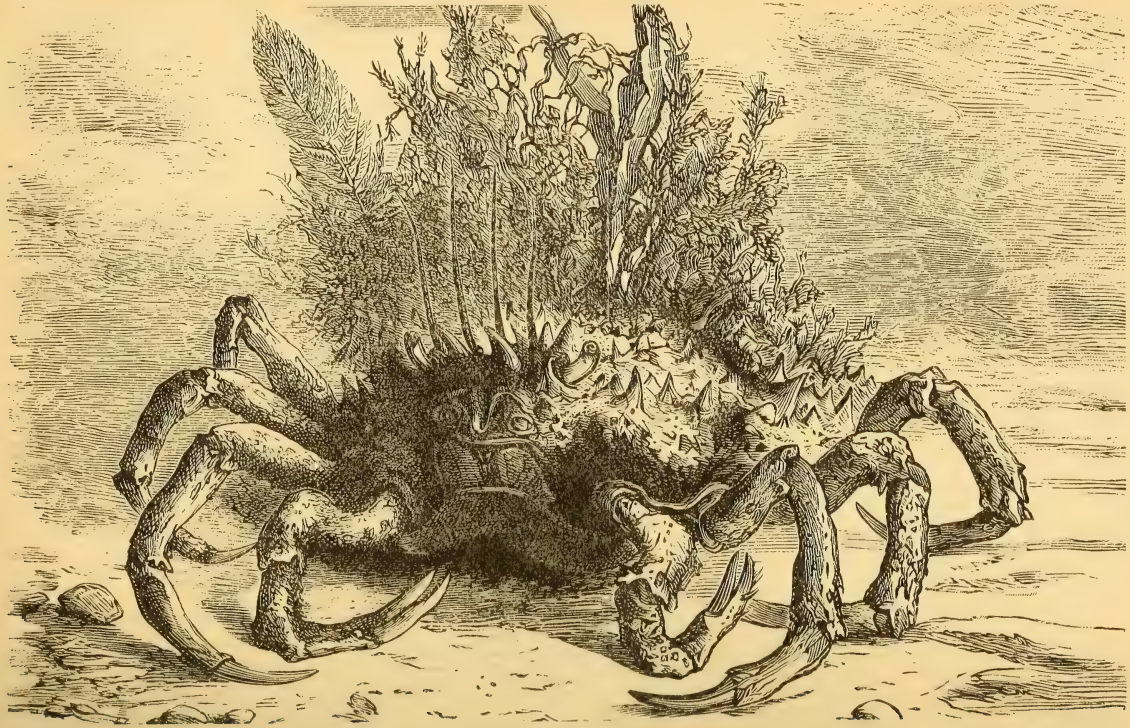
"Tell us something more about some more queer fellows," whispered May in her cousin's ear, with a sidelong glance over at Pat.

Grace understood that the children relished Pat's quaint expressions, and so went on:

"I will tell you about some of the *Cephalopods*. They are a class of *molluscous* animals, with eight long crooked legs projecting out from around their heads. The cuttle-fish is the most remarkable of all the *Cephalopods*. Besides their eight legs they have two feelers much longer than their arms or legs. All these arms and feelers are set with strong circular cups or suckers. The eight-armed cuttle-fish, in hot climates, is, sometimes, twelve feet across its center, and each one of its arms measuring between forty and fifty feet. It is then called the devil-fish."

"Well, now!" exclaimed Pat, scratching his head again.

"When it seizes its prey it stretches out its long arms and applies its suckers to the surface of the body, then, drawing them up in the center, a vaccuum is formed, and they are fixed fast by the pressure of external air. Like crabs and lobsters, it is more easy to tear off their arms than to separate them in any other way; and like the crabs and lobsters their arms will grow again. Their mouths are so strong that they can easily break in pieces the shells of animals on which they feed. The ancients were fond of the cuttle-fish for food, and the Italians eat the monsters yet. Sometimes, when the Indians go out in their canoes, a great devil-fish will come along, and, spreading out its arms over the boat will sink it and its crew. The Indian is usually careful to take an axe along, so that the arm or arms of the fish may be instantly cut off the moment they appear upon the boat. The most curious thing, though, is that it is said to have three hearts, and always carries an immense inkstand under its throat. When frightened, it throws its ink out all around it, making the water so black it can easily escape, unseen. This ink is also so bitter as to drive off all its water-enemies."



AN ODD TREE-PLANTER.

"Another foine tale, mum. Sure, and I loikes to hear such quare things. If Kenny was only here, I should loike it much."

"Another strange *Cephalopod*, is the paper-nautilus or argonaut. The shell is as white and delicate-looking as paper, and though it becomes very brittle on being exposed to air, it is quite flexible in water, thus escaping destruction. It has eight arms, two of which are membranous. The most singular thing about this little fish is its power for sailing on the water. When the sea is calm, great numbers may be seen sailing about like little boats. It is said these creatures furnished the original idea of navigation."

"But how do they do it?" asked Frank.

"When they want a sail, all they have to do is to discharge enough water from their shells to make them sufficiently light to float, then they raise the two membranous arms for sails, and throw out the other six over the sides of their shell for oars. They are not attached to their shells, and for a long time it was thought that they took possession of deserted shells like the hermit-crabs, but since they have the power of repairing any injury done to their shell

it is more than likely that the shell is its own especial property. When anything disturbs the little sailors, they draw in all their oars, take down their sails, fill themselves with water and sink to the bottom. Large quantities of these animals are found in the Indian Ocean and in the Mediterranean Sea."

"Such a foine tale as that!" exclaimed Pat, admiringly. "Surely, mum, and it's the wish of me life that I can sometime go to sea. Then I could see all the craythers for mesilf. But sure, mum, and I must go now. My mither sint me out to pick up sticks, and I jist stopped to look at the lobsters and forgot mesilf," and, hastily disappearing, Pat was soon heard breaking up sticks among the brush.

"Now," said Cousin Grace, "what have we been talking about this morning?"

"I know," said little Rose, eagerly.

"Well, dear?"

"About lobsters and a 'tinging-bug and a crab-spider what plants trees on his back, and a awful big thing with free hearts and eight, oh! dreat big arms, as long as a dreat high house, and a little fish that sails on the water — a paper-fish!"

A Devil Fish.

"Cousin Grace, you told us of several kinds of crabs; are there as many of lobsters!" asked Frank.

"There are prawns, shrimps and craw-fish which look very much like the American lobster. Prawns and shrimps are usually found among seaweed, a little distance from the shore. Shrimps are much smaller than prawn, and therefore are not so much prized as an edible. The craw-fish are found in every river and creek in England. In fact, these three last mentioned fish belong more particularly to England, yet species are found in all parts of the world — even in the Mammoth Cave of Kentucky."

"Cousin Grace, is it true that the fish in the Mammoth Cave have no eyes?" asked May.

"What would be the use of eyes if it is all dark there?" answered Frank.

"Some of them, it is true, have no eyes at all Others have eyes, but are entirely blind. That is a strange, dark river that flows through the Mammoth Cave. The little craw-fish in this cave have eyes, but can not see. Now, what can you tell me about the animals we have had to-day?"

"They are *Articulates*, because they are jointed,"

said Frank, "and they belong to the water-division of *Articulates*, because they breathe by means of their gills, and not through holes in their sides like insects."

"*Articulates* are divided into how many classes?"

"Five: insects, spiders, myriapods, crustaceans and worms," answered May.

"What are myr'pods?" asked Rose. "I've fordot?"

"Don't you remember the long worms with so many legs?" asked May.

"The centipede?" asked Rose.

"Yes, from the word *cent*, a hundred, and *pede*, foot — the worm with a hundred feet. Now I wish to know to which one of these classes lobsters and crabs belong?"

"To the *Crustaceans*, of course," said May. "I know from *crust*, the first part of the word; for lobsters and crabs are covered with a hard crust."

"Write this: "*Crustaceans* are divided into *Decapods*, *Tetradecapods*, *Entomostracans*, *Cirripeds* and *Rotifiers*."

"What jaw-breakers!" exclaimed Frank, shrugging his shoulders.

"*Decapods*," continued Grace, "have ten feet with

Hammer-headed Shark.

claws, and are of large size. *Tetradecapods*, have fourteen feet, and are not more than one inch in length. *Entomostracans*, have an irregular number of legs, and are either large or small. *Cirripeds*, have shells like mollusks, but have jointed legs as well as a body. From the opening of the shell, the animal throws out its legs looking like a delicate curl, whence the name of the group. *Rotifiers*, are animalcules destitute of limbs, and moved by cilia."

"What are *Animalcules?*" asked May

"Very tiny animals, indeed. So small as to be scarcely visible to the naked eye. Some of them however, are as large as a grain of sand."

"What are *Cilia?*"

"*Cilia*, are little hairs which edge the wheels of *Rotifiers;* for, you see, these little animals have two horns which they thrust out when hungry, and on the edge of each horn is a wheel — but we have no more time for this at present. We were talking about crabs and lobsters — large *Crustaceans.* Now, to what order of *Crustaceans* do crabs and lobsters, belong?"

"To the *Decapods*, I should think," said Frank.

"You are right, Now, the *Decapods* are of four

species: 1st. *Brachyural*, the short-tailed, the abdomen being small. 2d. *Anamoural*, with irregular abdomen; the hermit-crab belongs to this class, and the common crab to the first mentioned. 3d. *Macroural*, the long-tailed species, as the craw-fish and shrimps. 4th. *Anomobranchiate*, having the gills external, or else wanting, as the mantis-crab, which has a shell only on the fore part of it. The spider-crab and the cuttle-fish are of another tribe. The body of most of them is cylindrical, and is covered with a fleshy sheath instead of a hard shell. The cuttle-fish is a mollusk, the same as oysters. Now suppose we try our lunch."

CHAPTER III.

THE BOX OF SHELLS.

One more week at Aunt Jerusha's before the summer ended, and one more week with Mr. Dumas before he left for his tenth voyage on the wide, wide sea.

Aunt Jerusha was making a clam-pie for dinner and had sent May and little Rose down cellar to bring up the clams.

"Look, May, some of 'em dot their mouths open!" exclaimed Rose.

May took up a stick and thrust it in a clam's mouth and it closed, with a click, so firmly that May lifted it up by the stick.

"Suppose that had been your finger," laughed May.

"I 'dess I'd know better than to 'tick my finger in anyfing's mouth. But what did he have his mouth open for, May?"

"Don't know."

"Do you fink he wanted to breave better?"

"You'll have to ask Cousin Grace. Ah! here's a dead clam."

"How you know it's dead?" asked Rose.

"Because it has its mouth wide open and won't shut it again."

"What made the poor clam die?"

"I don't know I'm sure."

"I fink he starved to def? Aunt Jerusha keeps 'em down here a week most, and never dives 'em a fing to eat or drink."

When they went up-stairs May related the conversation.

"That is not the clam's mouth," said Grace. "That's his house, and he has to open the folding

doors to take in his food, water, and fresh air, and that is what made the clam die. He opened his door for water, and there was none to flow in."

"But where *is* his mouf? Ain't he dot one?" asked Rose.

"Yes, he has a mouth, though he has no head."

"How queer!" exclaimed May.

"Now we will separate the valves, or shells, as you call them. Here is the little animal; near the centre you see the heart. Here is the mantle with fringed edges, and here is the mouth just under a queer looking bonnet, made by the uniting of the two edges of the mantle near the hinge."

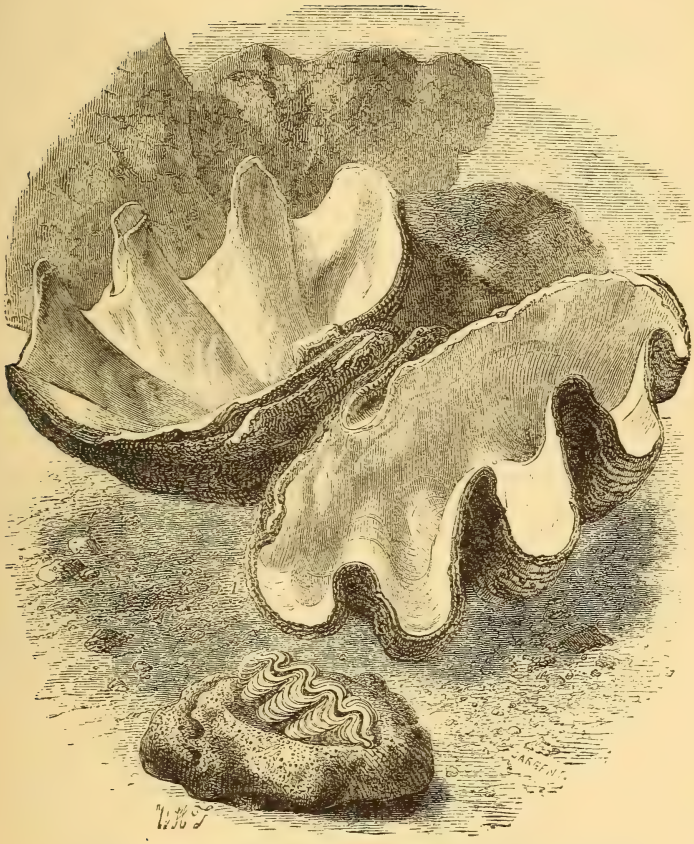
"What hinge?" interrupted Frank.

"The hinge of the doors to be sure. The halves of *bivalve* shells are united by an elastic ligament like a hinge. The animal has two powerful muscles with which he can keep the door of his house closed when he will. If he becomes weak from thirst or want of food, the muscles lose their power, and the doors fly open in spite of himself. Here at a little distance from the edges of the mantle, are four rows of gills through which the animal breathes. Clams live down in holes in the sand. It is said they can

change position by rapidly opening and closing their valves, ejecting the water with such force that it throws them backward. Now the oyster is generally found firmly attached to stones, and sometimes to each other, so that they look as if they never changed position. Yet some naturalists say they can move by the same motion that is peculiar to the clam, cockle and escallops. But of all the mollusks the oyster seems the most stupid, giving no sign of life, save as it opens and closes its valves to take in nourishment. Oysters cast their spawn in May, which fastens upon any hard substance that is near. At first the spawn appears like spots of grease, and often adheres to the adult shells, hence the formation of oyster banks. I often wondered why poles were stuck up in rivers, but have since learned they were set up to show fisherman the locality of oysters."

"What are *bivalves?*" asked Frank.

"Why, shells are divided into three classes, *univalves*, *bivalves*, and *multivalves*. The first has only a single valve, and is almost always in a spiral form like the snails. All the most beautiful shells belong to this class. *Bivalves* are formed of two parts. All the most edible shell-fish, as well as many others, are



1. TRIDACNA GIGANTÆ. 2. TRIDACNA CUM PORITES.

bivalves. *Multivalves* are shells with more than two distinct pieces, or many valves."

"I have a box of shells which I will bring down and show you," said Mr. Dumas.

"Now for a treat," said May, delightedly.

"See if you can tell to what class this belongs," said Mr. Dumas, first exhibiting the shells of a gigantic clam, or *Tridacna gigante*.

"*Bivalves*," they all shouted.

"Is it a clam?" asked May.

"Yes, and I have seen some larger still, so large that they would weigh five hundred pounds. The Catholic churches sometimes make use of them as vessels for holding holy water. This monster clam came from the ocean near the tropics."

"There is one thing about mollusks," said Frank thoughtfully, "they cannot belong to *vertebrates* because they have no back bones."

"Don't you remember we were talking about that, and little Rose said they were mushy?" said May.

"Instead of having their bones inside like most other animals, they have them upon the outside, wearing them as an armor," said Frank.

"Are they born with the shells on?" asked May

"In some cases they are not; but as soon as they crawl from the egg, the calcarous secretion begins, and soon becomes sufficiently hard to protect the baby mollusks," said Grace.

"Is it not strange to think that the same material used by man in fashioning our most costly edifices is the very same out of which the mollusks have constructed their homes?" said Mr. Dumas.

"I don't understand," said Frank.

"Why, carbonic acid combines with lime to make carbonate of lime. Carbonate of lime is building-stone; it is alabaster and marble. It is also the armor of the *Crustacean*, the house of the mollusks. Here is a mother-of-pearl oyster."

"O-h-h!" exclaimed the children.

"How exquisite! How lovely!" exclaimed Grace.

"This is very rare," said Mr. Dumas, much pleased with their admiration. "It is a mother-of-pearl oyster with *madrepore* attached."

"And are those real pearls within the shell?" asked May.

"Yes, real pearls."

"But the booful 'ittle tree growing on the top;

MADREPORE, WITH DEEP SOCKETS.

what is it, Mr. Dumas?" asked Rose, touching it ever so daintily with a tiny pink finger.

"It is coral."

"Oysters, coral, mother-of-pearl, pearls themselves, all in one specimen," said Frank. "We'll not get through with all there is to learn about this in a hurry."

"Where does the oyster get his p'itty pearls? Does he swallow them?" asked Rose.

"The ancients once thought that oysters swallowed drops of dew and that they hardened into pearls; but pearls are a disease in oysters. That is, a grain of sand or some foreign substance, gets between the mantle of the oyster and the shell, causing such irritation that the animal covers it with a smooth coat of skin, over which it spreads another covering of *nacre*."

"What is *nacre?*" asked Frank.

"Tiny scales with a glimmering pearly lustre."

"Where does he get the little scales?" asked May.

"Why, they are the lining of the mother-of-pearl oyster. Can't you see by looking at this shell? It is carbonate of lime in its most beautiful form," said Mr. Dumas.

"And the pitty 'ittle hard tree," said Rose. "Who planted it on the oyster? What makes it so hard?"

"It is not a vegetable form, darling," said Grace. "Don't you know Mr. Dumas said it was coral, the same kind of material as your coral chain with the gold locket."

"My chain is red, this is white," said Rose.

"The most common of all the corals is white. But there are red corals and black ones, too," said Grace.

"Isn't it strange," said Frank. "It looks as if it belongs to the vegetable kingdom, feels as if it belonged to the mineral kingdom, yet belongs to the animal kingdom."

"It belongs to the *radiates* too," said May, "because the organs within the animal as well as without, are radiately arranged."

"Smart little cousins, these of yours," said Mr. Dumas, smiling at Grace.

But little Rose was quite impatient to have her last question answered.

"What was it?" asked Grace.

"Is this queer lookin' tree some little animal's house, and does he live in those little holes?"

"That's what I used to think," said Frank. "I thought lots of little insects lived in all those little holes; and Cousin Grace, I certainly read it somewhere, that coral is built by insects, that certain little insects have built great islands in the middle of the ocean, and that Florida was built by coral insects."

"Erroneous. Coral is but the skeleton or bones of a number of little animals called *Polyps*. All this *madrepore*, this little coral tree on the oyster, was once covered over with the skin and nerves of the animals. It is only when the *Polyps* die and their flesh decays, that we come upon the coral itself. You see the coral is entirely inside of the little *Polyps*, just the same as our bones are inside of our skin and muscles. Do you think you understand, puss?" asked Mr. Dumas of Rose.

"I ain't a puss," she pouted.

"What's the reason you're not?" laughed Mr. Dumas.

"'Tause I ain't dot no tail, nor fur, nor eyes, like a tat. I belongs to the *highest* order of the animal kingdom; I'm a 'ittle dirl," she answered gravely.

"I beg the little dirl's pardon," said Mr. Dumas with mock gravity, taking Rose up in his arms.

"Show us more shells, please, Mr. Dumas," said May eagerly.

"Well, here is a cluster."

"*Univalves*," said May.

"Right," said Mr. Dumas, taking up the largest, and blowing through it.

"Why, it makes music," said Rose, clapping her hands.

"It is the *Triton imbricata*, and is found from one to two feet long. The savages make little holes in the apex of the spire, then use it for a martial horn. I made these holes to see if I, too, couldn't have a horn not made with hands."

May took the shell, but instead of putting it to her lips held it to her ear.

"It is singular," she said, "that we can hear the sea roar in them."

"That's another exploded theory," said Mr. Dumas. "Such are the strides which science makes. The sounds which you hear in the shell are only waves of air which press within."

"Why, how easily it is explained when one understands it," said May, admiringly. "I never could understand how the roar of the sea could be left in

1. Triton imbricata. 2. Nautilus pompilius. 3. Helix ovata. 4. Argonauta paperaca.

an empty shell. It always seemed to me something like the ghost of the animal that once lived in the shell."

"That is, you accepted it as something supernatural?" smiled Grace.

"Yes, I couldn't help it. It was so unnatural," said May.

"The next in size is called the *Nautilus pompilius;* the next, *Argonauta papyracea.*"

"We had something about that class in our last lesson," said Grace, "and I am glad the children now have the chance to examine the shells."

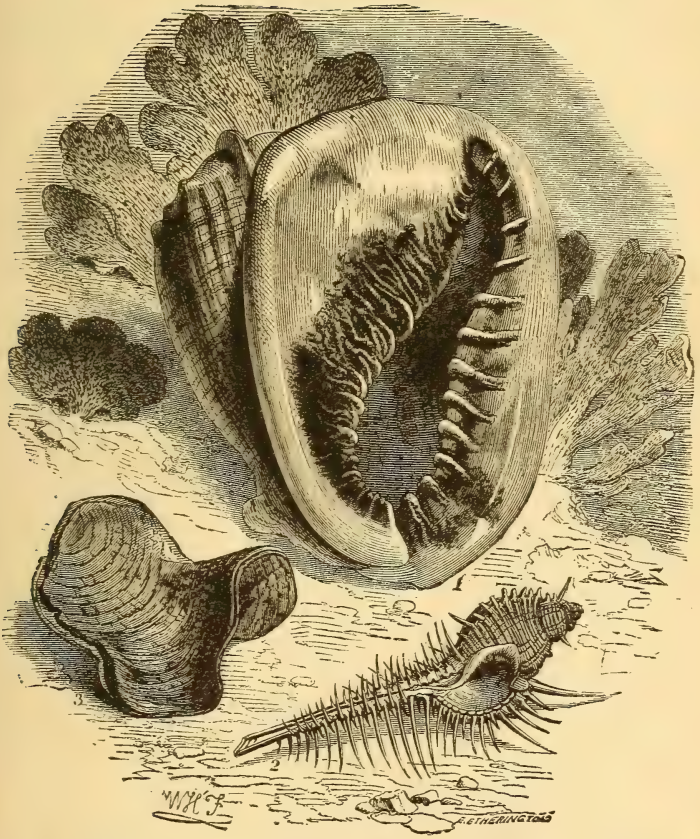
"What's this 'ittle black shell's name?" asked Rose.

"That is the *Helix ovata*, and belongs to the *Helidæ*, or land-snail family. There are four thousand living species of land-snails — just think of it!" said Mr. Dumas. "They all feed on vegetable substances, consequently being a great pest to the farmer and gardener. They are *Gasteropodous molluscs.* During the winter they remain torpid by closing the mouth of their shells with a mucous substance which dries and becomes hard. They like warm, moist weather, only coming out at night when it is dry."

"O what funny looking shells!" exclaimed May, as three more were exhibited.

"The largest one is called the *Helmet shell* because of its resemblance to a helmet. It is found on the coast of Madagascar. The animal that lives in this shell belongs to the genus *cassis*. Italian artists sculpture these shells beautifully in imitation of antique cameos. The next in size is called the *Placuna Sella* (or saddle-like), because it looks so much like a saddle. The other is called the *Spiny Rock*, from the spines protruding in every direction; its more scientific name being the *Murex tenpuisina*. The famous Tyrean purple dye was made from two little shell-fish, the *Murex* and *Buccinum*, the first named being found in deep water on the Phœnician coast, and the latter on the rocks near the shore. In fact, the meaning of the Latin word *Murex* is the purple fish.

"Then, here are some real beauties, the *Voluta imperialis*, and the *Trochus agglutinans*. The tracery and coloring of the first may be well called imperial. Solomon in all his glory might have envied the delicacy of tracery and the beauty of the coloring."



1. Helmet Shell. 2. Spiny Rock. 3. Placuna Sella.

"Are there ever any pearls found in the *univalve*?" asked May.

"Occasionally, in the *Strombus gigas*, or the fountain-shell. This is the largest known *univalve* which is edible. It has a thick oval shell, and is called fountain shell, and sometimes is used as a garden ornament."

"What have all these shells to do with fins?" asked Frank.

"That is it," smiled Grace. "Mr. Dumas, perhaps you can tell us whether some of these creatures have fins?

"There are those belonging to the order *Pteropoda*, which swim in the sea by means of a pair of fins extending out from each side of the head. The *Clionidæ* family belonging to this order are so numerous in the northern and southern oceans that the waters appear swarming with them. They are called whale's food, the whales scarcely opening their mouths without taking them in by thousands. Then there are the *Venus slipper* and the *Glass nautilus* belonging to the genus *Carinaria*. At least those are the names given to the shells. The little animals themselves are furnished with a sort of a

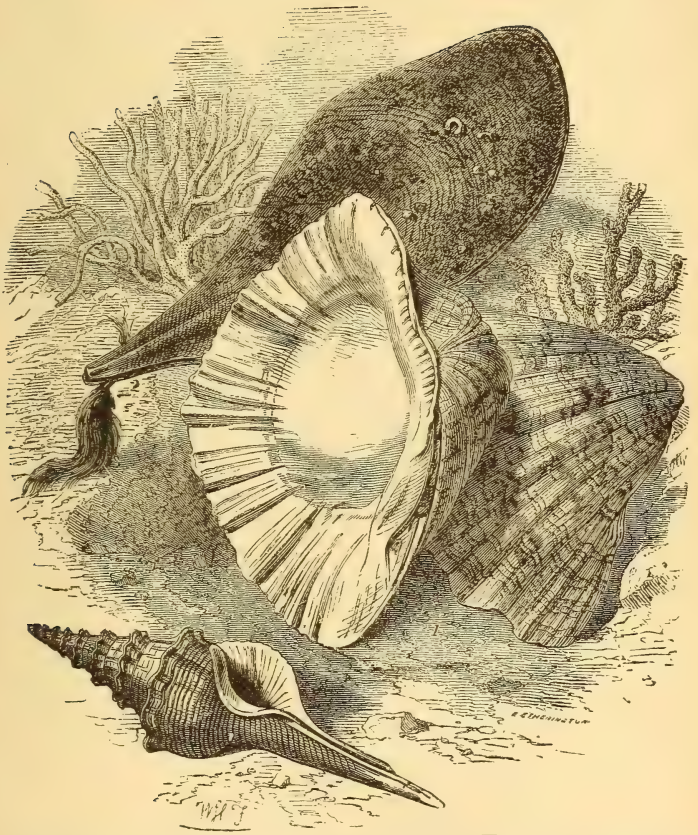
fin which they use for a rudder in propelling themselves along. Then there are the *Hesteropods*, an order of mollusks which have the foot compressed in the form of a thin, vertical fin. So that you see we can obtain some fins even out of shells. Now I have one more group of shells to show you," continued Mr. Dumas. "The first two shells, back to back, once contained the *Hippopus maculatus*, or Bear's Paw clam. It is the *Pinna nobilis* of which I wish to speak. Do you see the long bunch of silk attached? That is called the *byssus*. It is composed of many silken fibres, attaching the shells to rocks. The *byssus* of the *Pinna*, or Wing-shell, is famous for its quantity, beauty and quality. The filaments are very strong and of an unfading reddish-brown color. In Sicily these filaments are woven into gloves and a sort of stuff like silk. These threads belong to bivalves that have no heads."

"How does it get there?" asked May.

"Why, it is merely the fringy prolongation of the mantle."

"Well, what is the mantle?" asked May.

"It is the outward fold of the skin. Under this



1. Hippopus maculatus. 2. Pinna nobilis. 3. Fusus longissimus.

mantle the animal can withdraw all his organs. Every mollusk has one. It was shown to you in the clams that were opened."

"What's the 'ittle shell's name?" asked Rose.

"*Thesis longissimus.* It is the same genus of *Gasteropoda* that the Zetlanders utilize into lamps. It is made to hang horizontally by being suspended with cords. The cavity is filled up with oil and the wick made to pass through the canal."

"I am a thousand times obliged to you, Mr. Dumas, for so pleasantly as well as instructively entertaining us," said Grace.

"It's just been the best lesson yet," said May.

"If Pat had only been here, it would have been perfect," said Frank. "How we shall miss you after you are gone, Mr. Dumas."

"And Pat, too, it appears; for I have concluded to take him along for cabin-boy; so prepare yourselves for a wonderful treat by the time we return," laughed Mr. Dumas.

"O, I am so glad," cried Frank. "He did want to go to sea so bad."

"Children, what have we been studying this morning?" asked Grace.

"Why, about shells and their inhabitants," said Frank.

"*Conchology*," said May.

"That applies only to shells. You have also been studying *Malacology* a treatise on soft-bodied animals, the mollusks," said Grace.

CHAPTER IV.

ROSE AND THE REPTILES.

'It's tho' hot this mornin'—tan't I dust have a 'ittle bowl of bread and milk for my breakfas' and sit out on the back door-step?" pleaded Rose, of Aunt Jerusha.

So her aunt furnished her with a bowl of rich creamy milk, and a great slice of bread, and Rose sat and enjoyed her breakfast until it was about half gone; then she became interested in a large toad which came hopping towards her.

"Toadie, don't you want some bread and milk?" she asked, in her sweetest tones; whereupon the toad turned about, and began hopping in another direction. Rose, still holding her bowl and spoon, sprang up and ran after him.

But the toad hopped the faster until he came to a

large tree, where he quickly disappeared in a small hollow. Nothing daunted, Rose sat down on one of the large roots, and patiently waited for his re-appearance. In a short time, thinking himself no longer

pursued, the toad ventured out; and no sooner done than Rose poured out a spoonful of milk before him, and bade him eat; but the toad seemed to take no notice, whatever.

"I dess toads don't like bread an' milk!" she said at last. "I wonder what toads do eat. I'll do and ask Mr. Dumas." And setting her bowl and spoon down on the grass, away she ran.

"I fordot, Mr. Dumas, but I tome to ask you what hop-toads like for their breakfas'es? There's a big hop-toad under that tree, and he wouldn't eat one bit of bread and milk."

"He likes bugs, and flies, and worms."

"Fank you; and do you know what family he belongs to? tause Tousin Grace asks us about the family, every time."

"They are a family of *tailess Batrachians*, called *Bufonidæ*, I believe."

"I knowed it would have an *idæ* to it; they all do. I dess I'll 'member that, then won't I 'stonish Tousin Grace?" and the little girl laughed gleefully. "What was that other hard word you said?"

"*Batrachian?*"

"What does it mean?"

"Frogs. Havn't you ever seen a frog?"

"Never."

"Come with me down to the bottom of the garden, and you will see plenty of them if you don't make too much noise."

Rose slipped her hand in his, and they were both starting off, when Grace, with Frank and May, appeared on the scene.

"O Tousin Grace!" exclaimed the little one, holding very tightly to her new found friend's hand, "Mr. Dumas is doing to take me to see the frogs. Don't you want to go along?"

"Of course we do," said Grace.

"And, O Tousin Grace, there's a booful hop-toad under that tree — no, he's not so very pitty, but he belongs to the *boofulidæ*," said Rose.

"*Bufonidæ*," you mean," said Mr. Dumas.

"Suppose I tell you a story of four pet toads while we are walking along," said Grace.

"Oh do!" cried the children.

"I became acquainted with my four pet toads in a very singular manner. One day we were sitting at dinner under an open shed; that is, there were no doors, and one side was a lattice, up which clam-

bered honeysuckles and roses in profusion. It was a very warm day, and while we sat eating, a large toad hopped upon the step near us and seemed to be intently regarding us.

"'He is after flies for his dinner,' said my father.

"'I wonder if he would like some bread with his meat,' I said, flinging a large crumb with as sure aim as I could. The toad threw out his tongue as quick as a flash, and caught the bit of bread. I was delighted, and flung him one piece after another until he had all he could eat, and hopped away.

"The next day, at the same hour, the hop-toad came and brought another with him. I fed them again, when, to my great surprise, the next day, while we were at dinner, four great puffy toads deliberately hopped upon the step and sat down in a semicircle, winking and blinking as demurely as judges upon a bench. To me, matters at that moment were intensely interesting. I showered crumbs of bread all around. Again and again they came, until one day I missed them, and speculated vainly as to the cause. Dinner was over, and all the dishes washed. I tied on my sun-bonnet to go to school, and was just passing out through the shed,

when I gave a scream and darted back into the house, for there, right where my pets were wont to sit, lay an immense black snake, his head raised up, looking into the shed. My father went for the hoe and soon dispatched the reptile.

"'This is the secret of your pets' non-appearance to-day, Grace,' said my father, 'for snakes feed largely upon toads, and this one, doubtless, thought our porch would be a good place to look out for *his* dinner. I hardly think the toads will ever return,' and they never did, though it is said they live to a great age, and my pets might have remembered me the next summer, but I never saw them, to know them again."

"May be the naughty snakes ate 'em all up," suggested Rose.

"I do not know."

"There is something I would like to know about toads," said Frank. "I would like to know how it is they have been found imbedded in solid rocks and in the hearts of trees. I read one time of a toad being found in solid rock and there it had been living in its close quarters for a hundred years, and I don't see how it could be."

"It does seem miraculous until we understand it," said Mr. Dumas. "It takes toads fully four years to get their growth. At first they are small. When autumn comes, they creep into some hole of a tree, or a crevice of rock, never thinking that they will be growing even while they lie in a torpid state, so when spring comes, many of them find they have grown too large to ever get out into the daylight again. They are prisoners for life, unless some outside cause brings them to light."

"But how do they live without anything to eat?" asked Frank.

"O there are plenty of little flies and other insects fond of exploring holes; so they walk and fly in, but never come out again, for the hungry toad is ready with his long tongue to grab them up and swallow them down."

"Mr. Dumas, does it ever rain hop-toads?" asked Frank.

"I have seen the ground all covered with them after a hard shower, just for all the world as if it had been raining toads," laughed Grace.

"Do you know how it is?" asked May.

Grace nodded.

"Toads come out of their holes in wet weather, — perhaps because they like the rain, perhaps, because they are washed out — and they hop forth to dry themselves — but here we are at the frog-pond. Here they sit and cry *Polly-wog, polly-wog, polly-wog*, all the day and night long, unless they hear some

"SOMEBODY'S COMING"

one near, then they give a jump and are out of sight."

"I should think their throats would ache," said May.

"The same ones do not sing all the time, of course," said Grace. "One ceased his song and others took it up before he was done. Perhaps you can understand something about how numerous frogs are, when I tell you that each female frog some time in the month of March, lays her spawn which consists of from six hundred to a thousand eggs."

"Tell us all about them," cried the children.

"All the eggs sink to the bottom of the water, where they remain until the eggs enlarge, at the same time becoming lighter, when they rise to the top of the water, and float.

"In about three weeks the eggs open just enough to let the tad-poles' tails through, just a little bit at first, but becoming more distinct every day, until in about three weeks more there bursts from the eggs perfect formed tad-poles. The tad-poles each have a sucker under the lower jaw, with which they are enabled to cling to substances on which they wish to feed. Six weeks after the animal has left the egg, he has his hind legs. Two more, and his fore legs put in their appearance. Soon after he loses his tail, and hops out on land a little frog. His appetite is changed, too. He no longer cares for vegetable

diet, but darts out his tongue in the same manner as does the toad, to lap up worms and insects.

As soon as the young frogs have entirely quitted the tad-pole shape, which is about the first of August, they leave the water and emigrate to the woods and meadows. They travel by night and rest by day. When winter comes they retire down under the moss that grows beside ponds and swamps, and there they remain frozen up until spring, to sing as merrily as ever as soon as the warm sun thaws them out."

"Is the great bull-frog the little frogs' papa?" asked May.

"O, no; but a distinct species. They are the most aquatic of all the frogs, and generally sit in pairs on the margin of ponds, the male crying out something like 'More rain, more rain!' somewhat like the bellowing of the bull, hence his name. There are fifty or more known species in the frog-tribe, divided into three sections, common frogs, tree-frogs and toads."

At this point the attention of the whole party was drawn to the shrill, troubled cries of a bird a short distance from where they were seated.

"Something is the matter," said Mr. Dumas. "A

A Dreaded Enemy.

robin has her nest over there and she is in trouble. I will go and see about it."

"Let us go, too," said Rose, still clinging to his hand

"Ugh!" exclaimed Frank, "there is a monstrous black snake coiled around a branch of the tree close to the nest."

"And mother Birdie is trying to defend her little ones valiantly," said Grace.

"And a sorry time she'd have of it if no one was to help her, for already the fiery eyes of the snake are fastened full upon her, and in spite of her terrific cries she will soon become so beside herself as to fly right into the snake's jaws," Mr. Dumas said, as he seized a large, heavy stick.

May and Rose fled up the hill and took refuge in the summer-house, where she could watch the proceedings through a window, but Grace and Frank remained until the snake was beaten from the tree, and dropped, a lifeless mass, upon the ground.

"Dear little birdies," said Rose, rushing to the scene as soon as the danger was over. "I dess the little wobins will love you now, Mr. Dumas. Lift me up high so I tan see the tunnin' 'ittle fings."

"There is a skeleton of a snake under the bushes yonder. I think it must be one the hired man killed two or three days ago."

"He's all back bone and ribs," said May.

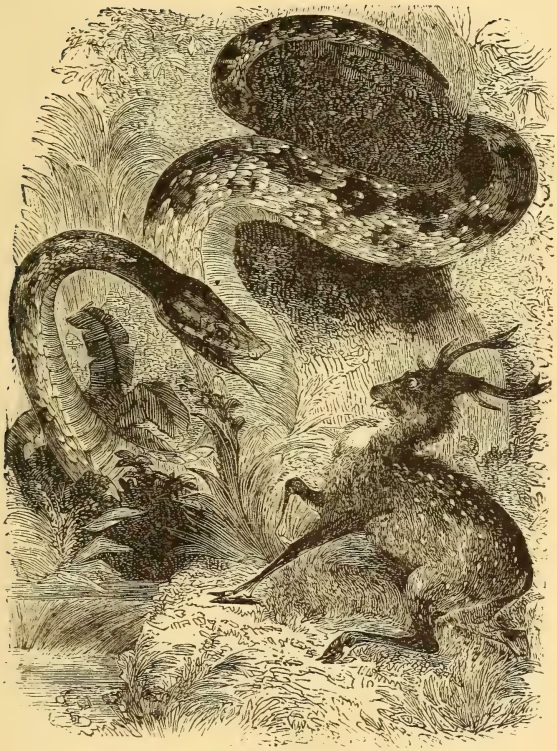
"I have found his skin!" exclaimed Frank, lifting something up on a stick."

"Not this one's, I guess. But snakes do change their skins. I have watched them creep right out, frequently, and it is quite an interesting feat," said Mr. Dumas.

"That reminds me I forgot to tell the children that the frog tribe change their skins every eight or ten days during the whole summer," said Grace.

"The bite of the black snake is not venomous?" asked Grace.

"No, the venomous species bear the general name of *vipus* from the word *vivipares*. All the vipers bring forth their young alive, the eggs being hatched within them before they are laid. The word *vivipares* comes from *vivus*, alive, and *pario* to bring forth. There are about twenty species of vipers. Of the snake tribe in general there are nearly two hundred species. You can tell the venomous ones by their large, flat heads, sometimes heart-shaped,



Boa-Constrictor and Deer.

and by their short bodies. The harmless kind have small heads and longer bodies."

"Mr. Dumas, have you ever seen a viper swallow her little ones?" asked Frank.

"I once saw a rattlesnake open her mouth and take in her half dozen little ones at one swallow, when she thought they were threatened with danger; and as soon as it was over she opened her mouth and discharged them."

"How funny!" laughed May.

"Is the rattlesnake anything like the viper?" asked Grace.

"It is a much larger snake, but there are many things similar. They both belong to that order of *Ophidians* that are venomous, and both are *viviperous*, that is, produce their young alive. The viper in particular, belongs wholly to the old world, while the rattlesnake is wholly American. But the most formidable looking of all the serpents, is the great boa-constrictor, and yet it is not venomous. I have seen it let itself down from a tree, coil itself around and around an unfortunate deer, crushing it to death almost instantly.

"It is sometimes forty feet long, and as thick in

proportion, and some travellers affirm that they have found the body of a stag in the boa's gullet, all but the horns which were sticking out of his mouth because he was not able to swallow them."

The little girls shuddered, and crept closer to Grace.

"You know," continued Mr. Dumas, "that serpents have no grinding teeth. They can pierce and hold with their teeth, but cannot masticate, hence all the serpents swallow their prey whole."

"I do not think I understand quite so clearly as I would like, how the venomous serpents use their fangs," said Grace.

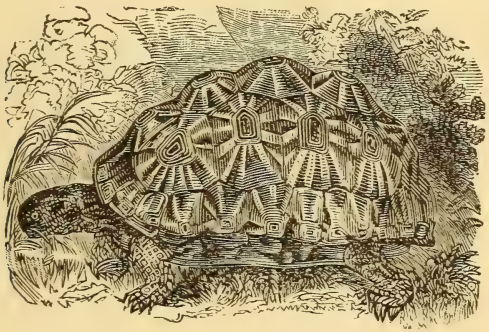
"They have two pointed teeth pierced with a small canal, through which the poison forces itself from glands situated under the eyes. The fangs are hidden in a fold of gum when the reptile does not wish to put them to use. The rattlesnake belongs to the family *Cortalidæ*, genus *Cortalus*. The vipers belong to the family *Viperidæ*, containing several genuses."

"Mr. Dumas, have water snakes fins?" asked May. "I never saw a water snake, but I have read about them."

"No, their tails are flattened sideways, so that it can answer the purpose of fins."

"Oh, see that queer thing yonder!" exclaimed Rose, excitedly. "A snake wiv a big pie-dis' turned over on his back."

"That is a land tortoise;" and stooping, Mr. Dumas touched it, when immediately it drew in all its feet and its long neck within its shell.



A LAND TORTOISE.

Rose opened wide her eyes in the greatest astonishment.

"Where have it gone?" she asked, as Mr. Dumas picked it up and turned it over and over.

"Into his nice, cosy home. Don't you wish you could carry your house around with you on your

back, so that when dangers threatened, all you would have to do would be to creep in right quick, eh, Rosie?" and Mr. Dumas pinched the little girl's cheek; then turning to Grace, he continued:

"This tortoise is quite an old fellow. Here are three or four sets of initials accompanied with dates. Here is one as far back as 1789."

"Is it possible?" said Grace, examining it closely, while the children were all astonished to see the letters and figures on the breast-plate of the tortoise.

"Who cut all those pretty marks on his back?" asked May.

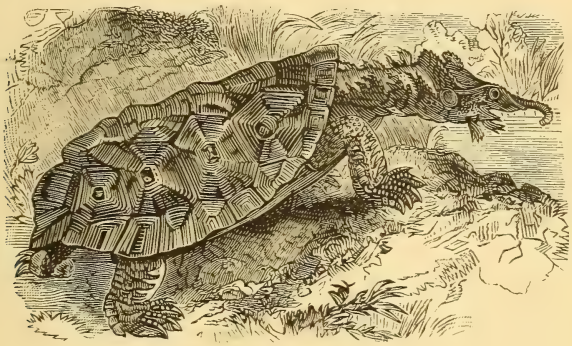
"I dess Dod did that," remarked Rose, soberly.

"Bless the child!" said Grace. "Of course He did. And that is why some people call him the geometric turtle. Those marks on his back are like certain symbols in geometry."

"Aren't turtles good to eat?" asked Frank.

"Not this kind. The green turtle is the best edible one, and it is seldom found on shore except in the month of April, when it crawls upon land to deposit its eggs. They dig holes in the sand with their fore paws, just above high-water mark, about two feet deep, in which they let fall sometimes as

many as a hundred eggs. Then they cover them up with just enough sand to hide them from sight. and just enough to admit of them being hatched out in the required time. The eggs are round, each measuring two or three inches in circumference, The yolk can be cooked just the same as a hen's egg, and makes just as delicious food. At the end of twenty days or more, the little turtles, just



hatched, not more than three inches long, creep out of the sand. In seven or eight days they become strong enough to seek their natural element, the water. There they are more secure, and find their proper food which consists of marine plants, and occasionally shell-fish. Their legs are very much like fins."

"Are the words tortoise and turtle applied to the same species?" asked Grace.

"Tortoises more properly belong to land. The word turtle is more properly applied to the marine *Chelonian* reptiles. The turtles are divided into families, *Chelonioidæ* and *Sphargididæ*. Logger-

FISHING ON THE MADEIRA.

heads belong to the first named family. Tortoises belong to the family *Testudinidæ*. The strangest looking turtle I ever saw was the matamata. He is found in South America, and has the habit of lying in the grass with his ugly looking head thrust out,

ready to pounce upon small fish and reptiles as they pass him. The most valuable of all the turtles are the *imbricated*, valuable because of their thick, semi-transparent shells, out of which are manufactured the beautiful tortoise-shell combs, which ladies prize so highly.

"They have a strange way of catching turtles on the Madeira, with a sort of bow and arrow. Not by shooting them, however. The iron arrow point has a long string attached to it, which is wound about the shaft. The thread unrolls when the animal dives with the arrow sticking in him, and the swimming shaft guides the fishermen to the spot, when the animal is finished with a harpoon.

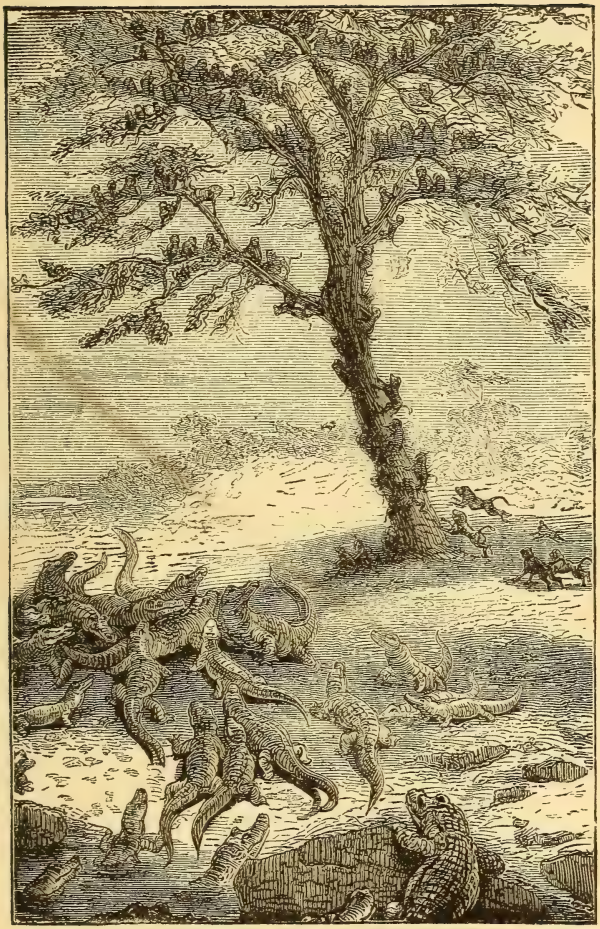
"Ugh! there is a lizard," exclaimed Grace. "I never could quite conquer my prejudices against a lizard, though I know they are perfectly harmless, being timid and gentle in their habits."

"Where do they live?" asked May.

"They live in holes in sand, and by pairs. They lay between five and seven eggs which they leave to be hatched by the warmth of the air. Both the male and female change their skins about twice a year. Like other oviperous quadrupeds, the lizard

can live a long time without food. It belongs to the order *Saura* and to the family *Lacertidae.* There is a lizard called the *Flying Dragon* because he has wings, though he cannot fly one mite with them. Then there is the *chameleon* noted for the several

shades of its skin, saxon green, deep green, blue and yellow. Then there is the salamander, noted for its endurance of heat, the frilled lizard, the newt and others. Then there are the crocodiles and alligators."



Monkeys and Alligators.

"What's the difference between a crocodile and an alligator?" asked Frank.

"Crocodiles and alligators both belong to the family *Crocodilidae*, the crocodiles being found in the Nile and Ganges. The alligator belongs to America, and is sometimes called the American crocodile. The crocodile is much the largest of all the lizard tribe. He measures from eighteen to thirty feet, and is covered with thick scales, impenetrable to pistol or musket shot. Can't you tell them something else about the crocodile, Mr. Dumas?"

"I suppose the reason that people naturally shrink from the lizard is because he looks so much like the crocodile," remarked Frank.

"I will tell the children a story," smiled Mr. Dumas. And then he told them of a great number of crocodiles coming up out of the water to attack hundreds of monkeys who had come down to the shore on an exploring tour, and how the monkeys tumbled pell-mell over each other in their frantic endeavors to ascend a tree, and that the tree just groaned under its animal weight, while the alligators stood around looking hungrily on, the monkeys all chattering at once in the meantime."

"Now for a summary of what we have learned to-day," said Grace, as soon as the children's merriment had subsided.

Frank and May both began:

"We have been talking about reptiles, a class of cold-blooded, *vertebrated* animals, divided into three orders, *Chelonia* or turtles; *Saurians*, or lizards; *Ophidians*, or serpents. They are all *oviperous*, though some few hatch their eggs within, before being laid. There are two families of turtles, *Chelonioidæ* and *Sphargididæ*. The lizard family is called *Lacertidæ*. *Viperidæ*, is a class of venomous serpents. The rattlesnake belongs to the family *Croalidæ;* black snakes belong to the family *Colubridæ;* boa constrictors to the *Boidæ* family. Toads and frogs are a class of *Batrachians*, frogs belonging to the *Randæ*, and toads to the *Bufonidæ*."

CHAPTER V.

IN MR. DUMAS' ROOM.

Where was Rose? Everybody was hunting for her all over the house, in the garden, in the orchard. Uncle John even looked over into the pig-pen, to be sure she hadn't been devoured alive; Aunt Jerusha looked down the well; Jane, the kitchen girl, searched up garret and down cellar, while Grace and May and Frank ran about shouting, "Rose! Rose!"

At last a voice answered:

"Here I am. What do you want?"

And running around to the side of the house from whence the sound came, they beheld little Rose looking calmly out of an open window in the second story.

"What are you doing there?" asked Grace.

"In Mr. Dumas's room lookin' at his pretty fings," she answered innocently, turning away from the window.

Mr. Dumas turned red to the roots of his hair, and fumbled hastily in his pocket; but not succeeding in finding what he wished, he rushed into the house, and on up stairs, followed by Grace and the two children.

"Do tome in, Tousin Grace," said Rose, running to meet them. Mr. Dumas has dot lots of funny fings."

"It was very, very naughty in you, indeed, to go anywhere you were not invited," said Grace, reprovingly.

"Who tied your hands?" asked Frank, for there the little girl was walking about from one object of interest to another, with her hands tied before her.

"I did," said Rose, dropping her head. "I fought I touldn't touch anyfing if I tied my hands."

"Bless the child!" exclaimed Mr. Dumas, snatching her up in his arms and kissing her. "If I had known you was such a little lady, you might have seen into my room long ago."

"But what made you think of such a thing?" asked Grace.

"Tause Mr. Dumas dot our chains and buttons out of his room, and all his pitty shells, so I fought he must have some more fings in here. Mr. Dumas don't tare a bit, do you?" she asked, coaxingly, throwing an arm around his neck.

"Not now, since you didn't get hurt; but if you had meddled too much with a glass case over yonder, you might have been poisoned to death."

"Where?" asked Grace, with white lips.

"It is only a strange, beautiful plant. I handle it with buckskin gloves; but don't be alarmed, Miss Montague, I shall destroy it immediately.

"What's dose stuffed fings over yonder?" asked Rose, pointing her finger in the direction.

"One is a narwhal and the other is a seal."

"Won't you tell us about 'em?" pleaded Rose.

"Yes; you've been such a good girl that you shall

know all about them. Shall I tell you about the seal, first?"

"That dreat brown fing, what ain't dot no hind legs hardly, and what's dot a head like a pussy tat, only there's no ears?"

"Yes, that is a seal, and a wonderful animal he is. Indeed, the seals seem endowed with so much intelligence, and act in some respects so much like human beings, that the Icelanders entertain a queer superstition for them. They believe they more nearly resemble the human species than any other creature, and think they are the offspring of Pharaoh and his host, who were turned into seals while passing through the Red Sea."

"How odd!" exclaimed May.

"Perhaps the most intelligent of all the seals is the Ursine seal. The males are some eight feet long, but the females are much smaller. Their bodies are thick up towards the head, but decrease toward the tail. The fore legs are two feet long, and with the feet, look like turtles' fins. The hind legs are quite short, and the five toes webbed. Their general color is black when young, but they become tipped with gray as they grow old. The

THE SEAL AT REST.

color of the female is ash. The Ursine seals live in large families, each male possessing from ten to fifty females. The males are very fond of their offspring, and if a female accidentally drops one, or injures it in any way, he falls upon her and whips her terribly, until he leaves her for dead. If one of the young ones are carried away, or in any way in-

THE SEAL.

jured fatally, the males show every mark of excessive grief, weeping tears of sorrow."

"Poor, poor seal!" exclaimed Rose, pityingly.

"Sometimes the males fight terribly, and which

ever one is whipped, loses all his females; for, seeming to have contempt for the weaker one, they all go over to the male who is victorious.

"Sometimes the little baby seals fight, and then the male is always the most pleased with the little one that whips. He pats him on the head, and licks him with his tongue, as if he were kissing him. The Ursine seal seldom has more than one little one at a time, which it nurses about three months; but the common seal has two or three, which are kept in cavities of ice, the male making a hole through the ice down to the water, which he does by blowing his breath upon the ice until it melts, thus forming an opening. When the mamma seals come up out of the water, they bleat like sheep for their little ones, and single out their own darlings from among a hundred of others.

"Seals are taken in large quantities for their skins and oil; indeed, they constitute the universal resource for the Greenlanders. The flesh forms their principal food; the fat furnishes them with oil to give light through the long, dark nights, to make their fires, and in which they can cook their food. The skins of the entrails are manufactured into

THE OTARY.

material for their shirts, and curtains for their tents. They even use this material for their windows. From the bones they made all their working implements, until the foreign introduction of iron. The women sew with the fibres of the sinews, which is much stronger than thread, and make a delicious soup from the animals' blood. The outside skins of the animals make warm clothing, coverings for beds, houses, and boats, as well as thongs and straps for a great many purposes. The seals are found in all northern latitudes, and some few in the temperate regions. They are easily tamed, and show the warmest attachment for their masters.

A gentleman once captured a young seal, and took it home with him. He kept it but a few days when he began to fear that it was going to consume more provision than he felt able to provide for it, so he determined to take it back to its home and throw it in the water. For this purpose, two or three men were engaged, and it was taken out upon the water in a boat and then cast overboard, but it could swim much faster than the men could row, and soon overtook them, clinging to the side of the boat. Nothing could induce the seal to let go his hold until his

fore feet were actually so hacked that he was obliged to give up, staining the water with blood, as he fell. The owner of the seal felt badly all the night about it, and next morning, when he heard the poor seal whining at the kitchen door to get in, he could not possibly resist any longer, but tenderly took him in to the fire. The creature showed every manifestation of delight at his restoration, by licking his master's hand, wagging his tail and regarding him with the same tender light in his great, brown eyes that one often notices as so characteristic of the dog. Then he stretched himself out before the fire perfectly contented and happy."

There were tears in May's eyes, and Rose said:

"If I had a little seal I wouldn't make him do back into the water. I'd lobe him to death."

"I think he'd be as jolly as a dog," said Frank.

"When they are old, their voice resembles the barking of a dog, but that of the little ones sounds more like the mewing of a kitten. There are several species of seals. There is one which measures from fifteen to twenty feet in length, the male being distinguished from the female in possessing a large snout, projecting five or six inches beyond the ex-

tremity of the upper jaw. The seal inflates this snout when he is angry, giving it the appearance of an arched nose. This species is called the bottle seal. Then there is the leonine seal, so called because his neck is covered with long, waving hair, very much like the mane of the lion. A male of this species often weighs as much as sixteen hundred pounds. Seals belong to the family *Phocidae* from the Latin word *Phoca*, seal."

"It took a large case for that narwhal, didn't it?" said Frank, addressing Mr. Dumas.

"Yes; it was rather a troublesome specimen, on account of its bulk; yet this is quite a young one. A full grown male will measure from twenty to thirty feet, without his tusk, and that is from six to ten feet long."

"What pretty skin the narwhal has, all spotted wiv' black," said Rose, admiringly.

"Yes; and isn't his horn pretty? It looks like a piece of white ivory, plaited," said May.

"That is all the weapon the poor narwhal has, and he never uses it save in a matter of self-defence. He is one of the most peaceable inhabitants of the ocean."

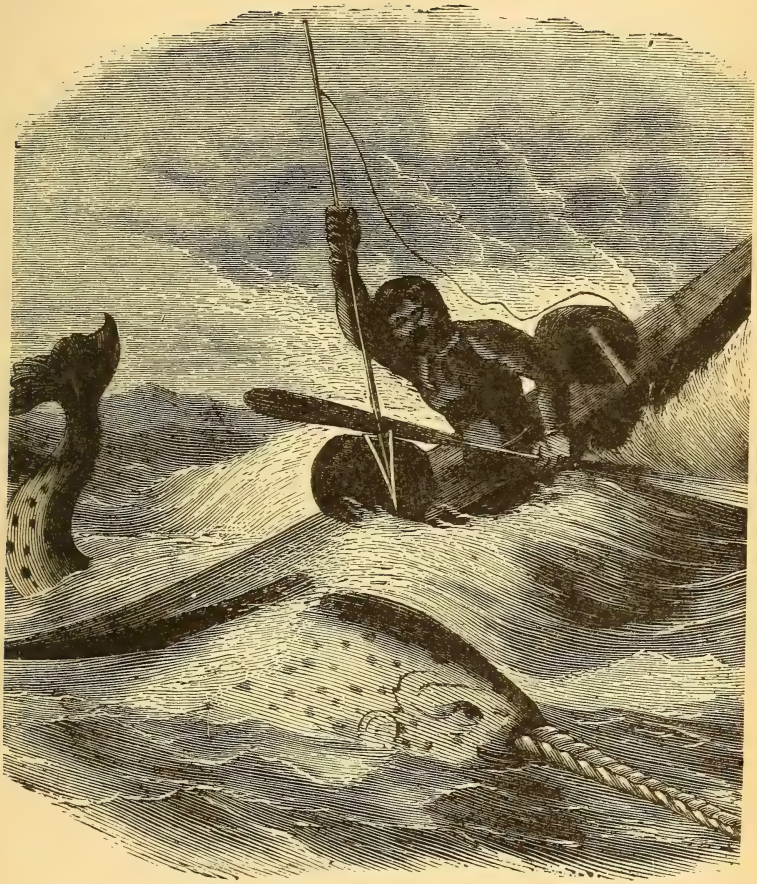
"Where did this one come from?" asked Frank.

"From the northern ocean. The Greenlanders capture them for their flesh, which they eat; for their oil and teeth as an article of traffic, and for the long tusk, which, as ivory, is much more valuable than the tusks of elephants, being much harder and capable of higher polish.

"The Greenlander has a funny sort of a boat with a round hole in the upper part of it. They get into this hole, leaving only the upper part of their body exposed, then with a long spear attached to a great long spool of stout twine, they thrust it forward into the narwhal. The wounded creature at once dives down into the depths of the ocean, but returns in a short time to the surface of the water when it is soon dispatched with a lance."

"Why do whales come up to the surface of the water, when there are so many dangers around?" asked Frank.

"Because they have to, for they do not breathe like fish, but like you and me, through a pair of lungs. You learned that a little fish breathes through its gills, that it keeps continually opening and shutting its mouth, the water it takes in, forcing its way



THE PERILS OF A FISHING VOYAGE.

through the gills. But the whale tribe cannot live in the water all the time, no more than can you and I. When these animals are undisturbed they generally remain on the surface of the water long enough to breathe eight or nine times, and then go down under water again for about five or ten minutes, or, if feeding, for fifteen or twenty."

"Have the whales any teeth?" asked Frank.

"No; they have no teeth in either jaw; the upper jaw being supplied with a horny *laminæ* called whalebone."

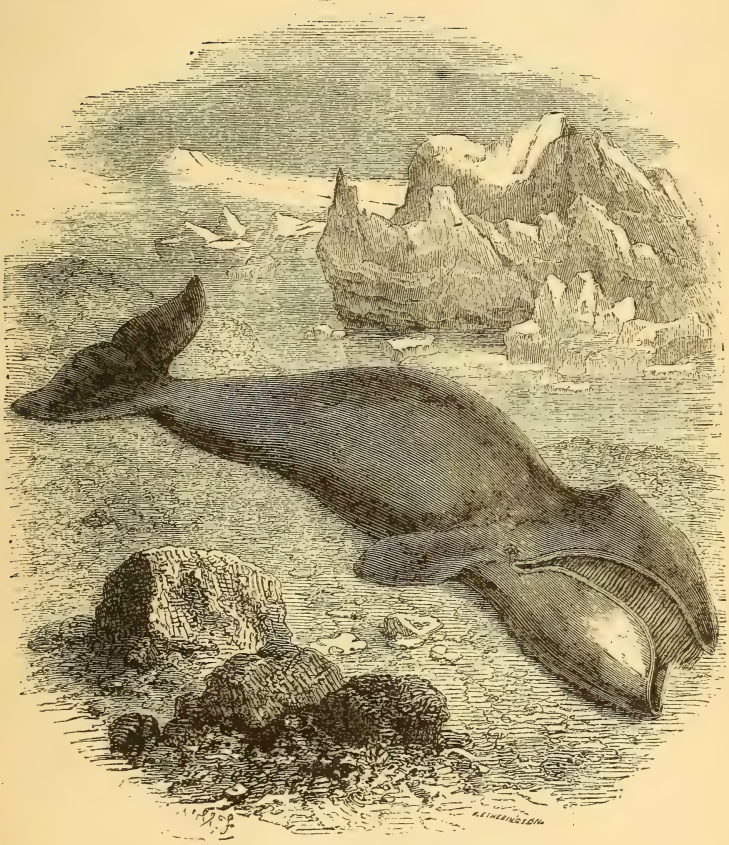
"Is that where whalebone, comes from?" asked May. "I never think when mamma is putting whalebone in my dresses, that they once served the great whale for teeth. I don't see how he can eat with such teeth."

"When feeding, he swims with great velocity down below the surface, with his mouth opened just as wide as he can get it. A stream of water, filled with immense quantities of cuttle-fish, sea-blubber and shrimps, is continually flowing into his great mouth. The water escapes through his blow-holes, but the food is entangled, the whalebone teeth forming a sort of strainer or sifter.

"The whale tribe have but one little one at a time, and when nursing it, the mother whale throws herself over on one side on the surface of the water. She is very careful of this one baby of hers, carrying it with her wherever she goes, and when hardest pursued, supports it between her fins. Even if wounded she keeps her hold of it, and takes it with her to the bottom, though rising with it sooner than she would, so that it can breathe. While nursing, the little whales are very fat, and are called by the sailors 'short-heads.' At two years old they are called 'stunts,' because they do not thrive very well for awhile after leaving the mother. After they are two years old they are called 'skull-fish.'"

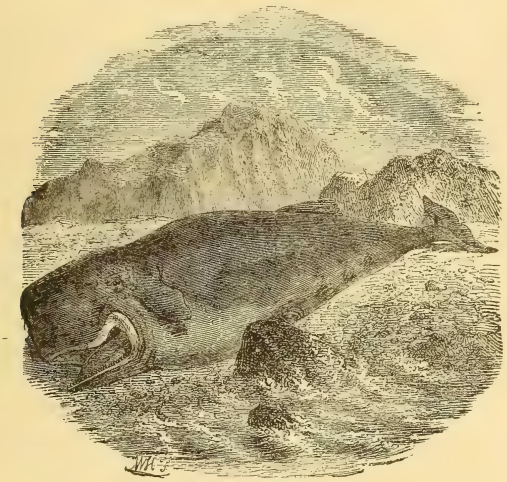
"Won't you tell us more about the whales' blow-holes?" asked Frank.

"There is a tubular opening on the top of his head. This spiracle contains double outlets, the same as man's nostrils. It is through his nose that the whale spouts water and vapor to the height of several yards, making a very loud noise indeed; but this is all the noise he can make, since he has no voice. The whales are shy and timid animals, and never think of showing their great strength save



THE GREENLAND WHALE.

when their lives are in danger. Then it is the narwhal uses his long, white ivory tusk. He plunges it into the keels and bottom of vessels, where they have sometimes been found broken short off. Whales abound in the seas about Spitzbergen and Green-



AT REST.

land, though they are found to some extent on the shores of countries nearer the torrid zone."

"Have you ever been whale fishing, Mr. Dumas?"

"Yes; I went some two or three voyages, the last time as first mate, and that was when I brought back with me this narwhal. The oil produced from a

single large whale will bring about five thousand dollars, and the whalebone alone often brings from one thousand to fifteen hundred dollars, so that you see whale fishing must be very profitable, a full ship of about three hundred tons burden, making from twenty to thirty thousand dollars from one voyage."

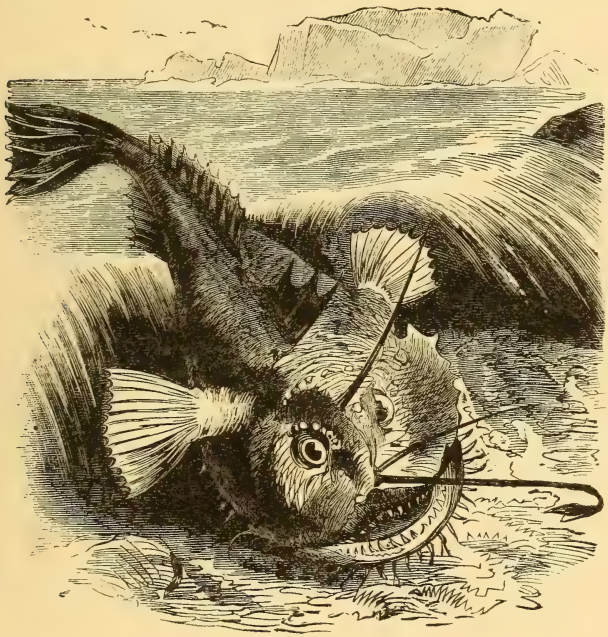
"Where do they get the blubber which makes the oil?" asked Frank.

"It lies directly under the skin and is from eight to twelve inches thick, being a beautiful yellow color when the animal is in health. So oily is this substace that one hundred barrels of blubber will produce nearly ninety-six barrels of oil. The fishing season begins in May, but must end by the last of August, to avoid the coming ice. Whales belong to the *Balænidæ* family, *Balænidæ* coming from the word *baleen*, which means plates of whalebone. The order to which they belong is *Cetacea*, from the latin word *cete*, a whale."

"Mr. Dumas, what's the name of that slippery looking fish, in that very large aquarium?"

"That is called the angler, or fishing frog, and came out of the Mediterranean Sea. It belongs to

the *Lophidæ* family. The peculiar formation of its fins makes it able to creep a considerable distance on land. The reason it is called the angler, or fishing frog, is because of the way it has of catching



THE FISHING FROG.

fish. It crouches close to the bottom of the sea, and by digging its pectoral fins down into the sand and mud attracts the attention of small fishes, who mistake the two or three long, horny threads on the

head of the angler for worms, and approach to snap them up, when suddenly they find themselves snapped up. It is called a fishing frog, because it is able to leap up like a frog, when it catches its prey. It is from three to six feet long, and has a very large head and mouth, as you can see from this specimen. Its voracity is remarkable. Large sea birds, as gulls, are frequently found whole in the angler's stomach."

"Do tell us about that beautiful red fish with such a funny tail," said May.

"That is a very rare fish, as well as a beautiful one. It is called the Japanese kingiyo, but I was unable to learn much more about it, but think it closely allied to the gold fish."

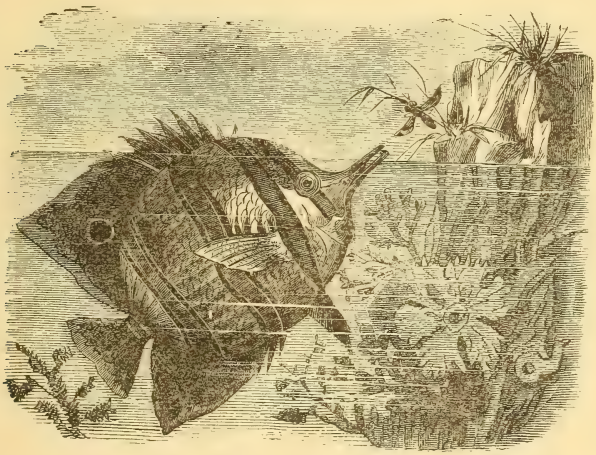
"It's dot on a wed jacket, and a long, white petticoat wiv' fringes all around," said Rose.

"It looks so in the water, really," said May, turning to Grace.

"I think it does, some; and so, Mr. Dumas, you think this odd-looking kingiyo allied to the gold fish?"

"It is mere speculation on my part, simply because I do not know where else to class him, I sup-

pose; but you know when the gold fish was brought from China to England, about two hundred years ago, it was looked upon as a great curiosity. Since, it has been introduced to the United States through England, and now is found almost everywhere, still



THE KINGIYO.

a thing of beauty, but rare no longer. I think the Japanese kingiyo a kind of gold fish, which has not as yet become generally known."

"And how is it with this curious looking fellow?" asked Grace, pointing out a large glass globe.

"That is another Japanese fish. The natives

make a great pet of it, and are never tired of witnessing the curious way in which the fish gets his dinner."

"How? how?" inquired the children.

"Do you not see what a funny mouth he has?"

"Yes, yes," assented the children.

"Now watch me place a fly on one of these leaves that projects just above the surface of water in the globe. The fly is dead, but the little fish will not know the difference. Now stand back and watch him shoot."

"Shoot! Is he a shootin' fish?" asked Rose, as she tiptoed to the edge of the table, and peeped cautiously into the globe.

"You will see," said Mr. Dumas; and soon they saw the fish swimming under the water. He had noticed the fly, and still remaining under water, though perfectly motionless, he shot a little stream of water directly upon the fly; but, as it was fastened with a pin, he could not succeed in bringing it down to the surface of the water.

"What does he do that for?" asked Rose.

"To wash the little fly down to the surface of the water, so that he may eat it for his dinner," laughed

Mr. Dumas. "His snout is very much like a boy's blow gun."

"I never heard of anything so queer as that," said Frank.

"There are a great many queer things in this world of ours. The learned name for this queer fish is the *beaked Chætodon.* He belongs to the family *Chætodinæ.* See the bands crossing and recrossing him, while his scales are very stout. The species are very numerous, and are held in high esteem for food."

"What are all vose fings in the glass jars?" asked Rose.

"If you will come in again to-morrow, I will tell you all about them."

"Now let us see what we have learned to-day," said Grace.

"I know, I know," said little Rose, eagerly, raising her right hand, and shaking it violently; for she had visited school once with her sister May, and had particularly noticed how the little girls strove to gain the attention of their teacher.

"Well," smiled Grace, "let us hear."

"Whales and seals are vertebrates 'tause they've

dot back bones, and they ain't fish if they do live in the water. They're mammals, 'tause they nurse their own babies."

"Very good, for little Rose. Now, Frank, will you show any other reasons why whales and seals are not fish?" said Grace.

"Fish are cold-blooded animals, whales have warm red blood, and breathe like quadrupeds by means of real lungs. They have movable eyelids, and fair bones like quadrupeds. Seals belong, as Linnæus has classed them, to the same order as do cats and dogs, having six front teeth in each jaw, and one canine tooth in both jaws on each side."

"Very good, and now, May, suppose you tell us in what way whales and seals are like fish, though they do not belong to that kingdom?" said Mr. Dumas.

"Why, in having fins, and being inhabitants of the water," answered May.

"Do you know how many fins the cetaceans or whales have?"

"Only two, the pretoral fins, besides their tails. They have no posterior feet or fins."

"How is it with thoca, or the seals?"

"They have four complete members, the hind ones forming with the tail a broad, stout caudal fin. The fore paws, though encased in skin, have nails like quadrupeds, enabling seals to crawl or tumble about — some species being able to travel upon land better than others."

"Very good," said Grace. "Come now, children; it is time to go down-stairs."

"I shall look for you all, to-morrow," said Mr. Dumas, bowing them out.

CHAPTER VI.

WHAT WAS IN THE JARS.

The next day found Grace and the children back in Mr. Dumas' room, and they noticed that it had been swept and garnished for the occasion. The great glass jars at once attracted the children's attention.

"O, see that beautiful little parasol with fringe all around it," said May.

"That's a living animal," said Mr. Dumas.

"Is it possible!" exclaimed the children.

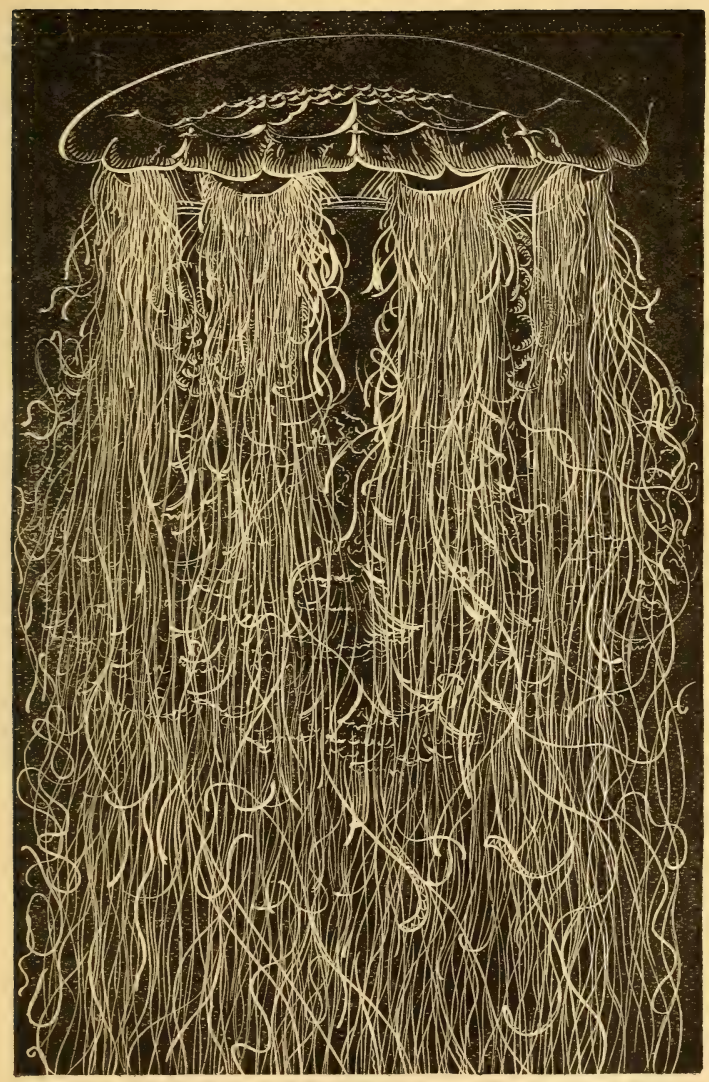
MEDUSÆ OR JELLY FISH.

"Yes, in the center part of the concave side of this disc, is the stomach. The mouth opens downwards, and is surrounded by what looks like a cloud of lace. It is the *Medusæ* or *jelly-fish*. In their stomachs are often found small fishes, crustacea and mollusks. Their tentacula possesses considerable muscular power, capable of drawing into its mouth almost everything that comes in its way. They belong to the branch *Radiata* and to the class *Acalephæ*. This class embraces a large number of animals, and if there is anything mysterious in nature it is this class of creatures. They can move, feel, take nourishment, sting if troubled, are phosphorescent and reproductive; yet no one understands just how it is. They are one of the mysteries of creation. If I were to take this *medusæ* out of the jar and set it aside for awhile, though now it weighs some four or five pounds, I would find that there was nothing left of it but a filmy skin, a mere cobweb, while the substance which drained away from it would appear to be nothing more than sea-water. Can anything be more wonderful? Here is a creature full of life and activity, weighing five pounds yet I take it out of the water and lo! it is not, for

nothing remains but cob-web and water. The *Acalephæ* have been divided into four families, the *Tulmograda*, the *Cilograda*, the *Cirrhigrada* and the *Physograda*. These families exhibit a great variety of structure and form. Here is one in this jar that has the form of hair, or tangled fringe. Agassiz once came across a jelly-fish in this form, and on measuring it, found that its hair or tentacles, as they are called, measured one hundred and twelve feet long, the body being seven feet in diameter. Up and down these tentacles are cells, each having a fine cord coiled up which the animal can spring at will, and it would not be a very pleasant thing to get entangled in those thread-like tentacles; yet out of water it would dry away to nothing but film. This queer, fringy-looking fish has for its mamma a little, wee thing called *Hydroid*, never more than half an inch in height."

"Here's somefing looks like a fan," said Rose.

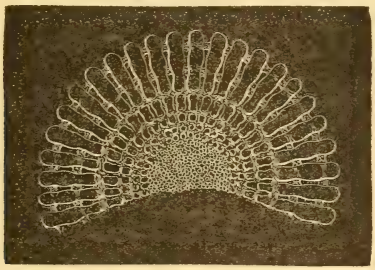
"That is what is called a sea-urchin. The center is his body and the open work his tentacles. Upon four of these tentacles are tiny forks. When there is any food this creature doesn't want, he passes it down a tentacle to one of these forks. The fork



closes upon it as quickly as though it were guided by fingers, then passes it on to another fork, until the last one drops it into the water."

"Here's a dreat bid bush in this jar, and it's dot dooseberries on it, I dess," called Rose.

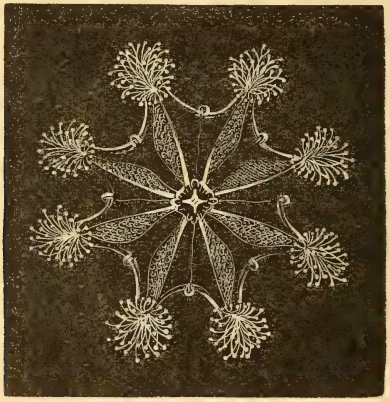
"It is a net-fish, and what looks like branches and berries are the tentacles of the fish, stretching up



and branching out here and there, and coiled up into little round coils. Sometimes this fish closes up, and takes the form of a cosy, latticed house. Little fish and shrimps never guess that it is a net to catch them, so run right into the nice-looking place without a thought of danger. The net-fish has eighty-nine hundred and twenty links; just think of that!"

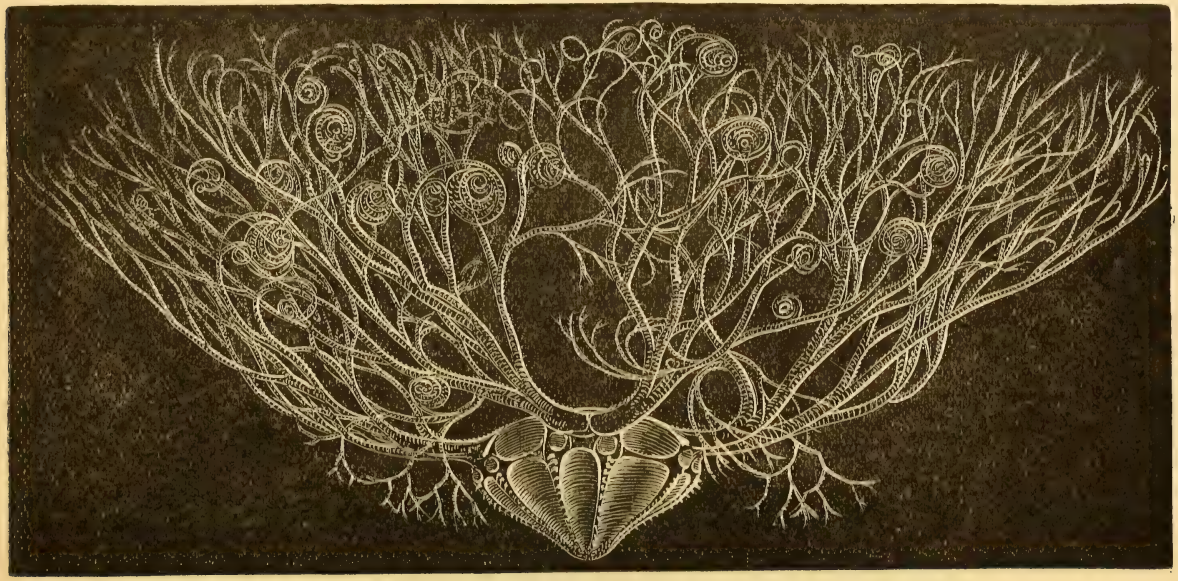
"O, here's some of the prettiest little breast-pins eber was," cried out Rose.

"They are the most common of all the jelly-fishes, and are called *Lucernaria*. This is in the shape of a star, each point seeming set with brilliants, only all is not gold that sparkles, so these little glittering



points are not pearls or diamonds, but tentacles and auricles to eat with, and to take hold by. They are generally found fast to sea-weeds along shore, and strange as it may appear, this beautiful star has the power of contracting itself up until it looks just like a half-blown morning-glory."

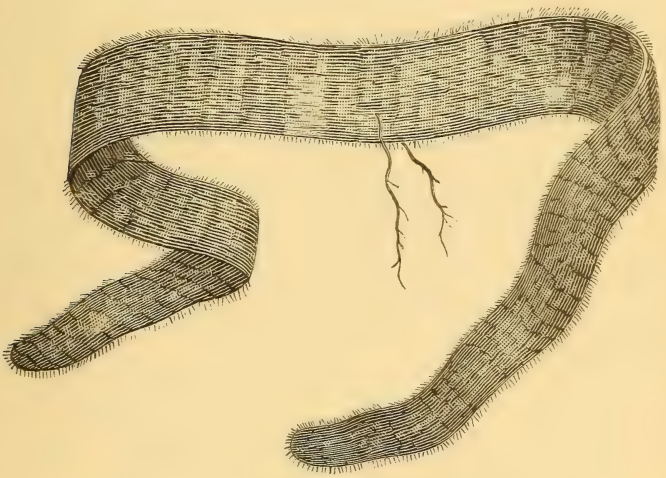
"O, here's somefing looks like a scarf," cried out



A Jelly Fish.

Rose, again, "see how shiny it is, and all the woolen stuff at the edges looks lovely, don't it, May?"

"It is a big *medusa*, and that woolen stuff, as Rose calls it, is its *cilia* by which it rows itself along in the water. It is called the 'Girdle of Venus.'"



"And this feathery-looking leaf — what is this?" asked May.

"It's all bue," said Rose.

"Another jelly-fish. The little fronds on each side of the broad stem are alive, in each of them a cell inhabited by a polypus."

"What is a polypus?" asked May.

"I dess it's somefing like a polly parrot," said Rose gravely.

"Poly means many, the word meaning with many feet or roots. This feathery leaf lives with its stem down in the sea-mud. Like many other of the jelly fishes, it was long thought a vegetable. It is called the 'sea-pen.' I suppose because it resembles a quill-pen and is found in the sea."

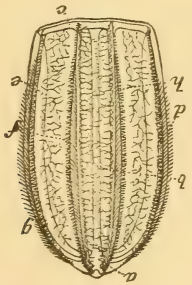
"Here's somefing has dot two long fevers for a tail, but there ain't no head or foots," said Rose.

"That is a *Plererobrachia*, a genus of *Acaleplus* belonging to the order of *Ctenophoræ* or *Beroid*, *jelly-fishes*. They always have a round body, and the feather-edges are the creature's tentacles with which he gathers up his food and with which he propels himself along in the water. This, in the next jar, belongs to the same order, but is of the genus *Idyia*. It looks like an inverted pouch. It is all stomach, and as soon as a fish enters this up-side down pouch, the mouth contracts, and there the fish is fast."

"Here's a boota," said Rose.

"In a bouquet holder," added May.

"The holder is a *Hobocodon hydroid*, and is the mother of the little flowers which she holds. The flowers are young *medusæ*. They stay there until strong enough to leave the hydroid, then detach themselves and float off upon the sea to 'paddle their own canoes.' There are some very strange



facts about these hydroids. Portions of them may be broken off, as, sometimes, the hydroid splits of its own accord, when each portion or division becomes an independent animal, growing to the same size as the original. For a long time these hydroids were called animal plants."

"What is this queer-looking bunch?" asked Frank.

"That's another hydra. A floating hydroid.

There are lots of little baby jelly-fish there, fastened to their mother. Soon they will become able to take care of themselves, and will drop off into the sea."

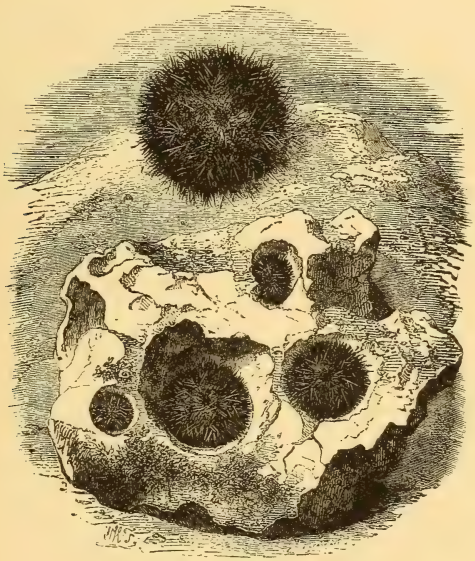
"I should like to make drawings of these jelly-fish, to take home and show mamma," said Frank.

"So you can, if you wish," said Mr. Dumas. "I know that she will be much interested. Still another class of radiata are the *Echinodermata*,

A BOUQUET.

or *Echinoderms*. They are the strongest and the most perfectly formed of all the radiata. They do not swim so easily and gracefully as the *medusa*, but creep along the sand, or are found sticking fast to

rocks by means of their many tentacles. One of the most curious of this class is the sea-hedgehog, or the sea-chestnut, called the first because it can contract itself in a round, prickly ball, like the hedgehog, and the last because in this condition it



THE SEA-HEDGEHOG.

looks very much like the prickly burr of a chestnut. The round body is clad in a solid cuirass, out of which project numbers of stiff, brittle spines. There are also little holes all over the cuirass, through

which the animal can stick his many sensitive little feet at his pleasure. By observing closely, you will see that one of the openings is larger than the others. This is the creature's mouth, and among the species that are carniverous, you will observe five tiny teeth. These animals are often found snugly encased in holes in the rocks; and another one of the mysteries is, how do they get there?

"Some naturalists presume that these little creatures carve out their own homes in the rocks by means of their sharp, prickly spines; but if they are as brittle as it is said, I do not see how this can be the case."

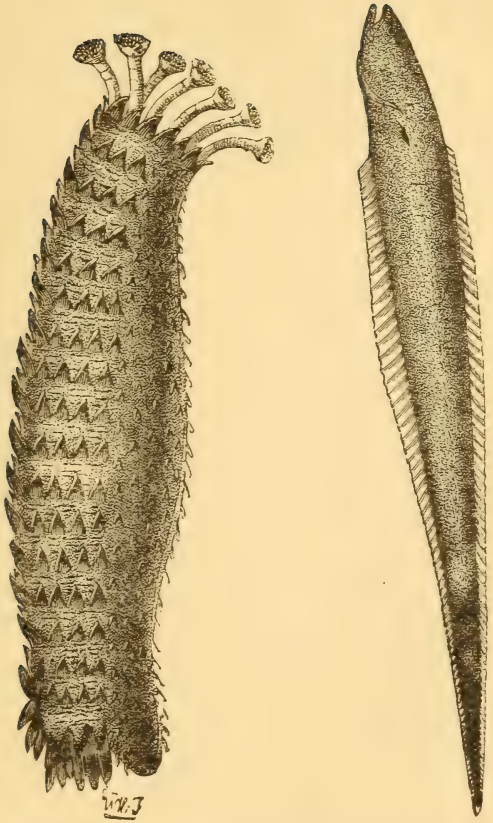
"What's this queer lookin' fing in 'is jar?" asked Rose. "There are two of 'em; one is a tunnin' long fish, but I don't know what the other is."

"That? why, that's a cucumber," smiled Mr. Dumas.

Rose looked at it steadily for a few seconds, and then said:

"It's the tweerest lookin' tucumber I eber saw."

"A sea-cucumber, Mr. Dumas means," said Grace. "It is a live little *Holothuria ananas*, and the fish is its parasite."



HOLOTHURIA ANANAS AND ITS PARASITICAL FISH.

"What's it dot all its tongues out for?" asked Rose.

"Those are its tentacles, and it can draw them entirely out of sight when it pleases."

"The Malays catch them in great numbers for the Chinese, who are fond of them in their soups,' said Mr. Dumas.

"It must be tedious work catching such tiny things," said Grace.

"It is. The Malays go out in boats, and at the distance of over a hundred feet down in the sea, they behold the *holothura* clinging to the rocks, and strike it with a sort of harpoon.

"Here are a cluster of sea-stars, belonging to the *Echinoderms*, which I collected and dried. I could not keep them alive in the glass jars. It is animal life in a strange form, isn't it? They are covered with a sort of a crust in order to protect them from their small sea enemies. They have five or more rays branching out from the center, in which their mouth may be found. All these rays are provided with numbers of tentacles, being in their case short, soft, fleshy tubes. With these they take their food, cling to the rocks with such force as to withstand

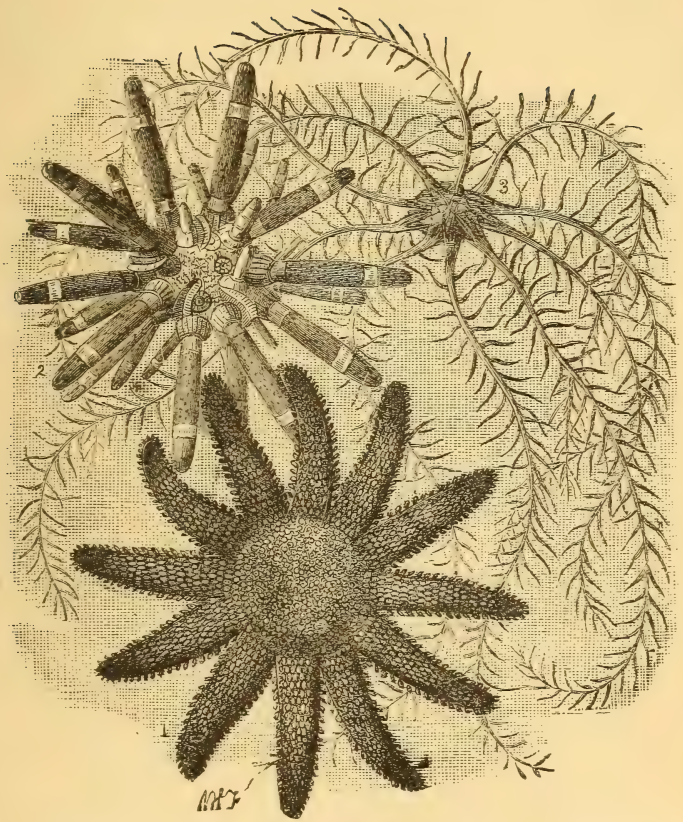
the force of the waves, though they are often swept high and dry upon shore. If the animal is thrown upon its back, it frequently pushes out and draws in again its hundreds of tentacles. So intense is its vitality, that every ray but one may be crushed and lost entirely, yet the animal lives, and possesses the power of reproducing all his lost rays. They are very voracious, and prey upon dead or living animal substances. Some naturalists believe these star-fish possess the organ of sight."

"Oh, here are some tweer lookin' fowers stickin out of little clam-shells. They are all stickin' fast to a piece of old board," cried Rose.

"These are little animals called *Cirripedes*, from *cirrus*, a curl, and *pedis*, a foot. They are the curly-footed animals," said Mr. Dumas.

"I neber heard of anyfing wearing their curls on their foots," laughed Rose.

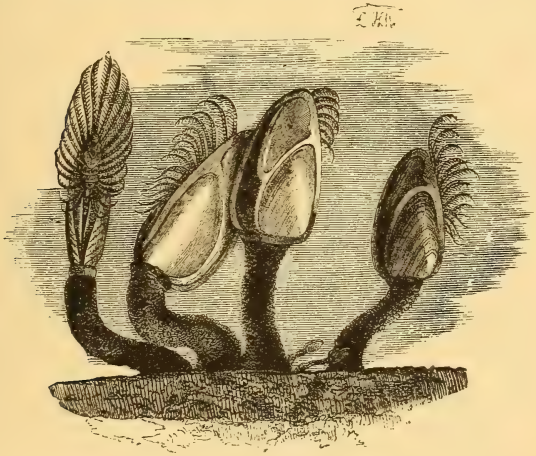
"These curls are also their *branchia* through which they breathe. All of the species possess twenty-four claws apiece, the twelve longest arising from the back part of the animal. The twelve smaller ones arranged six on a side, are more pliable and fuller of hairs, answering the purpose of hands. The *Cirri-*



1. Asteris paposa. 2. Cidarites imperialis. 3. Comatula Mediterranea.

pedes have no eyes, but possess a mouth, jaws and teeth. They have a heart, stomach, intestines, a nervous system and tendons by which they adhere to their shells. Another funny name they have is the *Goose-bearing barnacle.*"

"Why, do they bear little gooses?" laughed Rose.

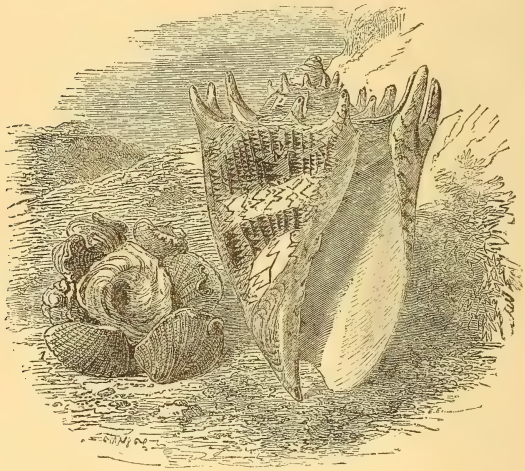


BARNACLES.

"There was a ridiculous story in the dark ages that the barnacle goose was produced in the shells of these animals," said Mr. Dumas.

"Why they have more than two shells!" exclaimed May, after giving the strange creatures a very close examination. "They must be *multivalves.*"

"Certainly, they are. The genus *anatifa* now is composed of five shells drawn together in the form of tulips. The *Cirripedes* are divided into two families, the *Anatifa* and *Balana*. *Balanus* means an acorn. This last family is contained in a short conical shell in the shape of an acorn, and is attached



without a stem to its support. They sometimes cover a vessel's sides to such an extent that she can scarcely move. Their tentacles they thrust out and quiver so violently that numbers of animalcules are drawn into the vortex and greedily devoured by

them for food. If any danger is apparent they shut themselves up quickly in their mantle under their valves.

"These sea-acorns were very much relished by the ancient Greeks at their tables; and the Chinese consider them a great delicacy served up with salt and vinegar. Both families may be found on old rotten timber that is submerged, as well as on the sides of ships."

"How do they get there?" asked Frank.

"At the commencement of their life they are attached to nothing, but on becoming adults cling to some foreign substance on which they can end their days; and to this home they must always stick, whether for better or for worse."

"Mr. Dumas, why do they call jelly-fishes *medusa*?" asked Frank.

"There was a fabled Gorgan medusa whose head was adorned with snakes instead of tresses, and whose glaring eyes turned into stone everything which looked upon her. Some of the umbrella-shaped jelly-fishes with their pendant tentacles might have had a fancied resemblance to this fabulous creature; and, it may be, because their phos-

phorescent light almost transfixed the unenlightened spectator into stone."

"Phosphorescent?" repeated Frank. "Tell us more about it, won't you?"

"Their beautiful tints shine with gorgeous splendor at night, sometimes with such brilliancy as to make the ocean look like a bed of flames. Sailors were very much frightened with this phenomena until after it was explained."

"I have read that the phosphorescence at sea was caused by the *night-shining nereis*, an animal also known under the name of the *marine scolopendræ* or centipede," said Grace.

"The *night-shining nereis* is, undoubtedly, one of the causes. The sea is full of these tiny creatures, which are found on all kinds of marine plants; but when they leave these plants to swim on the surface of the water they are particularly luminous, so small are they that thousands and myriads may be taken up in a little cup of sea water. They get in under the scales of fishes and cause them, too, to exhibit a phosphoresent light."

"Haven't any of the animals fins, we have been talking about to-day?" asked May.

"Not unless you make the numerous cilia and tentacles answer the purpose of fins, for it is by them that the *medusæ* swim and move."

"Have you anything more for us to see?" asked Frank.

"A few more specimens if you'll come to-morrow, I have an engagement for this afternoon."

CHAPTER VII.

QUEER FISH.

"Now," said Mr. Dumas, "I am going to show you some queer fish. They are accorded the very lowest place in animated nature. For a long time they were considered vegetables, but have since been proved to be animals, True, the only symptom of vitality it shows, is a visible trembling or contraction on being touched, yet it has a fishy smell, and on being burned has an odor like scorched wool or horn, proving that it is a specimen of animated

SPONGE.

nature. When living, the skeleton is covered with a sticky gelatine. Now, according to chemistry, gelatine can be obtained from animal tissues only; and chemists have even abstracted a fatty matter from the animal in question which they have analyzed and found it to contain (quoting from another) 'carbon, hydrogen, azate, iodine, sulphur, phosphorus, and somewhat larger quantities of phosphate, carbonate, and sulphate of lime, marine salt, silicia, magnesia, alumina and sulphate of iron.' When you children enter into the study of chemistry you will understand all these terms."

And producing something from his coat pocket, Mr. Dumas held it up, saying:

"Now, Rose, what have I here?"

"A round ball of sponge with little trees drowin' in it," she answered.

"Yes; it is the *spongia cyma*."

"What does *cyma* mean?" asked May.

"Sprout. This is sponge with vegetable sprouts. Now is this animal dead or alive?"

"Dead," they all answered.

"Yes," said Mr. Dumas, "his skin and flesh are all gone, and if I touch him he doesn't tremble the

least. If you will notice, you will see that some of the holes through the sponge are larger than others. When sponges are alive, and in a healthy condition, a constant stream of water may be seen issuing from the larger holes, while all the small ones seem as equally intent upon drinking, the water finding its way through all the canals before it is expelled. Now this circulation of fluid answers the purpose of nutrition, for without it the sponge could not live or grow. This water which flows through the pores also carries with it the eggs of the animal. These eggs, or corpuscules, are covered with hairs, by which they move through the water with great ease, until they attach themselves to some object after which they do not stir. It is found on submarine rocks in great abundance, and in a great variety of form and size. Here is another sponge I have, in the form of a vase."

"Are they found very deep down in the water?" asked Frank.

"Generally. The finer the specimens, the deeper they are."

"Then they must be obtained by diving?"

"Yes, of course."

"Won't you please tell us something about the divers?"

"There are men to dive for sponges, as well as for pearls and corals. The sponge fishery is now carried on more in the Grecian Archipelago than anywhere else, and on the Syrian shore. The fishery opens in June, and ends in October. The commonest of the sponges are caught with three-toothed harpoons, but the finer species would be injured by such a process, besides they are much deeper down in the water, so divers go down to the bottom of the sea and cut it off with strong, sharp knives. After obtaining the sponges they must be buried in the sand for some days, and then taken up, thoroughly soaked and washed, otherwise they would putrify and perish. Sponges belong to the family *Spongiadæ* and to the fifth, or lowest branch of the animal kingdom, which is *Protozoa*."

"I don't think I quite understand some things about sponges, yet," said Grace. "Sponges are produced by minute animals called polypi are they not?"

"Yes."

"Then why do they call the sponge an animal, instead of animals?"

"Because it is a compound animal composed of all these little polypi. The greater part of these tiny things adhere together and form compound animals. The sponge forms the lowest race of the polypi.

"Now going up one step higher in the animal kingdom we shall take up the order of *Zoantharia*; for marine polypi are divided into three orders, the most interesting of which is the order just mentioned.

"The *Zoantharia* comprise two large families, the stony, or madreporic *Zoantharia* and the fleshy *Zoantharia*. That was madreporic *Zoantharia* we found in the box of shells growing upon the oyster. I have some more corals in a different form which I will show you." And this time Mr. Dumas exhibited a glass case of corals.

"O, how beautiful!" exclaimed Grace.

"They are just like old snarly trees in winter-time," said May.

"Don't they have leaves on 'em in summer?" asked Rose.

"No, because they are like the little madrepore you saw attached to the oyster shell; they are the stony skeletons of numerous little polypids. Sup-

CORALS.

pose I break off a piece that I may better explain. The calcarious substance you will see is arranged in layers. Now the outside layer is called the bark, and is of a greyish color. You see that it is all full of little knobs, and in the very tip ends of the knobs are eight tiny holes. Now what do you suppose those holes are for?"

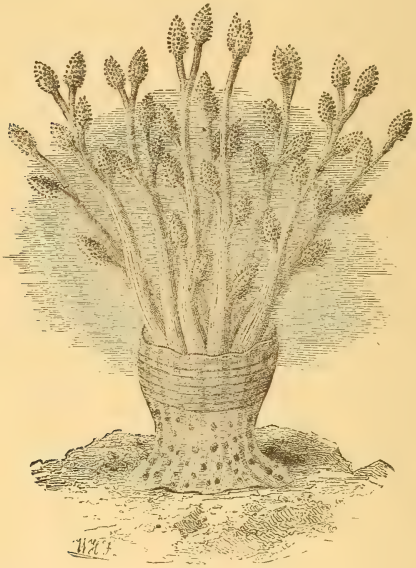
The children didn't know.

"Why, for the polypi to stick their eight tentacles through to be sure; for, as in the sponges, they are compound animals being one step higher in possessing tentacles. From the eggs of the little polypi in the corals, are formed bulbs, from which a stem shoots upward, on which branches grow. There is also a root which serves as a means of attachment. They take in their food by means of their long tentacula. I will now peel off the outside layer."

"What a b'ooful, bright red!" exclaimed Rose.

"Yes, just like the material out of which your coral chain is made. Divers for coral are furnished with a great cross, from the arms of which hang solid nets. This cross is lowered to the bottom of the sea with a stout rope. The diver then goes down and remains a half minute, moving the arms

of the cross rapidly around, so that they will scrape the rocks to which the coral sticks, thus entangling them in the nets. Then men on board of a boat pull at the rope bringing up the diver and his treasures to the surface.



SEA ANEMONES.

"Now we will pass on to the fleshy *Zoantharia* called *actinias* or *sea-anemones*. Here is the *arborescent* or *tree-like actina*.

"The body is a kind of sack, the bottom of it adhering to the sea-bed, while the mouth of the sack is open, through which several rows of tentacula shoot up like the branches of a tree. These animal flowers are flesh-eating, and in order to keep them in my aquarium in a healthy condition, I am obliged to feed them with meat and fish and worms."

"O, Mr. Dumas, won't you let us see you! I'd like so much to see a flower eat!" exclaimed May.

Some worms were procured, and the children were delighted, as well as astonished, to see the avidity with which the strange animal-flowers seized them from off the ends of the long reeds that were presented to them.

"Some of the *actinias* remain buried in the sand only thrusting out their tentacles, others are fastened to rocks which are almost on a level with the surface of the water. Unlike the sponges and corals, these animals can change their position when they choose. I have frequently seen them passing from one stone to another, and creeping along the sides of the aquarium. Sometimes they come up to the surface and seem to be enjoying the air. In this globe is the *actina Pumosa* of St. Helena."

"It looks just like a booful toilet tushion!" exclaimed Rose.

"The opening at the top is the creature's mouth. and the circle of fringe its several tentacula. The mouth is furnished with crooked teeth. This kind feeds principally upon shell-fish, which it draws into its mouth by means of its arms or tentacles. They cast out the shells and other hard substances through the same opening. If a shell is swallowed by mistake, it forces itself through the body, coming out near the base, and causing a wound. The whole inside of the body is one stomach.

"When they want to walk they let go their hold of the rock, turn themselves over, and use their tentacula or arms for legs."

"O, how funny!" cried the children.

"When their tentacles are fully expanded they have the appearance of full-blown flowers, many of them of very brilliant colors. When contracted, they have the form of a rounded cone. There are purple actinias, red, rose, blue, yellow, violet, in fact they may be found in almost any color. They belong to the family *Actinadæ* and to the order *Helianthoida.*

"Don't you find a difficulty in keeping them?" asked Grace.

"They are not so difficult to keep as some other things. If kept in a jar of salt water, frequently changed, they will live and flourish nicely. If, however, from neglect, they become unhealthy, their intestines protrude from their mouth, and they turn inside out. If the water is renewed soon enough, they will turn back again, and assume their natural shape."

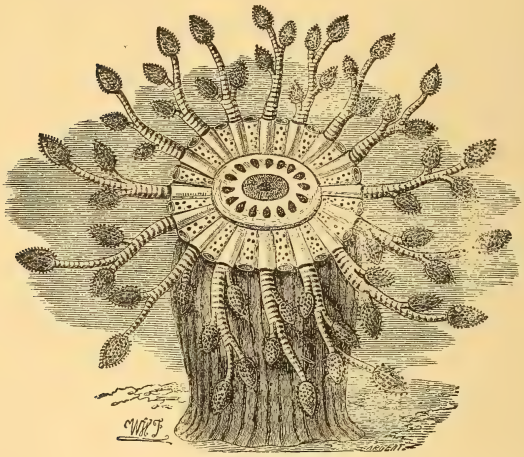
"I never heard so many queer things in all my life," said May.

"These animals have no eyes, yet the light affects them. If a light be held over the glasses in which they are kept, even though at such a distance as to communicate no heat, they close up and will not expand again until the light is taken away.

"A Frenchman once made several experiments on the rose-colored actinia. He cut off its tentacles, all of them, and they grew on again in less than a month. Then he cut the entire upper part off, but the animal entirely recovered its right proportions. He also cut one of them in two and offered a piece of a muscle to the detached part, and the limbs

eagerly seized it. They took it into the mouth and the animal swallowed it, it coming out at the opposite end. If the base of any of these flowers was cut, then the wound proved mortal.

"Here is another beautiful actinia I have to show you. This actinia has a cylindrical body, and its



ACTINIA.

tentacles look like those of the arborescent actinia, only they are shorter and more spread out.

"All the actinias are viviperous.

"In collecting actinias it is best to separate them from the rocks, by carefully introducing a board be-

neath, so that they may not be injured. They will flourish in glass vessels of sea-water, if the water is changed once a week."

"Is there no vegetable life at all in the ocean? Are all the flowers half plants, half stones; half plants, half animals?" asked Frank.

"There is the immense *algæ* and *fuci* classed in the vegetable kingdom, yet some naturalists believe that they, too, are animal matter built by the polypi the same as are sponges and coral. In fact, there is so little difference between sea-weed and sponges and corals that naturalists themselves are puzzled. But the bed of the sea is a garden of beauty even though all its wonders are full of life. It is like enchanted land — it is the fairy's world. Life in almost every form and color is there found."

"It would almost be worth any one's while to be a diver, if they could but catch glimpses of so many hidden splendors," said Frank.

"A half minute's glimpse would be only enough to provoke, instead of satisfy," said May.

"But Mr. Dumas, is not there a diving bell in which a man can go down to the bottom of the sea and remain for whole hours, breathing with full

lungs and walking about as if perfectly at home?" asked Frank.

"O how splendid!" exclaimed Rose, clapping her hands.

"Life can be sustained for several minutes under the diving bell; but the best armor is a reservoir of compressed air which the diver may buckle on his back, then with a system of nicely-arranged rakes and a double tube of India-rubber fitted over his mouth makes respiration easy, even down into the depths of the sea. The apparatus may also be fastened to a supply pump. A strong man may thus remain under the sea for an hour or two."

CHAPTER VIII.

REVELATIONS OF THE MICROSCOPE.

Pat came running up to the house the next day, followed by the children.

Well, Pat, what have you in your tin cup? asked Mr. Dumas, who was sitting with Grace upon the front piazza.

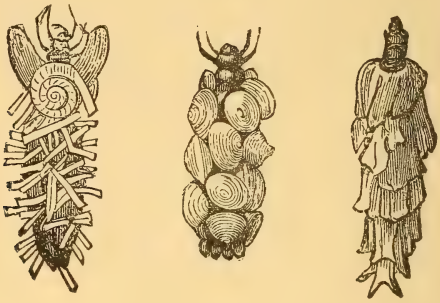
"Sure, sir, and that's just what I was wantin to know. They must be some kind of fish, yer honor, becase I found them in the wather."

"Everything is not fish that lives in the water."

"Sure, and I brought the craythers up to Miss Grace. She kin tell me, I know."

"O Tousin Grace, they're tunnin' little fish with shells, ticks and little bits of 'tones all ober 'em!" exclaimed Rose.

"Frank says he don't believe that they are fish at all," said May.

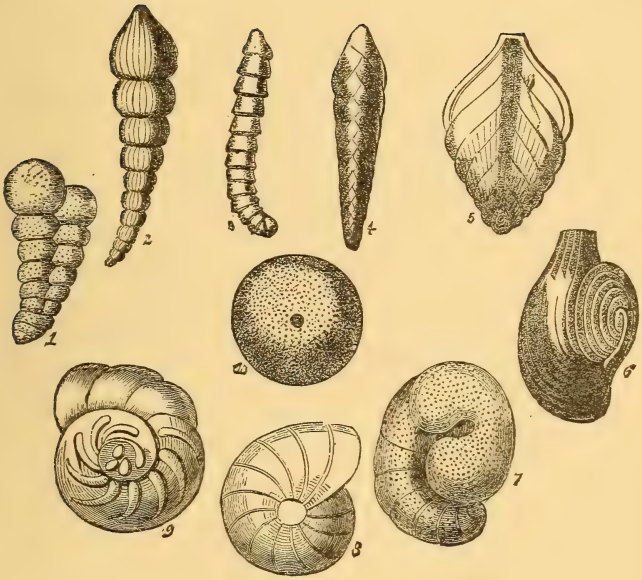


"Then what are they?" said Grace, taking the cup, and carefully examining the subjects.

"They look more like some kind of a worm," said Frank.

"You are right, for they are *Caddis* worms. They are the larvæ of the *Caddice* fly."

"Were they hatched with those shells and sticks on their backs?" asked May.



FORAMINIFERA (*Fossil Shells*).

"No, they made those cases for themselves. They are the houses which the little worms live in."

"How did they stick them together?" asked May.

"By silken threads secreted in their own bodies. The insect, in a perfect state, is a fly with four hairy membranous wings and long *antennæ*. They frequent marshy places, being very active in their movements, though awkward in their flight. They belong to the family *Phryganidæ* and to the order *Neuraptera*."

"If you will wait until I go to my room," said Mr. Dumas, "I will bring down a microscope that we may examine these little cases more minutely. One case is composed entirely of shells, another of bark, and this one of sticks and seeds," added Mr. Dumas, handing over the microscope to Grace.

Then the children took their turns at the glass, and were much entertained.

"Isn't there something else that we can look at through the microscope?" asked Frank.

"Why, yes, you can spend all day with it if you like. Here is a box of sand I would like to put under the instrument. It came from the sea-shore."

"Why," exclaimed Grace, "it is half shells; and to think that all these tiny shells once held a living occupant

"They are *Foraminifera*," said Mr. Dumas. "A name given to a group of tiny organisms having calcarious shells. They were, until recently, called microscopic *Cephalopods*, but are now regarded as *Protozoa*, the pores in the shells being for the tiny occupants to thrust out their delicate filaments in order to take in their food or to aid them in locomotion. Recent *Foraminifera* are beautiful subjects for the microscope, but they are found more plentifully in the fossil state. In the fossil state, these tiny shells may be found in rocks of all formations. The grandest city in the world is said to be built of them, since they constitue the stones of which the city is built. Even the pyramids of Egypt are said to be composed of these *Foraminifera*, massed together into the stone work, and there are mountains largely composed of just such tiny shells."

"Now, children, when you see the world is full of creatures that you cannot see at all without a glass," said Grace, "don't you think your lifetimes too short for the study of natural history?"

"The world is teeming with animal life even beyond the power of the most powerful microscope," said Mr. Dumas.

May took a pin, and tried to touch one of the little shells, which only appeared to be a grain of sand.

Rose watched her intently, then puckering up her forehead, said:

"How *tan* God make such *little* fings?'

"A mystery that has puzzled greater philosophers than we," said Mr. Dumas.

"I was about to show you," added Mr. Dumas, "what moves in water unseen, or unnoticed, since we have been talking so much about water-creatures in the few days past. Who will bring me a drop of stagnant water upon a leaf?

The children all ran to a little pool, but Pat was foremost with a cup full.

Mr. Dumas placed a drop on a single leaf, and placed it under the microscope.

"What *do* you see, Rose?" asked Frank, impatiently, as the little baby-student kept them waiting a long time for their turns.

"O, eber so many fings! There are fishes and worms, and little snakes and lots of jumpin' fings!"

"Well, let somebody else see these wonders," said Frank.

"What is that thing with a feather on the end of its tail?" asked May, when she got the glass. "It looks something like a wee bit of a lobster."

"Well, so it is. It is called *Cyclops Quadricornis*. *Quadricornis*, because it has four horns or *antennæ*, and *Cyclops*, because it has one eye. It belongs to

a genus of minute *Crustaceans*, and to the order *Entomostraca*. They may be found in clear or stagnant water, and are some of the animals which help to make the sea luminous. Now, let us cut off the tail of this little lobster, and place it under a reflecting microscope, for you see I have one glass just for very small objects. The feathers at the end of the two-pronged tail, are the *Cyclops*' fins or

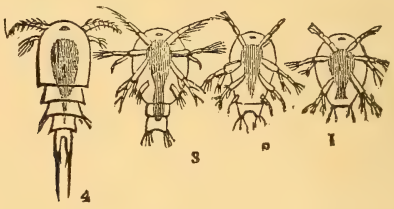
Cilia with which he swims. Now, do each one of you notice those two little purses on each side of the mother *Cyclops*' eggs, and if you will observe closely, you will see the *Cyclops*' young in several stages. They look like little crabby bugs. The smallest one has just been hatched. Another, a little larger is eight days old; another, fifteen, and another more than a month old. You see the largest one is beginning to take the form of its mother.

Each one of the mother's bags contains as many as forty eggs. All of the *Entomostraca* are covered with hard, horny shells. Here is a *Cypris* which seems to be a tiny bivalve, for it has its body enclosed in a shell of two horny pieces. They have feathered legs and *antennæ* which serve them for fins and *Cilia*. They are a very common species, and swim with great rapidity. Remove its shell

and you have an animal like this. Do you see that beautiful red object? That is a *Daphnia*, and it is a genus of mollusks belonging to the order *Brachiopodo*. This is always a favorite microscopic object."

"Please, Mr. Dumas, are such little creatures as these any good?" asked May.

"Certainly they are; for nothing God has wrought is for naught. They are very useful in cleansing



stagnant water from decomposing matter. Nothing but mites, yet a mission to fill."

"Faith, sir, and I'd loike to ask what koind of craythers they are with the little wheels spinnin' around. They are the purtiest and the oddest of 'em all to be sure," said Pat.

"They are wheel-animalculæ or *Rotifiers*. There are a great many species. They belong to the branch *Protozoa*, and were placed by Ehrenberg among the *Infusoria*."

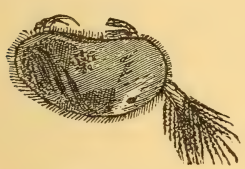
"What are *Infusoria?*" asked May.

"They are the animalcules which tinge stagnant water with green."

"And is it animals which makes the wather green? Sure, and I've wondered mony a toime where the green scum come from," said Pat.

"So have I," said May.

"Their nutriment consists of decayed vegetable and animal matter, hence why we find them in



stagnant pools of water. Their various motions are exercised merely for the purpose of obtaining their prey. The rotation of their wheels causes an eddy in the water, which attracts into its vortex animalcules which are swimming near. Then it contracts its tentacula, and has them fast. These *Rotifiers* may be kept for months out of water, appearing like a little round grain of sand, yet coming to life and motion on being replaced in water. These wheel-bearers frequently change their

shapes. They can withdraw their wheels at pleasure and become a globule. I have seen an animalcule called the *Protean Vibrio*, which first had the appearance of a tiny graceful swan. It changed its form many times. Sometimes it would draw its head and long neck entirely out of sight, and take the form of a cone, then it would throw out a wheel and appear to be a *Rotifier*."

"Does it belong to the same species as the wheel-bearers?"

"It belongs to the branch *Protozoa*, the same; and are ranked among the *Rhizapoda*, which move by minute tentacular filaments."

"I see some little green balls moving about in the water. What are they?" asked Frank.

"*Volrox Globators*. They roll over like a ball,

spin like a top, or glide along. They seem to be studded with a great many green spots which are surrounded with tiny hairs or *Cilia*. These spots are globulets which contain their young. When they are properly matured, the exterior membrane bursts, and the little ones begin an existence of their own."

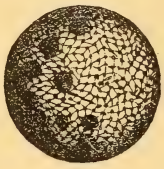
"Mr. Dumas, what are these things on this leaf?" asked Frank.

"Those are *Hydræ* or *Polyps*. They have a long tubular body fixed at the base, and their mouths are surrounded by arms or tentacles. They are cer-

tainly one of the most wonderful productions of nature. The long-armed and green *Polyp* will speak for the whole class. They affix themselves to the under parts of leaves and to the stems of vegetable matter that grow immersed in water, and feed upon small worms for the most part, and swallows them leisurely, though they may be three times larger than themselves. Sometimes two *Polyps* com-

mence swallowing the same worm, one commencing on each end until their mouths meet, then the largest *Polyp* gapes, and swallows his foe and all; but, instead of suffering any by the process, he remains in his brother *Polyp's* stomach for an hour, when, strange to say, he comes out unhurt, and very often with the prey which he was contending for."

"If I iver heard the loikes of that, sure, in all my born days!" exclaimed Pat, throwing himself down



and rolling over and over with laughter, which he was joined in by the others until the tears rolled down their cheeks.

"Sure, now!" said Pat, again.

"Another very astonishing thing about these little creatures is, that if they are all cut to pieces, not only the parent-stock will remain uninjured, but every piece, though there are hundreds, will become a distinct animal. The head of one species may be

engrafted on the body of another, forming one creature. Both tails may be cut off, and the two head portions of the animal be engrafted together and they will form one animal with two heads. These creatures are very active for most of the year, but when it becomes very cold all action is suspended, and they remain torpid until warmer weather comes."

"Were the *Hydræ* we were talking about as being the mothers of some of the little baby jelly-fish the *Hydræ* you have been telling us about to-day," asked May.

"Those were marine *Hydræ*. These are fresh water ones," said Mr. Dumas.

"Let me see if I can name over everything we

have talked of and seen to-day," said Frank. "First, there was the *Caddis* worm, then the *Foramnifera*, *Cyclops quadricornes* belonging to the order *Entomostraca*, and then the little baby *Cyclops*, the *Cypris* the *Rotifiers*, the *Volrox Globators* and the *Hydræ* or *Polyps*."

"That will do," said Mr. Dumas. "Now bound away to your play."

The children did not need a second invitation and Mr. Dumas and Grace were left alone.

"O, Mr. Dumas, how can I ever thank you enough, for the interest you have taken in the children?" said Grace, earnestly. "I am sure our lessons will grow dull when we take them up at home alone."

"It has, indeed, been a happy summer," said Mr. Dumas, "and I am glad if I have in any way helped make it so."