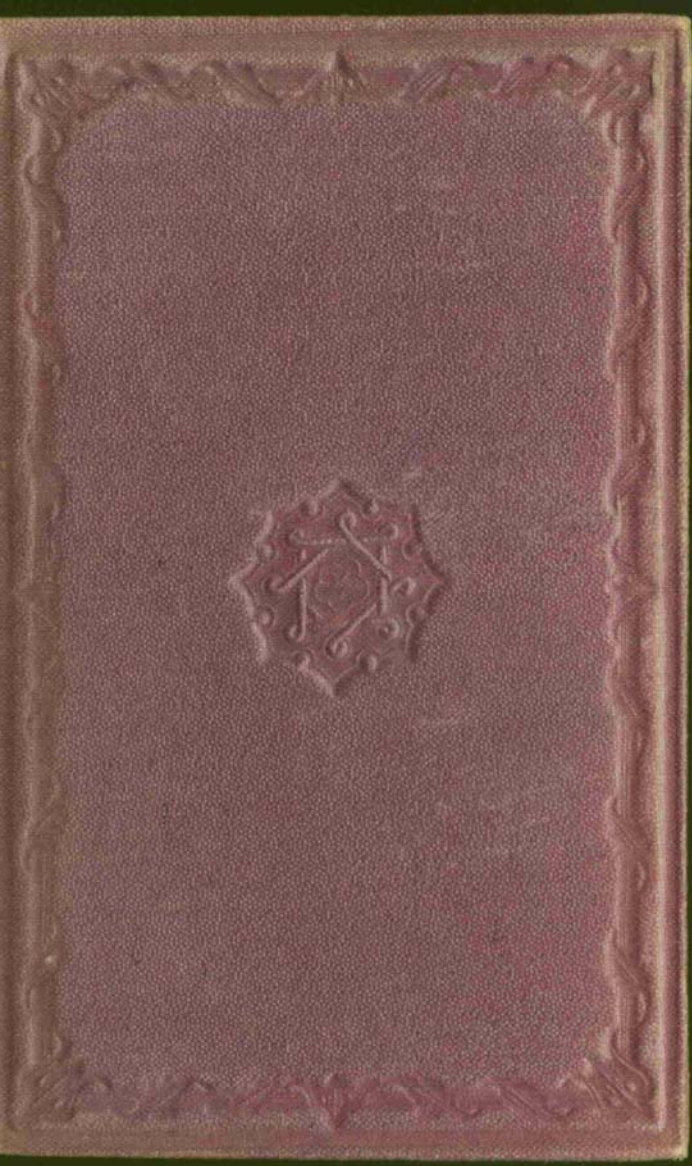


LAND

STILLS



UNIVERSITY OF CHICAGO PRESS



PRESENTED TO

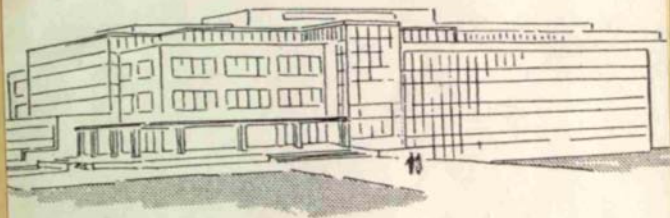
MICHIGAN HORTICULTURAL SOCIETY

BY

PRESIDENT T. T. LYON.

1887.

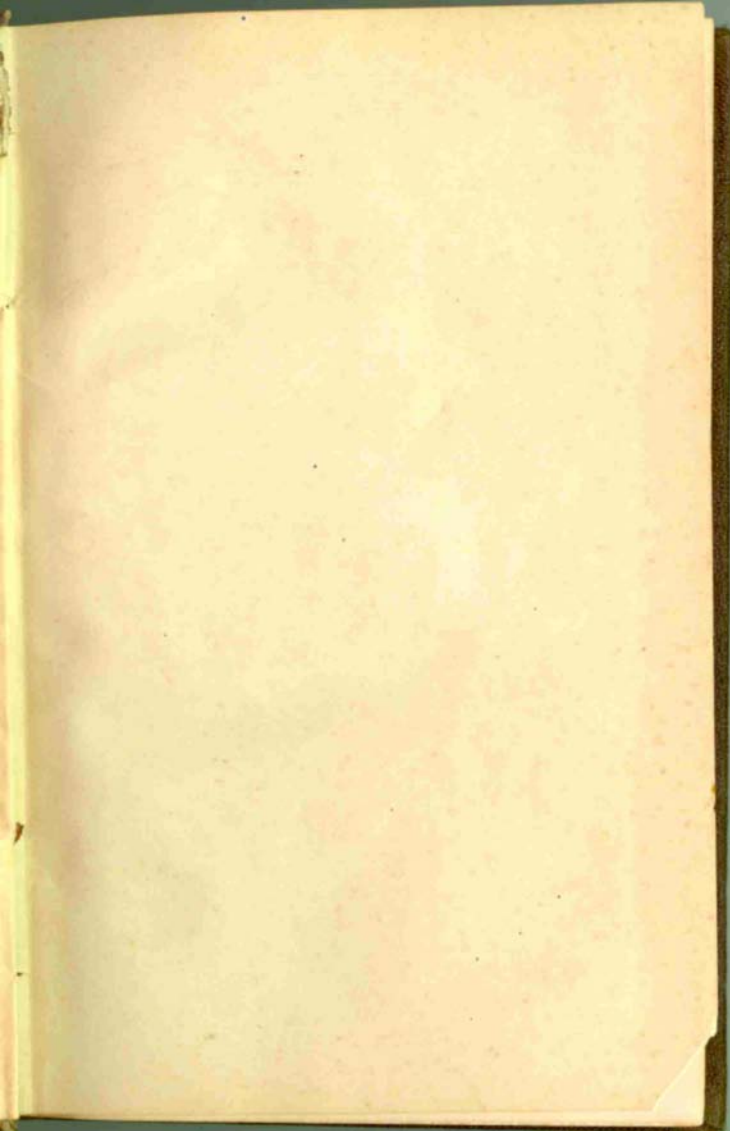
THE FRIENDS OF THE
MICHIGAN STATE
UNIVERSITY LIBRARY

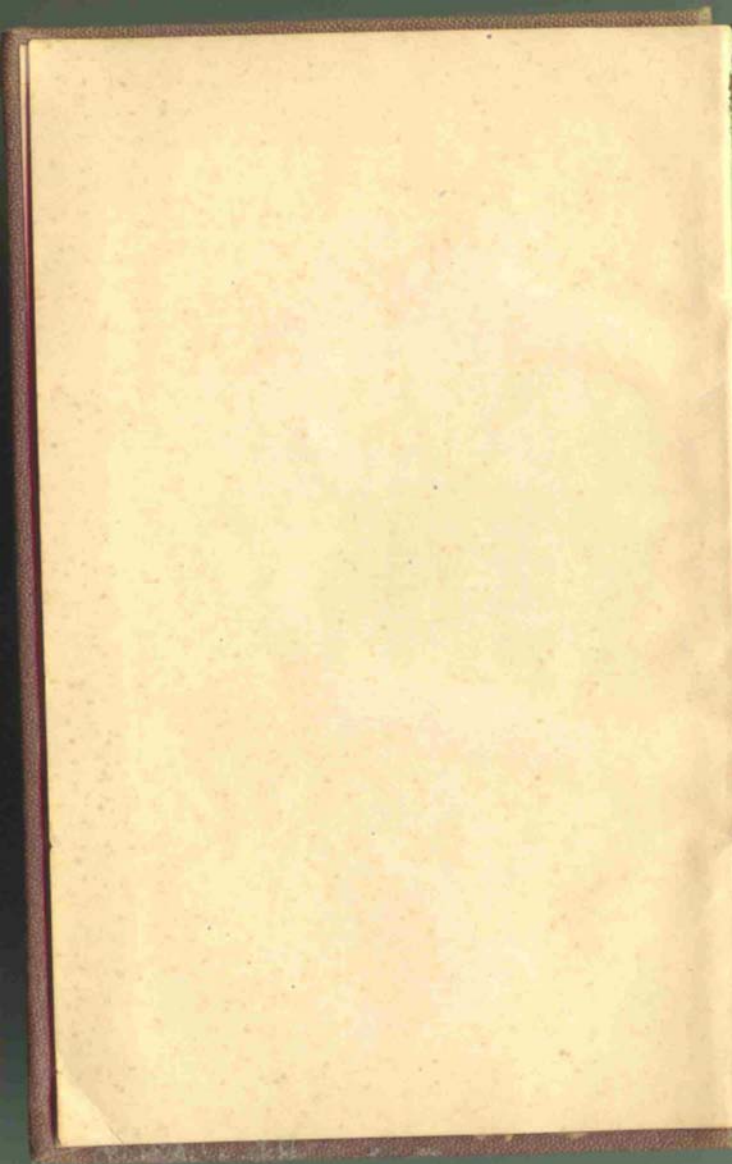


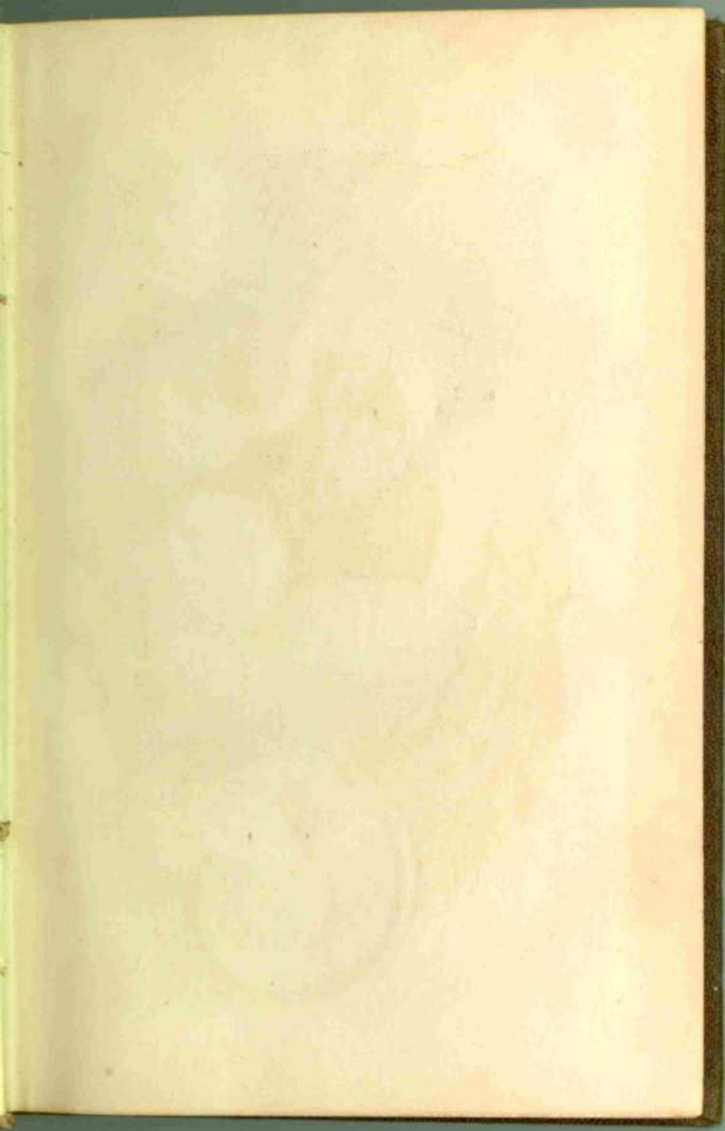
This book donated by

Thomas Gunson











RAMBLES

AFTER

LAND SHELLS.

"Why this longing, this for ever sighing
For the far-off, unattained, and dim,
While the beautiful, all around us lying,
Breathes up its low, perpetual hymn?"



PUBLISHED BY THE
AMERICAN TRACT SOCIETY,
28 CORNHILL, BOSTON.

Entered, according to Act of Congress, in the year 1863, by the
AMERICAN TRACT SOCIETY,
In the Clerk's Office of the District Court of the District of Massachusetts.

STEREOTYPED AT THE
BOSTON STEREOTYPE FOUNDRY.

P R E F A C E.

THIS book has been written to interest both adults and children in some of the least known wonders of God's skill. Land Shells, from the retiring habits of their animals, are little observed. The one or two kinds familiar to every person, are so common as to be little esteemed; and, in the dead, faded, and broken condition in which they are most often seen, have little of their original beauty. While on a few weeks' visit to Central New York, — a limestone region, — the writer gathered sixty varieties. Collected fresh, and arranged in a cabinet, they surprise every one with their diversified elegance.

Still, the shells of our temperate zone are homely in comparison with those of the tropics, which can be procured in exchange or by purchase. To illustrate the subject, a few tropical land shells have

been drawn and colored from nature for the frontispiece of this volume. Scattered through the pages are some of our own species. The *Helix*, with its animal, is copied from Binney. The reader, who pursues the subject, is referred to Binney's large illustrated work, and to a descriptive catalogue of American land and fresh-water shells by the younger Binney, soon to be issued by the Smithsonian Institution. Woodward's "Recent and Fossil Shells" is regarded as the best cheap manual of conchology in general. *

CONTENTS.

	PAGE
CHAPTER I.	
MOLLUSCA—HELIX PULCHELLA—CONCHOLOGY. . . .	7
CHAPTER II.	
AUNT FANNY—THE SNAKE—GATHERING SHELLS— THE MOIST PLACE.	13
CHAPTER III.	
THE SHELLS DISAPPEARED—CLASSES OF SHELLS— THEIR STRUCTURE—TEETH—GOD'S WISDOM AND GOODNESS.	22
CHAPTER IV.	
CLEANING OF SHELLS—HELICIDE—HELIX ALBOLA- BRIS—HELIX PALLIATA—HELIX TRIDENTATA— HELIX CAFFRA—ACHATINA—ACHATINELLA. . . .	33
CHAPTER V.	
ANOTHER EXCURSION—ANTS—EGGS OF THE HELIX —ENEMIES OF THE MOLLUSCA—HORNETS—PALISSY THE POTTER.	48
CHAPTER VI	
HELIX ALTERNATA—HOW THE SHELLS ARE MADE— SUCCINEA OBLIQUA—THE CARRIAGE DRIVE—THE SOLDIER—NO SHELLS IN PINE WOODS—BEES— HELIX PERSPECTIVA—HELIX FIDELIS—HELIX INTERTEXTA.	61

CHAPTER VII.

- VISIT TO GRANDPA RUSSELL'S—THE STEAMBOAT—
 THE VILLAGE—GRANDPA RUSSELL'S HOUSE—
 MONEY-COWRIES—LANTHINA—HALIOTIS—KEEP-
 ING THE SABBATH—PECTEN—EXCURSION TO THE
 WATERFALL—HELIX LABYRINTHICA. 77

CHAPTER VIII.

- DEAD SHELL—LIMNÆIDE—LIMNÆA APPRESSA—
 FRANK AND ARCHY—THE DUCKS—THE WATER
 SOLDIERS—THE SWEETEST THING IN THE WORLD. 95

CHAPTER IX.

- ELMWOOD—UNCLE HENRY AND AUNT LEDA—THE
 FISHERMEN—TRILOBITES AND AMMONITES—EX-
 CURSION TO THE FALLS—SEPTARIA—THE FALLS
 —HELIX HORTENSIS—RETURN TO ELMWOOD. 112

CHAPTER X.

- THE CABINET—BULIMUS FASCIATUS—LA BRILLANTE
 —GLANDINA—CYLINDRELLA—THE DISSIDENTING
 REGIMENT—WORK FOR THE ARMY. 133

CHAPTER XI.

- FOSSILS—FROGS—THE MORNING—BROOK SNAILS. . 149

CHAPTER XII.

- PHYSA VINOSA—PUPA DECORA—THE THUNDER STORM
 —SNAILS IN WINTER—SEA SHELLS—PLEASANT-
 NESS OF THE STUDY. 159

RAMBLES AFTER LAND SHELLS.

CHAPTER I.

Mollusca—*Helix Pulchella*—Conchology.

"MOTHER, what does *mollusca* mean?" asked Frank Russell, a boy of twelve years, who was inspecting the books in his grandfather's library.

"It means soft-bodied animals. Oysters and clams, slugs and snails, are mollusca."

"I thought oysters are called shell-fish."

"They are; but that name would not answer for all soft-bodied animals known as mollusca, because some have no shells, and others, having shells, live on the land."

"Shells on the land?" said Frank, turning

around. Do you mean those on the shore by the sea?"

"No, there are shells in the woods and fields. In England, they are found in the hedges, ditches, old ruined walls, in the gardens, and even in the cellars. Bring me the thin volume next the one at which you were looking, and you shall see what I mean. There," said she, turning to the plates of the *British Mollusca*, "are they not beautiful?"

"How I wish I lived in England!" he said, looking wistfully at them.

"What would you do?"

"I should go into the garden this minute, and bring you a handful."

"Well, Frank, go down by the brook, beyond the garden, and turn over any chance board that has lain there some time, and try what you can find."

Frank looked as if he thought his mother was making sport of him; but, seeing her in earnest, he ran with good speed, never stopping till he reached the green banks of the

little brook. A few scattered pieces of board were in sight. These he turned hastily over, then ran further to look among the potato hills; but in neither place was there any thing to reward his search, and he went back to the library disappointed.

"Not a mollusca on the premises, mother."

"A *mollusk* you mean. Mollusca is plural. Do not be too sure till you have learned to use your eyes. Let us see if mine can help you." Frank gladly brought a sun hat to his mother, and followed her through the winding paths till they reached the brook.

"Here is a promising place," said she, carefully turning over a brown, decayed piece of board that lay imbedded in the grass.

"Well, I see nothing yet but some wriggling worms and little bugs running about," said Frank.

"Look here, and here, and there!" answered his mother, gently taking up certain white specks, one after another. In a moment he was down on his knees, picking away at the

white specks too; and soon, with a cluster in the palms of their hands, they sat together by the side of the brook.

"They are small enough — too small to put in a book, any way."

"But not too small for God to make, my dear child, and to make with wonderful delicacy and beauty, too. Here are some which I will put upon this green leaf, and lay in your hand. Now examine them with the magnifying glass."

"White trumpets, mother! Lines as fine as hair drawn all over them! They are as thin as glass, too!"

"Keep quite still a few moments, and then tell me what you see."

"Hurrah! Here are the mollusca! Little white fellows with horns on their heads, nodding all about to see where they are. There they go back again into their round doors. Why did they shrink back that way all in a second?"

"Because you moved your hand. They

withdraw into their houses for protection, and very far too, you see."

"Let me draw one out with a pin."

"No, Frank, you could not do it. He pulls back so stoutly that you would break the shell, and it would be cruel to tear the little fellow to pieces in that way. We will see about getting him out another time."

"Come, little white trumpets, give us some music."

"Call them by their own name."



"What name, pray?"

"Helix Pulchella."

Il. Pulchella magnified. "That sounds like Latin, mother," said Frank, laughing; "but I have not gone so far as that, or, as the boys in school say, 'it is not in my book.' Why such a long name for the wee things?"

"Pulchella means pretty. Helix means that the shell is spiral or coiled."

"That's not a bad name, after all. And now what shall I do with them? for I think they are too pretty to throw away."

“Put them in a box with the written name, if you like. You can add to them to-morrow, if you fancy going with me and aunt Fan to the woods near the lake in the morning.”

The proposition delighted him, for, of all places, he loved the woods best, and now his curiosity and interest were excited. He carried his new treasures to the library. Grandpa was there reading, and to him he enthusiastically described them. The latter listened good-naturedly, while running his fingers through his snow-white hair till it stood on end; and when the boy finished, his black eyes twinkled over his spectacles.

“Getting to be a conchologist, eh?” said he.

“No, sir. What is that?”

“There is Webster’s Unabridged. Look it out, and you will remember.”

There it was — a long word: “Conchologist. One who studies the nature, properties, and habits of shells and their included animals.” And the next word caught his eye: “Conchology. The science of shells and the animals that inhabit them.”

CHAPTER II.

Aunt Fanny — The Snake — Gathering Shells — The Moist Place.

THE next morning, Frank awoke at dawn. The birds were singing so loudly among the trees on the lawn that he could not go to sleep immediately. And then so many pleasant thoughts of the intended excursion came into his head that dozing was no longer possible, and, for once, he rose with the sun. It seemed a long time till the family gathered in the breakfast room. When they did, he had so much to say about the woods, the sunshine was so cheerful, and the morning so breezy and cool, that all agreed nothing could be pleasanter than to have a family picnic on the lake shore. Accordingly, when breakfast was finished, and grandpa had read a chapter of the Bible and prayed, and they had sung a morning hymn, as the birds had sweetly done

four hours before, the family separated to make ready for the intended trip.

Grandma and aunt Fan (nobody called her Fanny) filled a motherly basket with sandwiches, biscuits, tarts, and coffee, while Frank went off to the stable to see the horses duly harnessed and hurried to the door. In an hour, all were seated in the carriage except Fan and Frank, who, with the basket of sandwiches, chose to follow in the chaise.

What a pleasant drive that was through the shady streets, out between the green fields, past the camp where the soldiers were drilling, and two or three miles beyond, along the shore of the smooth blue lake! There were the old wintergreen woods, where school girls of two or three generations had picked berries and botanized, but which, at last, were being encroached upon by fields full of long, straight furrows, that pointed toward the woods, rich with the prophecy of coming harvest.

Frank and his mother followed a winding

path that led from the edge of the wood to a denser part, down in a ravine. They stooped and dodged the low branches, parted the interlacing boughs, stumbled over sticks, and slid among the leaves till their shoes were slippery. Fallen trunks of trees lay here and there, covered with moss, or crumbling to pieces. Frank was a city boy, and, though he had enjoyed rambles in the woods before, he had never found occasion to make acquaintance with the inhabitants. Both he and his mother began to search the decaying stumps with a certain caution, as if, possibly, they might contain something less welcome than a mollusk. Each with a stick broke away the decayed edges, looking carefully all the time. Frank lifted the leaves and pieces of bark in the hollow, and there, snug as a mouse, lay a round, dark shell, with a white mouth, like the top of a gothic window. The woods rang with a shout at his success. His mother smiled, and went on picking out from beneath the bark some little shells, hardly as large as

a pin-head, thin and shining. These she tied in a corner of her handkerchief, for they had forgotten to bring a basket. Nothing more was to be found in the top of the stump; so they lifted the moss and leaves near the roots.

"Here is another, and another!" and two more of the gothic shells were taken prisoners. The stumps each side of the path were successively inspected, yielding more of the brown and several small shining ones. In a hollow, nicely couched on a bed of damp moss, Frank found a large yellow-brown shell, with a white rim around the mouth. His mother added one more like it, which she picked up from among the leaves near the path. Just beyond was a mossy old stump, in which she found nestled a very small mollusk, that had a white bar across the entrance. Frank thought it would be as hard for the animal to creep out as for any living thing to get in.

"What is the name of it?" he asked.

"When we are at home, we will find out all about it," was the answer. "Here is a

promising bit of bark and moss;" and, lifting it up with the stick, there was a tiny cavern, just fit for a mollusk to live in. A small coiled snake lay there fast asleep. It did not stir, and Mrs. Russell covered it again quickly, and dropped her stick with an exclamation of disgust.

"Let me kill it," said Frank, advancing with a flourish.

"No; there is room enough in the woods for it and us too. It is of a harmless kind."

"But snakes ought to be killed."

"We did not come to make war on the rightful inhabitants of the woods. We have come only to learn about some of the wonders of God's creation, and to study the habits of the living things that are so often passed by unseen. Let the snake finish his nap."

Aunt Fan was now calling them, like a ventriloquist, in all manner of voices; and, thus reminded that it was already long past the usual dinner hour, they went back to the group seated under the trees, at the edge of

the wood. It was a pleasant spot. On the right, at some distance, was a quaint old house, with a deep dark ravine behind it, and a great hedge-bound lawn in front. On the other side, lower down, a gray-roofed campanile tower rose amidst deep-green oaks and chestnuts. These wholly hid the church to which the tower belonged; but it was pleasant to know it was there, and proof that the dwellers on this peaceful shore were not forgetters of God.

Before them a green field sloped to the yellow line of the winding road. This was skirted by trees and trailing wild grape-vines, with old twisted trunks that might entitle them to the name of grape-trees. Openings, here and there, gave bright, near glimpses of the lake and over their tops the blue water stretched away to the misty hills in the distance.

“How beautiful it is!” said Mrs. Russell, glancing at the sunny picture and at the gypsy-looking group near by.

“What have you found? Let us see,” said impatient Fan. Whereupon Frank began to empty his pockets into her lap.

“What ugly-looking things! Ugh! Horrid!” she exclaimed, turning them back into his hands as the animals began to thrust themselves out.

“Don’t you see that big fellow walking off with the shell on his back? Mother, come and see! Here is an animal so far out of his house that he can not get in again. Shall I keep the shell, and let him walk back to the woods and get another?” She could not help laughing this time.

“It does not leave the shell at all unless it dies. Would you take off a mud turtle’s back, and tell him to go and make himself another?”

“But see, mother; it can never get in again. It is now as long again as the shell.”

“Yet it is able wholly to shrink back, if hurt or alarmed. The good Maker did not

forget to provide means of protection in danger, even for the humble snail. It can not run quickly and hide under a stone, like a bug; but God has given it strong muscles, by which it can pull itself back into its house when frightened. Put them away now. Grandma is waiting."

When the picnic dinner was over, and grandpa had lounged long enough on the carriage cushions and shawls, and gazed up at the sky and at the fleecy clouds sailing about, and when grandma had gathered the remnants of the dinner, that nothing should be wasted, and aunty had seen the dishes snug and safe in the basket, they all strolled slowly down to the road, and then along to the shady place where the horses stood, patiently waiting to go back to their own picnic in the fields.

It was sunset when the party reached home. Frank was tired, and glad to put away his shells, without asking any more questions. He remembered that his mother told him

they lived only in moist places, and, thinking to make them comfortable for the night, he filled a goblet half full of water, turned them all into it, and set it on a shelf in the book-case, closing the glass doors tightly, to insure the safety of his treasures.

CHAPTER III.

The Shells disappeared — Classes of Shells — Their Structure
— Teeth — God's Wisdom and Goodness.

"WELL, mother," said Frank, full of indignation, the next morning after breakfast, "somebody has been mean enough to take away all my shells but three."

"Where did you put them?"

"In grandpa's book-case."

"We will go and see," returned Mrs. Russell, believing there was some mistake.

"Here are all that are left," Frank said, taking down the goblet.

"Did you put the poor things in water? These creatures are not made to live in water. We found them in damp, shady places, not in a brook, nor in a lake. Why, my son, they have climbed out of the glass, and run away themselves. There is one!" she pointed to the inside of the casing, nearly at the top.

"There is another, on the back of Hume's History. Do you see the shining trail wherever they have crept?"

By these marks, the astonished boy traced them behind the books, in the shelf corners, on the piles of pamphlets, and on the wood-work. They had evidently done their best to find their way back to the woods.

"This mishap will help you remember what I intended to tell you this morning. Bring the shells to the table, by the window."

While he gathered them, his mother went for those she had tied in her handkerchief, and came back laughing at her own misfortune — the small shining shells being broken into atoms.

"Never mind; we shall both do better the next time, and have learned, at least, to take a basket and small box lined with cotton, when we go again."

"And not to put them into water when we come back," added Frank.

"Unless they are fresh-water mollusca,"

his mother replied. "And now the first thing I wish you to remember is, that the mollusca are divided into six classes. We will talk now of three only. These are named from the way in which the mollusks move. The first is CEPHALOPODA. Where do you suppose their feet grow?"

"Out of their legs," answered Frank, smiling.

"No; out of their *heads!*"

Frank began to laugh; and the more he thought about it, the more he laughed.

"They must look like the pictures in Punch," said he.

"Oh, no. They are pretty enough. The feet or arms grow in a circle around the head, and enable them to swim rapidly. The name is given from two Greek words, meaning head-footed. The second class is GASTEROPODA. Where do you think their feet grow?"

"I can not guess."

"From the stomach!"

"Then they walk flat on the ground!"

said Frank, laughing so heartily when his mother assented to this, that aunt Fan came to see what had happened.

"The word Gasteropoda means stomach-footed," continued his mother, "and these shells are called crawlers. The next, the third class, is PTEROPODA. This means wing-footed. The pair of wings grow from the sides of the head."

"Do they fly, like butterflies?"

"No; they live only in the sea, and swim by means of these wings or fins. Most of them have no shells, and float about, attaching themselves sometimes to sea-weed. Now, to the three classes I have named belong all the univalves, or shells composed of one piece. How many valves, or parts, have your shells?"

"Only one."

"Then they are univalves, and belong to one of these three classes. Do the animals move themselves by arms or feet growing from the head?"

"No, indeed," answered Frank, watching one as it crept about the table.

"Then they can not be classed under Cephalopoda. Have they wings growing from the head?"

"No, ma'am," laughed Frank, "they are too fat for fairies."

"Neither do they belong to the Pteropoda. Do they crawl?"

"So they do!" exclaimed Frank. "I have it now, mother; they belong to the class Gasteropoda."

"You are right. And the largest portion of the sea-shells you have seen are in this class. But this second class, Gasteropoda, or crawlers, is divided into four orders, because their breathing organs are differently placed and differently made. The first is Prosobranchiata, meaning gills in advance of the heart. But where do you suppose the gills are placed?"

"Like fishes?"

"No. On the back of the head! And

these are all made to live in the sea. Those of the third order are called Opisthobranchiata, meaning gills situated on the back and sides, in the rear of the body; and the fourth order, Nucleobranchiata, in which the gills are placed on the back, belong also to the sea. We will not learn about them till we go back to live by the sea."

"But, mother, I do not see any gills in these mollusks. Do they belong to one of the orders?"

"They have no gills."

"Can't they breathe?" asked Frank, a little puzzled.

"Yes, they breathe air. You found out last night that they do not breathe in the water."

"Now I understand!" exclaimed Frank, in delight. "Things that live in the water have gills, like the fishes. But what have these snails to breathe air with?"

"What have you, Frank?"

"Lungs."

"So have the snails."

This time Frank sprang out of his chair with such a loud exclamation that aunt Fan brought her work into the library to hear what seemed so wonderful.

"Think of that, Fan," said he. "Those homely things, that you thought 'horrid worms,' have lungs."

"And heart," added his mother, "and liver, white blood, eyes, mouth, tongue, and teeth."

"How could all those be put into a snail?" asked Fan, soberly.

"There are snails not larger than a thread, that have all these organs perfect," said Mrs. Russell. "God's skill is not like the poor skill of man in these things."

"You have not told me, yet, to which order these snails belong, mother."

"I gave you the names of the first, third and fourth orders, because they include the mollusks that live in the water. The land snails belong to the second order, Pulmonifera, which means, having lungs."

"I can remember that," said Frank, watching a large snail with his shell on his back, crawling about the table, close to the edge. "Here, my big fellow, you will fall off that precipice, and smash your house, if not your bones."

"Snails have no bones, you recollect," his mother said. "That reminds me of a verse in the Psalms which says of the wicked, 'As a snail melteth, let every one of them pass away.' Snails look large while active, but shrink to half the size when dead, and with a stroke of your hand or foot you can almost wipe them out of existence. Or, if left in their shells, they shrink up to a mere wisp, like a dead leaf. With all their beautiful organization, they do, indeed, melt away. Now, Frank, tell me, if you can, where the eyes are placed."

Both Frank and Fan examined a snail carefully, and declared there were no eyes at all, where they ought to be. Nothing but horns—four horns; two short ones,

and two long. They were told to take the magnifier, and look at the ends of the long horns.

"Here they are, mother, at the ends of the long horns. How odd! I should think they would get hurt, mounted up so high."

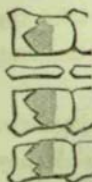
"Touch the long tentacles, or horns, as you call them, and see what protection the good Creator has given them," said Mrs. Russell.

Frank touched one softly, and in went the eyes, and down went the horns in a twinkling, just as you would turn a glove finger outside in. The eyes disappeared first.

"But, mother, suppose something should hit very hard, and spoil horns and all, would the snails be blind always?"

"No, if the tentacles were broken off, new ones would grow out again in a few weeks. The experiment has been tried many times."

"Where are their teeth?" queried Fan, now



thoroughly interested, and no longer shrinking from the touch of the restless things.

"On their tongues!" A hearty laugh greeted this information.

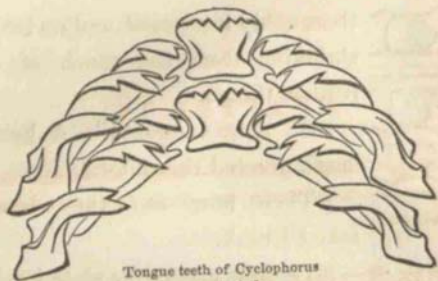
"Then how can they bite?" asked Frank.

"There is a saw-like plate behind the upper lip, with which they cut the leaves. The tongue is covered with rows of minute teeth, shining like glass, the points turned backward. These serve to grind the food, and carry it backward to the stomach."

"What wonderful little creatures, mother! I should think God would be tired thinking how to make them."

Tongue teeth
of *Achatina*
magnified.

"Man would tire, and fall far short of perfection, if he had the forming of them; but the Lord of all is infinite in wisdom and goodness. There is no limit to his power. Neither



Tongue teeth of Cyclophorus
magnified.

does he forget to provide for them, and for the birds and the fishes. Now you can understand better the verse you repeated the other morning at table, 'O Lord, how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches.'"

CHAPTER IV.

Cleaning of Shells—*Helicidæ*—*Helix Albolabris*—*Helix Palliata*—*Helix Tridentata*—*Helix Caffra*—*Achatina*—*Achatinella*.

MRS. RUSSELL did not think best to tell Frank any more about the shells till the next rainy day. Boys dread rainy days. They go lounging about, looking now and then out of the window, wishing they could see a patch of blue sky, and turn away, begging mother or sister to tell them what they can do the livelong day. You can imagine how pleased Frank was when he heard his mother's pleasant voice, one such dreary morning, calling him.

"Come, Frank! Come, Fan! I am going to be major-general to-day, and review my division."

"Are you going to play soldier, mother?" he asked, in profound astonishment. She did

not hear him, for she had disappeared down the cellar stairway.

"Is the review to be in the cellar?" said Fan, running to the door just in time to see Mrs. Russell coming up, with a deep dish containing cabbage leaves, and having a fine wire cover.

"You are the sutler, instead of major-general. If you have any thing nice to eat under those cabbage leaves, I hope you will count us as officers, and entitle us to a share," said Fan.

"Certainly. Try one now," replied her sister, lifting the cover and the leaves, and displaying the contents—a cluster of mollusks who thought they had been hiding under a great plant in the woods all the time. Fan gave a little scream.

"Ho! ho! those are the soldiers, are they?" cried Frank. "Patter away, rain! We'll have a good time within." And he followed his mother to the kitchen, where the tea-kettle was steaming away like a small loco-

tive. She removed the shells from under the leaves, placed them in another dish, and, before Frank could think what she was going to do, she had poured the boiling water over the mollusks. Every snail instantly disappeared in its shell.

"Oh, mother, did not that hurt?"

"Conchologists tell us these do not feel pain. You saw me destroy them in the quickest way possible, and it is necessary to do so, else we could not remove them from the shell. I heard a little boy propose the other day to pull them out with a pin!"

"So I did!" answered Frank, wondering at himself.

When the water had cooled, Mrs. Russell carried the dish into the library. Of course Frank went also, and Fan was willing enough to join them with her sewing. Mrs. Russell took a piece of wire, bent in one or two coils, and began to remove the animals, which came out quite easily after being well hooked on the wire. Frank attempted one with a bent

pin, but ran it through the shell in two or three places, and, finally, broke the snail in two, leaving part in the shell.

"You can not clean the shell rightly now, and the odor will trouble you in a day or two. My plan, you see, is the best."

"There he comes!" said Frank, watching his mother take out one of the snails. "How pretty the colors! — white, cream-color, dark gray. It is coiled exactly the shape of the shell. Do look, Fan!"

"That is the stomach of the animal which remains wound in the shell. The rest of the body protrudes when the snail is in motion, and is drawn back by a network of muscles which line the whole slimy covering or skin of the animal. This skin is called the 'mantle.' There is a strong muscle in the foot, also, fastened to the shell inside, and by means of which the snail draws itself back in its house, so stoutly that you would not be able to pull it out."

"I can see no foot, mother."

"Nor I either," added Fan, tipping over a snail.

"The whole under surface, or part that creeps, is called the foot."

"I should like to see your army perform a 'double quick' with such feet," laughed Fan, mischievously.

"Stop a minute before you laugh, Fan. You will see, presently, what an orderly army we can muster. You remember, I am to command one division during this summer's campaign, which I told you should be gasteropoda."

"Oh, yes. Crawling soldiers!" said Frank.

"And you remember the class gasteropoda is divided into orders, which shall be our brigades. The brigade we have chosen for close inspection is named pulmonifera."

"Air-breathers, that means," interrupted Frank. "Three cheers for the air-breathing brigade!" and he would have shouted in earnest, if his mother had not cautioned him to wait.

She continued, "This brigade, or order, is composed of several regiments, which conchologists call 'families.'"

"Do they carry a regimental flag?" asked Fan, who had forgotten to sew.

"You may have it so, if you like. The first regiment, or family, may inscribe on its flag the word *Helicidæ*, which means the family of coiled shells. So you see they are all related to each other. And now we will inspect the first company of this regiment. Company A! *Helices!* Why, Frank, where are they?" said his mother, after waiting a moment.

"I don't know," he replied, with a blank look.

"Right before you, on the table. All the shells we have yet found are named *helices.*"

"But, mother, these are not alike. Here is a small one, there a large one: some are yellow, and some brown."

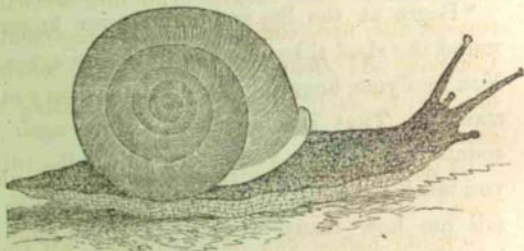
"Ah, yes," she answered; "the people who study shells found that out long ago, and

divided them into squads, which they call 'varieties.' Select those you think alike, and then we will find out their names, just as you would find out which was Johnny Grey, and which was James."

Accordingly, Frank, with Fan's assistance, separated the shells in clusters.

"What is the name of this helix, mother?" he asked, holding up the largest.

"Helix Albolabris."



Helix Albolabris.

"And what does that mean?" He turned it over and over, to see why it had so long a name.

"Helix, I just told you, means a coil. Albolabris means white-lipped."

"Is that white rim the lip?" queried Fan.

"Yes. The open part of the shell is called the mouth, and the edge of the mouth is the lip, which, in this case, is reflected, or turned back. The white lip is in pretty contrast with the yellow-brown shell. Notice, too, the fine lines that curve over the whorls, more perfectly than any graving tool could make them."

"I do not know what you mean by whorls."

"Begin at the lip, and move your finger round the shell till you come to the lip again. You find your finger higher up than when you started. That is one whorl. Move again, counting each time you return to the lip, till you reach the apex, or top of the shell. Now, tell me how many whorls has *Helix albo-labris*."

"Six!" answered Frank, triumphantly.

"How many has this?" asked his mother, taking up one which had reminded them of a gothic window, when in the woods. He counted as before.

"Five. But how rough it is! Shall I get a brush and rub it off clean?"

"Take the magnifier, first, and see if it needs cleaning."

"It is covered with little points and hairs!" he presently exclaimed.

"Which possibly gives its name; 'Helix palliata,' meaning cloaked," added Mrs. Russell.



Helix Palliata.

"A fur cloak, I should think," was Fan's suggestion, after examining it.

"We shall have to spoil our gothic window name," continued Mrs. Russell, "by calling the lip three-lobed. The points where the arches meet are named teeth; and the white bar at the entrance is an oblique tooth. There is

another shell that looks much like this. Can you tell me the difference?"

"It has a fur cloak, a white lip, and teeth, just like the other," said Frank.

"Look again."

"It is smaller."

"I see! I see now! It has a hole on the under side."

"You are right. 'Umbilicated,' the book says. The whorls wind around, leaving an opening in the center. The shell is called 'Helix tridentata'—three-toothed."

Mrs. Russell now laid the shells in a bowl of warm soap-suds, and, with a camel's-hair brush, cleaned them carefully, rinsed them in clear water, and laid them down to dry. Fan went to look for a box and some white cotton to place them in for safe keeping.

"I think I like shells better than flowers," said Frank, while waiting. "Why did Jesus never speak of them? He talked of fishes, birds, beasts, and trees and flowers."

"I suppose because the people were famil-

lar with the objects of which he spoke, while many, perhaps, had never noticed a shell, just as you had not till a few days ago. Syria, too, is a dry country, and probably shells do not abound there."

Fan presently came back and herself arranged the shells on the clean white cotton.

"They are really pretty, now, I own. I won't laugh at you any more when you go hunting in the woods for them."

"If you laughed at our interest in searching for the mollusca, you would also have to laugh at people whom you greatly admire. Dr. Livingstone, whose Explorations in Africa interested you so much, has already sent home many fine specimens of land shells. The Oregon and Colorado expeditions, over which you were enthusiastic, were accompanied by scientific men who collected natural history specimens for the Smithsonian Institute in Washington. There you can see what shells are found in all parts of our country. Persons are employed, in many parts of the world, by

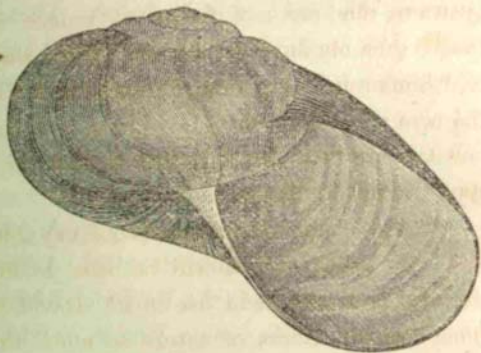
Professor Agassiz, to collect shells for his Museum of Natural History in Cambridge. He has already an immense cabinet. Then there is Madame Pfeiffer, whose energy you admire. She did not fear to venture among the cannibal Fijis for the sake of gathering plants and shells; and, when she was driven from Madagascar, although very ill during the journey, she did not forget to induce the natives to obtain them for her by the way."

"I give up! I give up!" exclaimed Fan. "I confess I laughed in ignorance, and, with such an array of my favorites against me, I promise not to despise the snails again."

"It is safe and wise not to despise any thing God has made. You will be sure to find beauty, and order, and use in it. David rejoiced in the works of nature so much, that he could not praise God enough without calling on the mountains, hills, trees, the birds, beasts, and all creeping things, to help him sing, Glory to God; and even tells little children to praise the Lord for his wondrous works.

So I think, if either Solomon or David were here, they would tell us that it is a good thing to search the woods and fields, and know the wonders they contain."

"Sister Annie, you said, a few moments since, that Dr. Livingstone had sent home African shells. Do they differ as much from ours as the plants and trees?"



Helix Caffra.

"Yes. They are much larger, and are more highly colored. I have seen a helix sent by him measuring three inches across. The color is green, in three shades, banding the

whorls in the same direction with the striae or fine lines, such as we noticed in *Helix albolabris*. There is another shell which belongs to the family *Helicidæ*, but does not march in the same company with the *Helices*," she added, looking at Frank. "The company, or species to which it belongs, is called '*Achatina*,' meaning a gate shell. One African variety grows to the length of eight inches. That is longer than my hand. Think of a great snail with such a house as that on his back, climbing up a tree to get his dinner!"

"And are there no such shells in this country?" asked Frank, wistfully.

"None so large. It is properly an African species. There is a little shell called '*Achatinella*,' very abundant in the Sandwich Islands. They are red, green, brown, yellow, or white, and are banded in a countless variety of ways; a narrow line of black winding in the same direction with the whorls. Sometimes there are several lines. The son of a missionary, who was interested in collecting these little

shells, told me he used to dig in the ground for them. Many times he found them on the trees, tracing them by a humming noise which they made."

"That would suit me, precisely," said Fan.

"Can we find shells on the trees, mother?"

"Yes, sometimes. At the West they have been found thus. If you look on the under side of leaves, upon the lowest branches, you may make a discovery now and then."

"When shall we go and try — to-morrow?" begged Frank.

"The ground would be too wet to-morrow, even if the sun shone. Snails do not like the wet ground any better than we. They take an airing when it is damp."

"Then day after to-morrow, if it is pleasant," urged Frank.

"Yes, that will do." And, with this decision, Mrs. Russell put away the shells, and went with her sewing to visit with her mother.

CHAPTER V.

Another Excursion—Ants—Eggs of the Helix—Enemies of the Mollusca—Hornets—Palissy the Potter.

IT was during the month of July that Frank and his mother were making excursions into the woods. Could they have spent April and May in the country, better success would have rewarded their search for shells. The snails wake from their long winter's nap, and come forth plentifully in the cloudy days of spring. They are then full grown, and are found most perfect. The dryness and heat of summer cause them to hide in the earth, or in the moist secluded places, where there is an abundance of shade and moisture. Mrs. Russell knew this, but was unwilling to wait for better opportunities, which might never come.

On the appointed morning, therefore, she was ready to go with Frank. He had been

waiting almost an hour, while his mother assisted Fan in her usual employment. He soon found a pleasant reason for this, for, when they were ready, there stood Fan with her flat, looking as if she meant to go, too.

"Are you really bound for the woods, aunt Fan?" said Frank, hardly believing his eyes.

"Too true," she replied, soberly.

"Good!" That was all he said, but it was a hearty welcome, nevertheless. So they went together down the long farm-lane, that led between fields of grain. The reapers were already at work there. The lane ended at a road which divided the grain fields from a hilly pasture. There was a deep cut through this pasture, at the bottom of which a brook spread itself broadly over the pebbles, and was then gathered into a narrow way between grassy banks, and glided into a pond in a field beyond, where the frogs sunned themselves all day, and croaked all night.

Cows, spotted and plain, red, white, and black, long-horned and ugly looking, or mild-

eyed and patient, were scattered over the pasture, browsing or standing, idly whisking their tails. This pasture was to be crossed before reaching the woods beyond. Fan could not be persuaded to run this gantlet. So, after consultation, they walked further along the road, and climbed through the bars into a field which seemed to be planted only with thistles. Fan sighed over the heat, the cows, and the thorns, and Frank rubbed his ankles and condoled with her over the rough road to knowledge. At last they reached the boundary fence. Frank went over at one leap; his mother followed, clumsily; and poor Fan, jumping from the top, fell full length among the leaves and sticks. They began immediately a thorough search.

“Come and see what is under this stone!” Frank shouted. Truly enough, there was a snug little family of insects as large as flies, with the prettiest blue, shining wings that could be imagined. They ran about when the light poured in upon them, knocking their

heads against every little lump of dirt, in vain efforts to hide. Frank put the stone back, and Fan told him she had no doubt they were gossiping now about the strange event, and congratulating each other over their narrow escape.

"Why are you tearing off the bark from the stumps, Annie?" she asked.

"To find shells."

"Are there any?"

"Nothing but ants, yet."

Then Frank rolled over a log, and exclaimed again.

"What have you found now?" called Fan.

"Nothing but ants," he answered, laughing; "but just see them run." A whole city of ants, frightened at the noise, and blinded by the light, ran over each other in the direst confusion, as the Assyrians must have done when Gideon's men broke the pitchers and blew the trumpets. Frank took pity on them, and turned back the log. And now it was Fan's turn to call the rest, mischievously.

"Have *you* found the first shell?" they asked.

"Oh, no. Nothing but ants! But, in good earnest, sister Annie, do tell us what they are doing. They are smaller than those under the log, and are running up and down this tree, just as if they had much to do, and were doing it with all their might."

"I can not tell you," answered Mrs. Russell, "unless Solomon's words can explain it. You remember the verses, 'Go to the ant, thou sluggard; consider her ways, and be wise; which, having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest.'"

"Then they are gathering food for winter," said Frank, watching them with great interest.

The little party continued to brush about among the leaves and old logs, till convinced there were no shells.

"We may be sure that where it is dry enough for ants to abound, it is too dry for mollusks," Mrs. Russell said. "We must go

down in the ravine there. It is moist, and filled too with old logs and stumps."

The same little stream that ran through the pasture came first through this wood, winding about at the foot of the hill, narrow and still. When they had clambered down the hill-side, they obtained footing on the roots of an upturned tree, and waited till Frank found a limb strong enough to bridge the brook. When all were over, each selected a place to search.

"Something new!" shouted Frank, enthusiastically, holding up two or three amber-colored shells, one containing the animal, the others empty. He laid them carefully in the basket.

"Here is a new variety of *Helix*," said his mother, showing a broad strip of bark she had just turned over. Seven large and small mollusks, curiously marked, clung to the moist wood, and one or two still larger lay upon the ground. When a log was too heavy to turn over, they scraped away the leaves that lay

against it, moving them slowly and gently. Now and then, they were rewarded by finding an albolabris, or another, still prettier, which reminded Frank of grandma's brown satin dress.

"If these mollusks are always hiding, mother, how do they find any thing to eat?"

"They come out in the night for their food. I am not sure, but if you were to wake up in the night in the woods, you might hear them munching the leaves. I think these with the black marks eat the decayed wood to which they cling."

"What is this?" asked Fan, holding up some leaves glued together, and within which lay a cluster of minute white globules.

"The eggs of the helix. They will hatch out soon."

"All these?"

"Yes. They are not many. One helix will produce from thirty to one hundred during the season."

"I wonder the world is not overrun with them," said Fan.

"You forget that He who creates has provided limits also. These snails have so many enemies, and so many difficulties to surmount in their short life, that the greater wonder is, they do not become extinct."

"What enemies can snails have?" Fan and Frank sat down on a log to rest and listen.

"Us, to begin with," replied Mrs. Russell. "When the woods are cut down, they disappear, for they can live only in the forest. The severe cold of winter destroys great numbers of them. Even the rivers are their enemies. In the vicinity of the Mississippi and Ohio, where the climate and soil are very favorable to their increase, they are destroyed in great numbers by inundations and freshets. Fires in the forests and prairies almost exterminate them. In woods where the Indians were accustomed to burn out the underbrush yearly, the mollusks are scarcely found. Then the birds ——"

"Not the birds, mother," interrupted Frank.

“Yes, even the birds, especially the thrush, will pick them up while creeping, carry them to a convenient place, peck away the shell, and devour the snail. Reptiles sometimes swallow them. A kind of field mouse, too, will burrow under the snow, and search them out in their winter retreats; and the hog will root for them so thoroughly as to cause their entire disappearance from the vicinity in which the creature is allowed to roam. Frogs swallow them, shell and all, sometimes, and, worse than all this, they sometimes eat each other.”

“What ugly things!”

“What would you think if you saw a little fellow bob up his head and bite off another’s tentacles?”

“Bite off the stalks that hold up his eyes, and make him blind?” asked Frank, in disgust.

“Yes.”

“I shall never like them again.”

“They do no worse than human beings, Frank; and, when it happens, the parts grow out again in a few weeks.”

"Well, that is kind in God, to give him new eyes."

"Sister Annie," said Fan, "I thought a little while ago, the world would be overrun with snails, but now I believe you will not find a shell left when you come home next year."

"If we managed their existence, we should probably make clumsy work of it," replied Mrs. Russell, smiling, and brushing away some leaves from a bed of moss. "Happily, God does that."

"Truly enough," added Fan. "What mistakes we should make!—just as inventors never get things quite to their minds. What a droll world it would be!" Fan went now to an old log, and began punching it with a stout stick. The stick suddenly plunged through the decayed wood.

"Buzz-z-z-z," said a score of hornets, rushing out to see who had broken into their house. Fan sprang up screaming, rattled her bonnet, shook her shawl, and then flew toward the brook, crossed the bridge at one

bound, and scrambled up the steep hill, as nimbly as a deer with a pack of hounds at its heels. The hornets buzzed angrily around Frank and his mother, jerking in all sorts of angles, unpleasantly near their faces, yet did not venture to sting either of them. They seemed to recognize their innocence in the matter by their quietness, and flew off again, in search of the real intruder.

Mrs. Russell followed Fan as quickly as she could, over the brook and up the hill. Then she saw her in the distance, sitting on a fence, exclaiming now and then, as she found a hornet sticking in her shawl. Happily, she had escaped with only five stings; but these were extremely painful, so that further search for shells was given up, and they went home as speedily as possible. Grandma's skill was equal to any need. Under her care, Fan was soon relieved, and smiling at her own expense.

"Aunt Fan, you will never wish to go with us again," said Frank, regretfully.

"Yes I shall. I have learned more about mollusks and hornets this morning than I could in reading a month. It is stupid to study natural history in a school room; to learn about things as if they lived in the moon, instead of our own woods."

Strange that Fan should live so near the woods, and not know better what they contained! But it is one thing to picnic there, and quite another to go with one's eyes open, looking for something—no matter what, if only one is wide awake. Palissy, the Huguenot potter, who loved God and his works, delighted to wander in ravines and dells near his home. He was a poor, uneducated man, yet he took pleasure in observing the formation and habits of insects. Afterward, when making china-ware, he was able to use the knowledge thus gained, by drawing and coloring so perfect copies of insects on his ware, that they attracted the notice of a noble lady, whose patronage made him famous. She was able to shield him, often, from perse-

cution, to which he was exposed because he was an avowed lover of Jesus. But above all the worldly benefits that resulted were the strength and happiness he found in thus communing with and praising the Creator. He could sing in his heart, while at work all day, "O Lord, how manifold are thy works! In wisdom hast thou made them all." His persecutors could not take away this joy.

CHAPTER VI.

Helix Alternata—How the Shells are made—*Succinea obliqua*—The Carriage Drive—The Soldier—No Shells in Pine Woods—Bees—*Helix Perspectiva*—*Helix Fidella*—*Helix Intertexta*.

“MOTHER, do you intend to take out the snails this morning?” Frank asked, the following day.

“Yes, now, if you like. Sit here first, and watch the little fellows crawl about, and then we shall know more certainly their names.”

“Did you not call the dark shells *Helices*?”

“Yes.”

“But the snails are different from those we have seen.”

“True. They constitute one of the varieties of the species *Helix*—that is, they form a squad in the same company, and are known by the name of ‘*Helix Alternata*,’ because, I suppose, these dark-red bars alternate with

the light brown of the shell. How do these snails differ from *albolabris*?"



Helix Alternata.

"The snails are shorter, the eye stalks are shorter, and their backs are partly orange color. See what yellow trails they are leaving wherever they crawl! What is it?"

"It is the coloring matter of the shell, always profuse in this variety of helix."

"Oh! Is that the way the shells are colored?" said Frank, with surprise.

"Yes. And the shell itself is made of similar secretions, thrown off from the mantle of the snail. The top or apex of the shell is commenced when the animal is hatched, and the house on its back grows by little additions to the door, winding round and round."

"Are the eggs like those we saw yesterday?"

"Very similar."

"How odd for shells to begin in eggs!" laughed Frank.

"What do you think of a snail's egg larger than a robin's egg?" asked his mother. He looked unbelieving.

"The African achatina, of which I lately told you, produces eggs an inch long. No robin's egg is as large as that, as most boys know," she said, smiling. "Now you may give me the basket, and we will see the new shells you found."

"One is spotted, the rest are plain," said he, looking in the basket.

"It is the snail that is mottled gray and black. You can see it through the shell. Are not the empty shells very clear and transparent?"

"Yes, and thin."

"You will understand and remember the name of the shell then, I am sure. Did you ever see a piece of amber?"

"No."

"It looks like dark-yellow stained glass, such as you saw in the windows of Grace Church. This shell is thought to look like amber, and is therefore called *succinea*, which means amber. It belongs to the family Helicidæ, just as the helix does, because the body is coiled in the shell, but is classed as another species of the same family on account of other differences. So, you see, it is only cousin to Helix."

"What is the other name of this new cousin?" asked Frank, much amused.



Succinea Obliqua.

"'Succinea Obliqua,' on account of the long, narrow mouth, leaning on one side."

"Yes, in this way!" exclaimed Fan, suddenly appearing at the door, and making a long, wry mouth, so that even Mrs. Russell had to join in the uproar that followed. "Come, put away the shells. You are to have a drive with father and mother, if you won't be five minutes getting ready."

The shells were replaced in the basket, and in just five minutes Mrs. Russell was waiting beside her mother, on the piazza. Of course, Frank was already in the carriage, watching Peter put the finishing touches on the handsome harness and shining ponies. Presently all were seated, and the carriage rumbled over the graveled road around the lawn, and out at the great gate, where an old, old willow stood sentinel; then up the hill, through the town, and away out into the country, along the smoothest road you ever saw. The toll-gate was reached, and grandpa had a chat with the keeper. After that, they met a large load of hay, and had to wait by the road-side for it to pass, and a moment longer for grandpa to speak with the farmer, who was mounted away at the top, just as if he was sitting on the roof of a house, and the horses were harnessed to the front door. How he expected to get through the toll-gate is more than I can tell.

They rode up and down the hills, now

through a rocky glen, and then past cool-looking woods, and between wide fields of grain. Some were almost ready for the reaper. In others the wheat was already beginning to lie in long, yellow waves, in the wake of the reaping machine, that was able, like a good servant, to do all the work while the farmers' sons were gone to the war. Then they came to a solid-looking stone bridge spanning a creek wide and shallow here, but away back in the glen it poured in a full stream down the road, giving the passers over the stone bridge just a glimpse of the white waterfall. On the other side of the creek was a large, old-fashioned farm-house. Here grandpa stopped, and was to remain some time to transact business.

Grandma thought she would wander along the shore of the creek till tired, and then return to the carriage. Mrs. Russell set out for the woods in the ravine and above the waterfall. Frank was about to follow her, when he spied a soldier sitting in the shade

of the bridge down by the stream. So he changed his mind, and went with grandma to talk with the tired soldier, who was on his way back to camp, after a short furlough. Grandma's head and heart were brimful of the war. She sat down by the volunteer, and chatted so sympathizingly, that, before the stranger knew it, he had told her all that concerned him in this life. Then she talked to him of the next, to which the first battle might hasten him, and, full of high patriotism herself, inspired him with new thoughts and new courage for all that was before him. It even made Frank's heart swell with an heroic spirit, so that he told the soldier he would like to go with him and be a drummer boy.

Presently, he bade them good by, and, with a fervent "God bless you," went on his way, strengthened in mind and body. Then grandma and Frank entered the woods near by, where they found his mother busy turning over the logs and sticks, and breaking down the stumps. He ran quickly to tell her about the soldier.

"You need only to say that my mother saw the soldier, and I know all the rest," she answered, casting a smiling and affectionate glance toward her.

"Are you repaid for all this labor?" asked grandma, looking at the disturbed earth.

"Yes, indeed. I have an abundance of new varieties of shells to tell Frank about when we get home. I find that each tract of woods possesses its own kind."

"Mother," asked Frank, "do you remember the woods on the north side of the bay, at home? Why did you never look there for shells?"

"Those are pine woods. Not a shell can be found there."

"Indeed!" said grandma. "Is it because of the soil, or the influence of the trees?"

"The dry, sandy soil, I presume. Snails are most numerous in limestone regions, like this. What is the matter, Frank?" He was dodging his head about to avoid something.

"A bee! a humble-bee!" He laid himself

flat on the ground to avoid it. "Every thing grows in the woods, I believe. There, now, here comes a lot of bugs, of all sizes, to see who I am, just as the Liliputians ran to see Gulliver."

"Did you not know there are wild bees in the woods, Frank?" said grandma.

"No. Are there, truly?"

"Yes, and they store honey."

"What do they do for hives?"

"They make their own in hollow trees. There is one kind that burrows in the ground; another that makes a nest of moss among the rocks. One kind will floor the nest with scarlet poppy leaves, while another prefers rose leaves. Then they line the nest with wax, and are ready to store the honey."

"I always wondered how Samson could have found a swarm of bees and honey in the carcass of a lion. Now I know."

"The Bible is a wonderful book. It tells us of every thing — does it not, Frank?"

"Except locomotives!" he answered; "and you know I like those best."

“Read Nahum, second chapter, and tell me if that does not describe a locomotive!” returned grandma, rising from the mossy seat where she had been resting. After gathering a few wild flowers, she was ready to go. “Come, Annie; come, Frank; we should return to the carriage. Your father will be waiting.”

So they all went down by an easier path that led through the yard and garden of the farm house. Mr. Martin was leaning on the gate. The farmer, in his straw hat and shirt sleeves, and with his hands in his pockets, stood inside, talking. When the ladies came near, Mr. Martin called out, cheerily, —

“All ready? Basket full of shells?”

“Not full, father,” said Mrs. Russell, opening the basket and displaying a handful at the bottom. The farmer looked and smiled.

“We,” said he, “don’t set much by snails. We turn out lots of ’em when we’re clearing. The children use them sometimes in their play-house.”

"Indeed!" exclaimed Mrs. Russell.

"The little ones would give you theirs in welcome, but they're away yonder at the school-house," he continued, nodding in the direction of the road.

"Tell them to bring me such as they can find, and they shall have a tea-set for their play-house," she answered.

And now all were ready for the return drive. The good mornings were said, and the ponies whisked away as fast as they could go, knowing well enough that their heads were turned homeward.

It was nearly noon when they reached home, but not too late for an hour in the library with the shells, before dinner. When these were poured out upon the table, Mrs. Russell selected a single variety.

"They are the finest and largest I ever saw. These are 'Helix perspectiva,' Frank."

"What does that mean?"

"It means perceived, or thoroughly seen, because the umbilicus is so open that you can

see every coil on the under side, to the very top. Do you not see, it is like a saucer made of coiled red twine? I do not wonder the children like them. The *stricæ*, or fine lines which cross the whorls, form almost an angle at the edge, instead of continuing in the same line to the umbilicus, as in other shells. This distinguishes it from a variety called 'striatella;' otherwise quite alike."

"Where did you find these, mother?"

"Always under the bark. They looked like worms wound up. I picked up a large shining and beautifully striated shell, as I thought, of a dark-green color, but, on turning it over in my hand, discovered it to be a worm. It was hard and tightly coiled; playing dead, I presume."

"What did you do with it?" eagerly asked Frank.

"I threw it down quickly, I confess," was the laughing reply. "Just as you threw down the snails when you began to study conchology."

"And what else did you find?"

"Plenty of baby snakes under the logs and stones, but they were all napping. Here are some new shells I discovered among the leaves, close under a log." She held one up.

"It has a white stripe," exclaimed Frank, pleased with the novelty.

"Yes, I think it the prettiest of all. We have none of the brightly banded *Helices* at the North. In Oregon, and in California, there are a few showy varieties. One — '*Helix fidelis*' — is yellow, banded with black, and the lip of a reddish color, while the lower part, or base of the shell, is bright chestnut. There is also a variety found in Florida, which like the *Achatintellas* of the Sandwich Islands, is either white, yellow, green, or red, banded with black. In tropical climates, the shells are much more beautiful than here."

"Ah, would I not like to look for such!"

"Well," said his mother, smiling, "when we go to Florida, if it ever happens, we will gather them under the palmetto trees. But,

after all, those shells do not belong to the States — or rather, they are only naturalized citizens, for there is good reason to believe they migrated from the West Indies.*

“How could they get across the water?”

“They are borne along by oceanic currents like the Gulf Stream. Seed-vessels, trunks of trees, and various small objects, are found on the beach of Key West and other places, evidently swept from the Cuban shores. As these gay little shells are not found elsewhere in the States, and are a tropical variety, we must suppose that is the way in which they made the voyage and colonized themselves. But we will not despise the plainer ones of our own woods. This banded one is a treasure.”

“Is it named for the band?”

“Oh, no. You will have to bring the glass to find the reason for its name. Now, do you see the lines crossing the whorls?”

“Yes, plainly.”

“Are there other lines in a different direction?”

"Yes, crossing the first, and winding with the whorls."

"Interlaced, or interwoven."

"Yes."

"Then you have the name of the shell — 'Helix intertexta.' Now look inside the lip."

"It has no lip, mother."

"Not a white, reflexed lip, certainly. But the termination of the whorl is called the lip, just the same; and, when plain and thin like this, it is called simple. What do you see on a portion of the lip, inside?"

"White, pearly spots."

"As if the moonlight had shone in, and the snail caught and fastened it to the shell?" queried his mother.

"That is it," laughed Frank.

"It is called a testaceous deposit because it is like the pearly composition of sea-shells. This aids in deciding the variety to which it belongs."

"Here is a letter for you, Annie," said grandpa, entering at this moment.

Mrs. Russell opened it quickly, and after reading it, told Frank it was from his father.

"He is already at Forestville, and wishes us to join him at grandpa Russell's. After that, we are to spend a day or two with my brother at Elmwood. He will look for us on Saturday."

This was a pleasant arrangement, and one that suited Frank. The shells were no more thought of during the busy time before their departure. Frank had much to do. There were the bow and arrows to be completed, a sail to be made for the boat, and the wooden cart to be painted, before he could think of undertaking a journey to his other grandpa's. All these were intended for a certain little cousin Archy, whom we shall presently find greeting him at the other homestead.

CHAPTER VII.

Visit to Grandpa Russell's — The Steamboat — The Village — Grandpa Russell's House — Money-cowries — Ianthina — Haliotis — Keeping the Sabbath — Pecten — Excursion to the Waterfall — *Helix Labyrinthica*.

OUR friends whizzed away in the cars on the appointed morning. It was in the midst of the traveling season; besides, there were many soldiers on their way to various points to join their companies or regiments, and therefore the cars were crowded. Frank found enough to amuse him the whole way. Two French families, bound for the West, occupied the opposite seats. Two women, each with a young babe and a row of little folks, formed the lively but well-behaved group. It is not often that three little people can sit together without quarreling, or crying, or twisting themselves into a tangle in fun; yet three did sit, side by side, that

warm summer day, as quietly as if they had been gentle-born, and under the eye of a prince's tutor. Further away sat an ill-bred young miss, in a flounced silk, who amused herself with throwing orange peel at her parents, and making faces at the passengers who frowned upon her. At each station there were soldiers, and often the fife and drum were sounding for recruits, or marshaling companies through the streets of the villages. At length the train shot along the shore of a broad lake.

"Here we are, Frank," said Mrs. Russell; "and yonder is the steamboat waiting for the train."

There it lay, as pretty a steamboat as ever was built, Frank thought, because it looked more like a toy than a real business affair. He hastened to leave the dusty cars, and get into the cool, pure breeze that came across the water; and, while his mother was talking with friends, he took her shawl and basket, and went immediately on board the "Water

Lily." Before she rejoined him, he had explored the pretty cabin, looked admiringly at the engine, and was already up in the wheel-house, beside the pilot, who remembered him well enough, as Frank had sat hours in that wheel-house every summer since he was four years old. No wonder this was his pet steam-boat. The engineer had given him a hearty greeting, too, and asked if he had made a model boat yet.

By this time the locomotive had whistled, and puffed, and rumbled out of sight, like a living thing. The bell of the boat now sounded, the gang-plank was taken in, the hawser cast off, and the steamer swept slowly and gracefully round, then, with good speed, headed up the lake. At every few miles there was a landing. Sometimes it was at a large village, which could send a lively crowd to the wharf to welcome the passengers and the mail; but oftener there was only a small cluster of houses, or only a single storehouse. Before the boat arrived at the various land-

ings, Frank was allowed to make the steam-whistle scream. When they approached closely, if there were no passengers to be left, or taken aboard, the mail carrier would show his skill in tossing the mail-bag on the wharf, while the boat sailed by, without stopping.

It was pleasant to plow through the water, almost as green as the sea, first to one shore and then to the other, now running close to a jutting point covered with trees, under which a picnic group waved their handkerchiefs and cheered; and then gliding past the sloping shores, where lay the richest farms in all that region; and, again, almost touching the foot of the hills, that grew higher and higher with each mile of distance. Now the shores were lined with rocky bluffs, broken by ravines, through which streams came tumbling and rollicking, and poured in foam over the last ledges of slate into the lake. Wild vines, tufts of bushes, or thick woods bordered the bluffs. The head of the lake was reached

at sunset; but there was no wharf, no village, not a living being in sight; nothing but a forest of low bushes and trees; so that a stranger might wonder if the boat was made to navigate the woods. But the jaunty little craft knew the way well enough, and soon found an opening that would have frightened a sailor much more than a "land lubber."

Here, along a winding creek, the steamer twisted and whistled, as merrily as if it was the easiest thing in the world to "face about," whichever way the captain shouted. The water lilies thought it prettily done, for they waved their green hands, and bowed their white faces so low that they actually plunged themselves head and shoulders under water, as the boat went by.

At last, the wharf was reached. There lay the town between great hills that loomed up on either side. Truly, it seemed shut from the world, like Rasselas's "Happy Valley." But Frank thought nothing about it, for he was on the lookout for his father, whom he

had not seen for weeks. The latter stood upon the wharf, waiting and smiling as he distinguished his wife and son among the group of passengers. A happy greeting, and the three were soon in a carriage, slowly toiling up one of the hills that overlooked the town.

Half way up, as if a white bird with spread wings had alighted among the green trees, stood grandpa Russell's house. The front door was open, the gate thrown back, and grandpa stood on the steps leaning on his cane, waiting to receive his children. Then came his widowed daughter, Mary, and presently, running and shouting, appeared Archy, ready to throw his arms around Frank's neck.

When the welcomes were kissed and said, and the guests were rested, aunt Mary led them to the tea-room. The canaries fluttered in their cages at sight of the new-comers. The garden door stood open, and the fragrant breath of roses and honeysuckles floated in. The well-laid table, with its tempting biscuits

and fresh honey, the ruby currants shining from under the snowy sugar, the new golden butter, and the sweet white bread, were refreshing, both to sight and taste. Frank and Archy did hasty justice to it all, for they sat next each other, and Frank could not resist telling him about a certain little sloop stowed in his trunk, which resulted in the escape of both from the table, with a bunch of keys in their possession. The trunk was easily opened, and the sloop, the bows and arrows, and the small cart, were at Archy's feet, he happier than any man with a crown laid before him. It was a happy, long-remembered evening. Neither was it forgotten to thank God around the family altar, that night, for the pleasant reunion.

The Sabbath passed in delightful quiet and rest; now at church, now at home, and now in singing hymns of the old and the new time.

Next morning Frank was up almost as early as grandpa. There was a large cabinet of shells which had stood for years in the parlor. Frank had often seen them carelessly,

but they had now a new interest in his eyes, and he was anxious to know more about them. When he met grandpa in the hall, he took his hand and coaxed him into an exhibition of the cabinet. This request was the more readily yielded to, because grandpa had gathered many of them himself, on the shores of the Pacific, and at the Sandwich Islands, and he could tell many a story associated with them.

"What shell is this, as white as milk?" asked Frank.

"'Ovulum ovum,' because resembling an egg."

"So it does look like an egg, when cooked for sick people."

"Cooked without the shell, you mean."

"Yes. And what are these yellow, glossy ones?"

"They are commonly known as *money-couries*. The islanders used them as we use money. Tons of them are taken to Africa for barter. Here are some with red rings, which

are employed as weights for nets, or for ornamenting dresses."

"Are these land shells?" asked he, in doubt.

"No. Nearly all you see were gathered on the sea shore, or obtained by diving."

"What a pretty shell this is, grandpa! It is shaped like a helix. It is thin as paper, and I am sure I never saw so bright a band of purple. Where did you get it?"

"Far out at sea. It is named, for its beautiful violet color, 'Ianthina.' They float in great companies, each one having a raft attached to the foot. On the under side of this raft are the eggs, securely fastened."

"How odd! Tell me about this rainbow shell, like a wide boat full of portholes."

"It is called 'Haliotis,' or ear-shell. It grows on the rocks, and the animal will hold so tightly that it can be safely removed only by the quickness and dexterity of the collector. Warm water will make them loosen their hold, and a sudden push sidewise finishes the capture. These shells are much

used in ornamental work. I think *papier-maché* requires its use. Your mother has a writing desk ornamented thus."

"Were those bright flowers made of shells?" Frank exclaimed.

"Yes. You see, here is green for the leaves, red for the roses, blue for forget-me-nots, and as many more colors as you like, changing into one another. They are often called California shells, because abundant on that coast."

"Were you ever in California?"

"No; in Oregon, beyond the Rocky Mountains."

"All alone?" queried Frank.

"I accompanied a caravan of trappers just beyond the mountains, and traveled with the Indians the rest of the way."

"I have read stories about the trappers. Are they not splendid fellows?"

"Poor fellows, I should say. They spent most of their money in gambling and drinking. They were desperate men, and hated me and my companion, who was both a physician and a missionary."

"What for?" said Frank, rising to his feet.

"Because we kept the Sabbath, and in other ways set them a Christian example. They were angry to be thus reminded of God. At one time they threatened our lives if we did not drink with them."

"Did you do it?"

"We did not fear them that can kill the body, but feared God rather. We refused. A few days afterward, the cholera broke out among them, and, by our attention and nursing, all but two recovered. They then confessed their intention to have killed us at the first opportunity. We were safe the rest of the way. God was able to restrain the wrath of man, you see. When you are tempted, be sure to remember and trust in God's promises. Live up to your principles, my boy, and don't sneak out of them when in the company of the wicked. That is what Jesus meant when he said, 'Let your light shine.'" Grandpa arose as if to close the cabinet and go away; but Frank begged him to explain one more very odd thing among the shells.

"This stone, shaped just like the fan-shells I have seen at home, on the shore, — what is it?"

"I found it at the mouth of the Columbia River. It is a fossil 'Pecten.'"

"What is a fossil? Was it ever a shell?"

"Yes, a long time ago. It became filled or mixed with a metallic or earthy substance, without losing its form, and is now hard and heavy. Many such are found deeply imbedded in the earth or in rocks. There are some stones, which when broken, show a fossil shell inside. Did you ever see a living fan-shell, as you call it, on the shore?"

"Plenty of them."

"Do they creep, like snails?"

"No, they only snap the doors together, and spit, as if they were angry because the tide had left them high and dry.

"That snapping, or sudden shutting together of the two parts of the shell, is their mode of moving in the water. Young mollusks can swim rapidly in that way. When

they are lying open, did you ever slip your finger in the shell? Try it. They will hold it as tightly as a baby with real teeth."

Frank thought this funny enough, and said he should certainly try it.

Grandpa continued: "One variety of pecten was formerly used as a drinking cup. Your mother must read to you about Ossian's 'hall of shells,' where kings and warriors feasted. There is a variety that was obtained in Palestine, by pilgrims, and worn in proof of the performance of their pilgrimage. It became the badge of knighthood. This shell," said he, taking up another, "flat on one side and deep on the other, is sometimes called the 'pilgrim's shell,' being used by them, it is said, as a cup and plate."

Frank was much interested, but Archy was already tugging at his jacket, to induce him to frolic, and then the breakfast bell summoned them all. Grandpa would never say grace till every one was seated, so there was no time now for play.

During breakfast, it was proposed to visit a waterfall in the neighborhood. Aunt Mary would be too busy. Grandpa declined, too.

"The young folks may climb the rocks," he said. "I am too old. Besides, you can pour as good a waterfall out of the pitcher there. You should go to the Columbia River, to see waterfalls. One pours over a precipice of twenty or thirty feet, and continues a whirling, foaming descent of five miles. A stream flows into that river, also, after descending a thousand feet, in a series of cascades, looking like a belt of silver on the sides of the mountains. The last plunge of the stream is over a precipice two hundred feet."

Frank thought it would be rather a long walk over the Rocky Mountains to that river, and was quite content to accompany his father and mother to a nearer place of interest. Then, too, he was to wade as much as he pleased.

A little basket, lined with cotton, was not forgotten; and before the sun rose too high

for comfort, the party were on their way to the foot of the hills, that sloped to the wooded level lying between the town and the lake. The stream, at the entrance of the ravine, was broad and shallow. Through it, or beside it when the mossy, dripping rocks would allow, they picked their way, stopping now and then to admire the high, jagged, crumbling walls of slate, hung with moss and running plants, and topped with dark evergreens. They climbed up the stairway of ledges, where the water was tumbling down, Frank, always first at the top, perching on a rock or fallen tree, and swinging his cap in high glee. Then they rested, and enjoyed glimpses of the next waterfall, just beyond a jutting cliff. Mrs. Russell looked carefully among the moss, and in the shady nooks of the broken rocks. One pale-looking *Helix albolabris* was creeping overhead, within reach. Frank discovered it, and thought it new.

"It is of a pale green, mother."

"Because starved," she answered. "You

see how thin it is; and the lip is not half formed. It is not full grown, but you may put it in the basket."

"Here are some shells for you," said Mr. Russell. He poured a dozen or more brown and white bits into Frank's hand.

"Are these shells, mother?"

"Yes, indeed, and not easily found either, because so small. Where did you get them?"

"There in the moss. You are not really going to keep them!"

"Certainly. They are beauties—shaped like tents too. Think of six whorls in that little thing, hardly larger than a pin. Under a glass, the lip is rosy, and you can see two raised lines, like a railroad track, revolving inside, where the whorls unite. Who but God could make such a thing as that?"

"None, truly," said Mr. Russell, "when one considers the living thing inside of it."

"What name would you give, if it had none already?" asked Mrs. Russell.

"*Multum in parvo*—much in little," re-

turned Mr. Russell, picking up a stick to assist in climbing, and getting ready to move on.

"The Fairy's Tower," suggested Frank, "because you know a fairy might ride up that railway in a ——"

"In what? There is nothing small enough to ride in through that door."

"Well, I was thinking of a flower that would do for a car, with a morning glory for a smoke-stack, and a lily of the valley for the bell."

"But you could put half a dozen of these shells into the bell. How then could the bell get into the shell? to say nothing about the smoke-stack and the fairy. Your name will not do. We must keep the old one — '*Helix labyrinthica*.'"

"Every thing is a helix, mother. How many of them are there?"

"Between one and two thousand varieties."

"In this country?" was the astonished query.

"In the world, I mean. The whole num-

ber of species of land and marine mollusks probably exceeds twenty-five thousand. A gentleman in London, Mr. Hugh Cumming, has twenty thousand species in his collection, which is considered the finest in the world."

"I hope I may see it some day," said Frank.

"You must have one of your own. We are making a good beginning this summer."

His eyes twinkled at the suggestion, and he resolved to carry it into effect.

Mr. Russell was shouting for them to follow, he being already at the foot of the next waterfall. When they had climbed this, they concluded to go no further, as a path here led up the steep bank, while, beyond, there was too deep a pool for pleasant wading, and more difficult heights to ascend. The path took them through a dense wood, and then into a field, whence they were able easily to find their way home, glad to rest, and ready to enjoy the roast and the dumplings, which proved aunt Mary's good housewifery.

CHAPTER VIII.

Dead Shell — Limnæidæ — *Limnæa* *Appressa* — Frank and Archy — The Ducks — The Water Soldiers — The Sweetest Thing in the World.

ONE afternoon, at sunset, Frank and Archy had a fine frolic in the arbor, at the end of the garden. They made rows of soldiers from hollyhocks, with monk's-hood for helmets, and pieces of honeysuckle for sabers and trumpets. Archy was rolling on the floor with laughter at a pig made of a gooseberry, when Mr. Russell came calling for his wife.

"Frank, go tell your mother I have brought her some shells worth having."

A very large green leaf lay in his hand, upon which were black shells, nearly two inches long, twisted in the oddest way, and rolling about as the animals within tried to crawl away.

"Where did you get these?" exclaimed Mrs. Russell, when she saw them.

"Down on the flats, as you may see from the condition of my boots."

"I am glad you took so much pains. You have made a great discovery. Were they in water, or covered with the mud?"

"Do you remember the stagnant pool near the bridge, almost hidden by lily leaves and wild grasses? I found them there, either swimming about on the water, shell downward, or clinging to the lower side of the broad leaves. Here is one fellow safely pocketed, that must be 'the oldest inhabitant.'"

He drew from his coat pocket a large shell, which measured just two inches from the apex to the base. Then Mrs. Russell gathered them all, except two, in a tin dish, and prepared them, as she had done before, for separating the animal from the shell. Frank assisted in removing them.

"How easily the edges break, mother!" said he, trying in vain to hold the shells carefully. The least pressure of his finger broke pieces from the thin lip. This was shaded into a

lighter brown than the rest of the shell. The inner side, or mouth, was faintly tinged with yellow, and shining as if varnished. The lower whorl spread out widely, and the upper ones were twisted exactly as if some one had done it with thumb and finger.

"I like these best of all you have found. See, mother, here is a yellow one."

"That is a dead shell."

"How can a shell be dead?"

"When the epidermis is worn off, it is called dead."

"What is the epidermis?"

"It is a thin covering or secretion thrown out by the animal, which you would call the color of the shell, but which is really the skin. In many marine shells this epidermis is fibrous or mossy, and serves to preserve the texture of the shell underneath. In others it consists of a brilliant gloss, which is soon worn off or corroded in the water, if the occupant is dead. Sometimes the epidermis will crack and peel off, if kept in too warm a place. Archy, do

you recollect how frightened you were last winter at the noise the shells made, one evening, in your room, after you had gone to bed?"

"Yes. I thought my soldiers were firing off big cannon. I cried very loud—I did."

"Afraid of your own soldiers?" said Frank, laughing.

"Well, I did not tell them they might fire," replied Archy.

"Oh, I understand now. You thought they had mutinied. They were very bad soldiers to do that."

"No, they are not bad," stoutly began Archy; "my brother soldiers are Union. They mind me very quick," and so he ran on with a long story about the unheard-of feats performed by his imaginary army, while Mrs. Russell and Frank were finishing their work. Then they obtained a book from grandpa, on the mollusca, and, with his help, soon found the name of the new shells.

"These are 'Limnæa.' You recollect, I told

you the order pulmonifera was made up of a number of families, the first of which is helicidæ. The fourth family is called 'Limnæidæ,' meaning pond-snails. You remember the animals of helicidæ have four tentacles, the eyes being at the top of the two longest. Now look at these snails, and tell me how many tentacles they have."

"Only two, and no eyes at all!"

"You will find the eyes on the head at the base of the tentacles."

"Away down there? Poor fellows! I would rather be a helix and look which way I pleased."

"How many teeth do you think they have?" asked grandpa. "One hundred and ten rows, and one hundred and eleven in each row. Let us figure that out. Twelve thousand two hundred and ten teeth on the tongue of that little fellow, no bigger than my thumb!"

"Do you believe that, grandpa?"

"I must believe what learned men have labored so long and hard to find out. But

what do you think of the Maker of all these little teeth, my boy?"

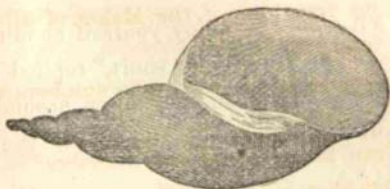
"He must be the same who numbers all the hairs of our heads."

"True, true. 'Fear not, therefore.'"

"But that is about the sparrows, grandpa," interrupted Archy, whose quick memory had been well tested in all parts of the Bible.

"Yes, Archy; but the same Father who feeds the birds, and watches their fall, gave the snails these beautiful and numerous teeth, that they might easily obtain the food intended for them. If he bestows so much thought and care upon even the little snails, of 'how much more value' are we! His providence will watch over us, if we trust in him. Now, read us more about the shells, Annie; you can see better than I," he said, handing the book to Mrs. Russell.

"Here is our variety, faithfully pictured," she said, after looking at the plates. "'Limnæa appressa,' it is called."



Limnaea Appressa.

"I do not understand that," Frank answered.

"The word means pressed together, and refers to the joining of the lining of the shell with the outer dark surface, or what is called the columella. There is a fold or twist of the columella, also, you see. The limnaeæ all have this fold."

"These are not land shells — are they, mother?"

"No; they are fresh water or pond snails, diving in the water, but obliged to come to the surface in order to breathe."

Jingle, jingle, went the tea-bell, and the shells and books had to be laid aside.

"Breakfast, dinner, and tea, all came in a bunch, aunt Mary. There is no time between them," said Frank.

"I am glad you enjoy yourself so much as to make the time seem short," replied good aunt Mary. And so they drew around the pleasant tea-table, and talked over the war news.

A day or two after the pond snails were found, Frank and Archy concluded they would go to the landing and look for shells. They equipped themselves with India rubber boots, a hoe, and basket. A neighbor, on his way to a cornfield in the same direction, willingly consented to carry them quite to the bridge; from there, when they wished, they could follow an old, abandoned railroad track, which ran in a straight line across the swamp to a lighthouse on the lake shore. The neighbor smiled when they told him their errand, and set them down safely at the bridge, promising to stop there for them on his way home at noon. Archy stood up bravely by the brook that ran under the bridge, and said he saw nothing at all, except some sticks, which he intended to convert into gun-boats for his

brother soldiers. But Frank began wading about here and there, sinking almost to the tops of his boots in mud and water. Not a shell could he find, except two or three young ones, like those obtained by his father.

"Father must have taken them all," said he to busy little Archy. "Let us go on the railroad. I can reach over into the swamp with my hoe."

Archy was loth to leave the half-finished fleet of gun-boats; but the railroad had its attractions, and he consented. Hardly had they started, when five fat ducks came waddling after them. Archy tried to drive them back; but no sooner had he caught up with Frank again, all out of breath, than the ducks were waddling close behind them.

"What do they want, Frank?"

"Perhaps they think we have something to eat in the basket."

Then they stopped, ducks and all, to inspect a pool. Frank reached out his hoe, and pushed off a log that was leaning on the bank.

There was nothing under it, however, and Frank and the ducks seemed to agree that it was of no use to stop there. So they all went on slowly, till Frank, looking all the while into the swamp, discovered, at last, a large limnæa sailing comfortably on its back.

"See, Archy, quick! There it is!" The hoe was carefully aimed, and glided gently under the shell; but, as he raised it up, the water ran off, and carried the shell with it. The mollusk was frightened, and down, down it went to the bottom of the pool, out of harm's way.

"That is too bad," exclaimed Frank; "and there is not another to be seen." But the ducks must have thought differently, for they pattered down the bank, and struck off into the water, sailing about among the tall reeds and bushes, looking back out of one eye to see if Frank and Archy meant to follow.

"What are they eating?" asked Archy. "Do they like weeds?"

"Let us see," said Frank, throwing down

the hoe and bending over to watch them. "Now I know! They are eating snails! Do you see those little round, black things, floating about in the water? My mother told me the birds eat snails in the woods, and now here are the ducks eating poor things that live in the water."

"What shall we do to the ducks?" questioned Archy.

"Nothing. Only, when they get fat enough, we will eat them."

"We don't eat ducks," Archy replied, in disgust.

"Yes we do — on Thanksgiving Day, any way," returned Frank, reaching out the hoe, and carefully drawing the snails where he could reach them. He fished thus a long time, and secured a number of shells, such as all children know by the name of "snail-shells," and which are so common on every lake shore and in every brooklet. These, however, were very much larger than any he had ever seen before, and were of a dark

brown, or green, or black, because the animal was alive within, while those cast up among the lake pebbles are dead and white. When he had safely placed them in his basket, the two walked on toward the lighthouse, at the end of the railroad. Near this was a deep ditch, or canal, filled with water. They could look down into it and see the long, green weeds and moss swaying about, with their tops almost reaching the surface. Frank soon saw two or three limnææ floating. This time he used the hoe skillfully.

“Archy, don’t you think they look like queer little boats with very sharp bows? Only the captain is lazy, and lies on his back with his foot sticking up in the air; and then, when he finds out I’m after him, he just draws in his head, foot, and all, and down goes his boat to the bottom. He isn’t drowned, either, for he can come up again when he likes. I do not know how he holds his breath so long.”

“Well, my captain and my brother soldiers

can go down when they want to," boasted Archy.

"I should like to see them do that," said Frank, straightening himself up.

"Well, they can shut the boat tight when they go down, and, when they come up, they can climb a stick just as boys do."

"How do they get the boat up?"

"Oh, they hitch it to the stick, and then pull it up. They could jump up to the shore as quick as you can think, if they want to." Frank could not help laughing, and then went back to his work. When he had secured all the limnææ that were in sight, he thought it high time to return to the bridge. It was well he did, for the patient neighbor was already waiting. When they reached home, Mr. Russell hailed them, to know their success. Archy had his apron full of boat-shaped chips, which he exhibited as "iron-clads," intended to transport his soldiers down "the river," which only meant across a tub of water. Frank set down his basket with a sigh,

saying he might have brought more shells, but they would slip off the hoe.

"To be sure they would," said his father laughing. "Why did you take it?"

"Because it had a long handle. I did not know the mollusks would dive when I hit them. How did you catch them?"

"I tied my handkerchief on the end of my cane, in the manner of a net, and scooped them up where the water was too deep for wading."

"Why did I not think of that?" said Frank, with regret.

"Never mind," said his mother. "Next summer, if we are spared to come again, you shall have a net and fine-toothed rake. Conchologists can not do without them."

"Would not the shells slip through the rake?"

"Yes; but the use of the rake is to pull up the weeds and water-plants by the roots. Then they are to be well shaken over a fine net, and the mollusks that cling to the leaves

and roots will drop. You can get quite a variety of pretty ones in that way. A net, too, would have helped you, to-day, to catch those that were floating."

"Why can I not have the rake and net now?"

"Because we are to return home very soon. To-morrow we are to visit an old friend in the country, and Thursday we shall go down the lake to Elmwood."

The next day's drive and visit, in which Frank and Archy were allowed to join, proved very delightful. There were cows and sheep to be inspected, the mowing machine to watch, rabbits to play with, and, above all, a swarm of bees to hive, which greatly amused Frank and Archy. Then a box of new honey was taken from another hive, to be sent to grandpa Russell. After all the day's sport, they had an early tea, and a drive home after sunset. When they reached home, Mr. Russell told his father he had brought him a clover-field, sealed up in a box; but it did not occur

to grandpa, at once, what that might mean, and Archy tried to help.

“What is the sweetest thing in the world?” he asked.

“I suppose you think it is honey,” answered grandpa, smiling; “but there is something sweeter than that.”

“What can it be?” “What can it be?” exclaimed both Archy and Frank.

“‘The statutes of the Lord; more to be desired are they than gold, yea, than much fine gold; sweeter also than honey and the honey-comb.’” And so grandpa read the whole of the nineteenth psalm that evening, at family worship.

The carriage was at the door, early in the morning, to take Mr. and Mrs. Russell and Frank to the steamboat. Archy looked sorry enough, but told Frank that his brother-soldiers should march all the way on the lake-shore, and would then come back and play with him.

“Bring your soldiers when you come to see

me," said Frank, "and I will show them the great ships on the ocean."

"Yes, I will. But my soldiers have ships and gun-boats, more than you ever saw — one hundred thousand and eighty-eight sixty!"

"Tremendous! What a fleet! Good by, Archy."

"Good by, Frank."

CHAPTER IX.

Elmwood — Uncle Henry and Aunt Leda — The Fishermen
Trilobites and Ammonites — Excursion to the Falls — Septa-
ria — The Falls — *Helix Hortensis* — Return to Elmwood.

ELMWOOD was the name of a point of land reaching out into the lake, and was so called because of the many old elms upon it, conspicuous for their size and graceful beauty. A cottage nestled among them, some distance back from the shore, and at the foot of a hill. A path from the cottage wound through the grove, and led to a bridge and dock, thrown out at the extremity of the point, and built upon piles. There were seats here, and a flag-staff, but no flag was waving from it to-day.

The distance seemed long to Frank, for he sat in the wheel-house and watched for the elms two hours; so, when at last they were in sight, he could hardly wait for a near ap-

proach to sound the whistle, that uncle Henry and aunt Leda might know of the arrival. When he did, it gave a loud shriek. Then he saw aunt Leda, in her broad hat, making haste to reach the bridge. She had a youthful, rosy, smiling face, and a happy way of making every body feel at home as soon as they set foot on the bridge.

It was all new to Frank, as indeed it was to the rest, for Elmwood had been in his uncle's possession hardly a year. As they all walked up the path toward the cottage, this uncle came striding down with great steps, having a tall, robust figure, a broad hand with a hearty grasp in it, and a heart that was always overflowing with goodness and generous enthusiasm. Frank thought he would make a good Santa Claus when grown to be an old man; and, after they had walked up to the cottage, and chatted in the pretty parlor that looked out upon the lake through the drooping elm branches, he thought again what a capital soldier he would make. And, truly

enough, uncle Henry has gone to the war, a loved and honored officer. But just now he was sitting with the rest, in the cool parlor, and talking. Late in the afternoon, when the heat of the day had abated, they all wandered along the shore; then had a rowing match, and afterward a short sail in the boat that was kept moored in a cove. When they came back, it was twilight. Two fishermen were on the shore, drawing in a net, and a third stood in the water, casting out sticks and stones that had caught in the meshes. The still lake, the darkening shore, the boats, and the fishermen drawing in their net, formed a sweet picture that reminded Frank of the fishermen of Galilee; and he could almost fancy Jesus walking on the shore, and calling them to become fishers of men.

"Will they catch any thing, uncle?"

"It is too late in the season," he replied. "Perhaps they may get their supper in this draught."

Frank waited till they had drawn the net

quite in, thinking he might find shells in the meshes. But when it came fully in sight, it contained neither fishes nor shells. A few stones were caught, heavy enough to break the net in some places, so that the fishermen would need plenty of leisure to mend it well. It was now dark. Frank returned to the house in time for tea, and to hear the plans for the next day. The proposal was a trip to Taghcanic Falls, on the other side of the lake, and eighteen miles above Elmwood. They would be able to take the old steamboat, that went up the lake before noon, and returned late in the afternoon. Aunt Fan and cousin Nellie had been notified to join them in the "up boat," if the day was fair.

Early in the morning, Frank was at the bridge, and had the privilege of running up the flag, to signify to the captain of the boat that some one desired to take passage. But it would be some hours yet before the arrival, and in the mean time he walked with his father along the shore, to see a farmer who

was said to have some curious minerals and a petrified frog. These minerals proved to be fossil shells, and the frog was a *trilobite*—one of an extinct family of crustacea; a sort of old-fashioned cousin to the crab family. When Mr. Russell said this, Frank was not sure that he rightly understood it.

“Do you mean that there are no such animals living now?”

“Yes, exactly. These are found in the oldest rocks that contain any remains of animals and plants. Shells are found thus, also.”

“But the farmer said he plowed them up in the field.”

“Very true. They abound in the rocks in this vicinity, and often become detached and mixed with the soil.”

“And have we no such shells now?”

“Many in recent rocks are the same that we have, but there are other species entirely extinct. I saw, in Agassiz’ Museum of Natural History, a number of ‘ammonites,’ which are fossil. One measured a yard across. They

have been found as large as four feet in diameter. They are in shape more like the Nautilus, or 'paper-sailor,' than any other shell, being coiled and flat. The smaller ones are abundant in this country, and are known among common people as 'petrified snakes.' They are found in great abundance in England. Sir Walter Scott alludes to them when he says, —

'Of thousand snakes, each one
Was changed into a coil of stone
When holy Hilda prayed.'

"Are there any in this country?" asked Frank.

"Yes; I should not be surprised to find them in the quarry at your grandfather Martin's."

While talking thus, they were walking back to Elmwood. Frank could scarcely forbear running, for he had the wonderful trilobite in his pocket. The farmer insisted upon his accepting it, because he was so much pleased at finding a boy interested in those things.

Frank showed it to his mother as soon as he reached the house. She was as greatly pleased as himself, but could not wait to talk about it now, because she was assisting aunt Leda in packing the dinner basket. There was an hour yet before the arrival of the boat. "No hurry," uncle Henry had just said, and gone out, but he returned immediately.

"The boat is in sight! She will be here in less than five minutes! All to the bridge, quick!" he shouted, and hastened on to detain the boat, if necessary. It probably had made so few landings as to gain an hour.

What dismay was pictured on the faces of the ladies! The basket was not half ready, and bonnets, shawls, and parasols were not assembled. Mr. Russell came to their aid.

"What shall I put in?" said he, when he glanced at the variety on the table, all of which could never be crowded into the basket. But in went the boiled ham, with a clean napkin which his wife was quick enough to wrap about it; then a dish of pastry, a bowl

of jelly, a loaf of bread, and rolls of sponge cake, and, lastly, such forks and spoons as happened to be within hasty reach. All this time the whistle was screeching and screaming, and when it stopped, they knew the boat was at the bridge.

Mr. Russell and Frank started at a pace that threatened destruction to every thing in the basket, and Mrs. Russell and aunt Leda ran after them, placing their bonnets as they went. When uncle Henry and the captain saw them, both shouted "No hurry! no hurry!" but they only caught the word "hurry," and so hastened all the more. There stood aunt Fan and Nellie, leaning over the railing, and laughing right heartily at the plight of the excursionists. When all were safely on board, amid welcomes and congratulations, the boat plowed her way up the lake, having so few passengers besides themselves that it was as if they had chartered her for their own use. It was but a short sail to the landing. When arrived, Frank saw nothing but an old brown

farm-house, wooded hills back of it, a quiet creek finding its way to the lake, and in the distance a long dilapidated bridge, built over a dam in the stream. Upon reaching this, they found it so broken that it was impossible to cross and ascend the hill by the ordinary route.

"Let us climb the banks of the ravine," said one. This was tried, but the banks were too high and steep, and covered with a thicket of briars and low bushes.

"Can we not go up the bed of the creek to the foot of the falls?" inquired another.

"We will try it," said uncle Henry; but he had not led them far when he found there was no path, and that the water was deep above the dam. The gentlemen could pass it well enough by swinging themselves from branch to branch of the overhanging trees and bushes, assisted by some wading. But what could the ladies do?

"We will carry them over," said uncle Henry, lifting his wife in his arms and walk-

ing into the water. He set her safely down on the other side, and came back for the rest, — bearing each over thus, except venturesome Nellie and the dinner-basket, whom and which Mr. Russell, in some way, spirited around at the edge of the pond. The rest of the way up the ravine was easy enough. They crossed and recrossed the stream upon stones, made their way through thickets, and then out upon the flat rocks, the walls of the ravine closing in narrower and higher at every step. When they came upon the flat layers of rock at the side of the water, Fan called out, —

“Come, somebody who is learned enough to tell me what these are,” pointing to remarkably round smooth stones, about a foot in diameter, imbedded in the rocks. “What are they like?”

“Stone pincushions,” said Nellie.

“Footstools,” laughed another.

“Fossil cannon balls,” shouted Frank.

“Tell us, father, what are they? I am sure you know.”

“‘Septaria,’” he answered.

“Just as wise as I was before,” said Fan.

“You will find pictures of them in Dana’s Geology; and there you can learn how the different varieties are formed. You can call them concretions of clay if you choose. Sometimes a fossil shell is found inside, or a cavity containing a ball, or lined with crystals. These, I think, are solid and veined. There is a small variety known as clay-stones, shaped, perhaps, like a bird, or the clasp of a bracelet, a ring, and many other singular forms.”

“Where are such found?” asked Nellie.

“In various parts of the world. They are plentiful on the banks of the Connecticut River, I believe.”

“If we had only brought a hammer,” sighed Fan, “what might we not discover within these stones! My big brother, is not your fist stout enough to break one?” Uncle Henry did not care to try, but promised to carry one home for her.

"Take one large enough for your fancy work-table, and have it sawed and polished. It would be much prettier than your marble-top," suggested Mr. Russell.

"Are you in earnest?" queried Fan.

"Truly," was the reply. "In England the largest are used for that purpose."

After determining to take away some of these odd specimens, the party went on, hearing all the way the roar of the waterfall. A sudden turn in the ravine revealed it at once. Far up toward the sky was a narrow gateway of rocks, topped by the ever-present pines, and, through this straitened pass, the water rushed and fell, white as snow, and broken in a toss of mist. Projecting points in the rocks caught and transformed it into a thousand plumed arrows, which shot into the stream below.

"It is like a long bridal veil embroidered with white arrows," said Nellie, after the first exclamations of delight and surprise were over.

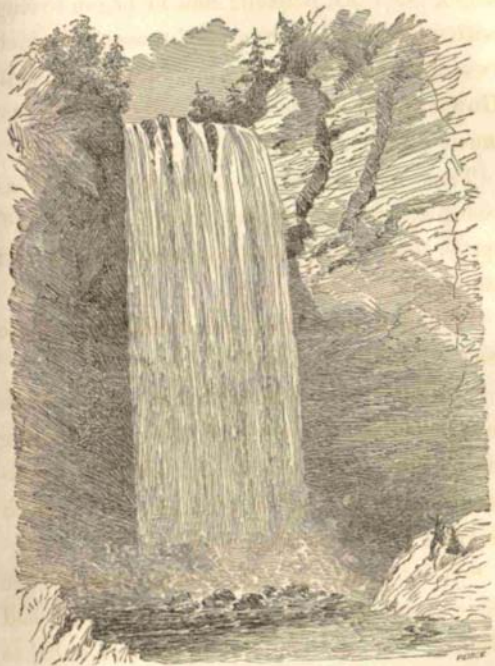
"It may be like the robes of an avenging angel," said Mr. Russell; and he began to sing with enthusiasm a hymn of praise, in which two or three of the party involuntarily joined. How sweetly it echoed and mingled with the music of the waterfall!

They approached as close to the falls as possible, without getting into the clouds of spray, and found seats for leisurely rest and enjoyment of the scene.

"Do you think any one could scale these walls?" asked Frank.

"Never," replied uncle Henry. "The shale rock crumbles too easily to allow safe footing in any crevice. Think of climbing two hundred and ten feet of such rock! Few church steeples are higher than that."

"What a pity that all the world can not see this wonderful waterfall and ravine!" said Nellie. "It just pours and pours, and shakes itself out into all beautiful shapes, and the rocks crumble, every year changing into new buttresses, and throwing out new balconies,



TAGHCANIC FALLS.

draped with vines, and yet nobody sees it all. What a pity!"

"But it is just as obedient to the work given it to do as if all the world stood approving. May ours be done as well, when only God sees," said Mrs. Russell.

While they chatted thus, forgetting that it was already long past the dinner hour, aunt Leda was unpacking the basket. When Mrs. Russell perceived it, she went to her assistance; and it required the ingenuity of both to supply the articles forgotten in their haste. Flat pieces of slate were washed in the stream and laid for plates. For lack of a pitcher, each one could carry his own cup to the waterfall or dip it in the stream.

"So much the better," said Mr. Russell, when the rustic dinner was announced. "My father says salmon never tasted so sweet as when a squaw brought some, laid neatly on a piece of bark, and covered with fresh leaves."

Just as Frank was enjoying a newly-made sandwich, he spied a mollusk clinging to the

under surface of a slab of slate tipped up before him. He sprang up with a shout, and secured a fine 'Succinea,' or amber-snail, of a size not often met with. This reminded him of his intention to look for shells. As soon as he had dined, therefore, he went back to the thicket they had passed, and began tumbling about the logs and scattering the leaves with a stout stick. To his great delight, he found more of the amber-snails clinging to green leaves of branches overhanging the path. There were plenty of the helices by the side of the logs, and not a few of the several kinds found in other places. Pleased with his good success, he hastened back to his mother, and emptied the contents of his pockets into her lap.

"Take care, Frank," said aunt Leda, when she saw the mollusks squirming about. "I said 'nay' to a college boy once, who came to see me with frogs in his pockets and a lizard in the breast of his coat."

"Never mind, Frank," said aunt Fan; "the

girls now-a-days are turning naturalists, too."

"Where did you find this?" asked his mother, noticing a new shell. "I am surprised, for these are supposed to belong only in the seaboard States. It is an imported shell."

"Explain yourself," suggested Mr. Russell.

"I mean they are not native mollusks, but are brought over from England in various accidental ways, as on barrels and boxes that have lain on the wharves."

"I should say they were smuggled over," said uncle Henry.

"Do mollusks live on our wharves, mother?"

"No. But you remember I once told you that in Europe they are more domestic in their habits than with us, living in gardens, ditches, in old walls, or among ruins."

"How did this shell get here, do you think?"

"Perhaps on a canal boat, or by the slow emigration of its ancestors. There are sev-

eral species, once unknown in this country, that are now plentifully diffused through all the States."

"You have not told us the name of this," said Frank.

"*'Helix hortensis.'* Our variety, you see, is plain yellow; but in Europe they are of various colors, and prettily banded with dark brown. These banded shells have been found lately on the little islands near Cape Ann; and it remains to be seen if they lose their beauty when acclimated. You must look on the stalks of plants for these. They are fond of climbing."

"It seems to me snails know a great deal," said Frank.

"They are guided by instinct, not by reason, just as the birds and bees are. Do you not remember what the Book of Proverbs says about 'four things which are little upon the earth,' which are called 'exceeding wise'?"

"No. What is it?"

“The ants are a people not strong, yet they prepare their meat in the summer;

“The conies are but a feeble folk, yet make they their houses in the rocks;

“The locusts have no king, yet go they forth, all of them by bands;

“The spider taketh hold with her hands, and is in kings' palaces.’ Compared with these, the snail is a dull little creature; but the good Creator gave it all the wisdom it needed to make it comfortable and happy. I must tell you about one bright little snail, though. A pair of ‘*Helix pomatia*,’ or Roman snails, were put in a garden for safe keeping. One of them escaped, but finding its companion did not follow, it returned in quest of its fellow-prisoner. So says a naturalist, who observed them.”

It was time now to return to the lake-shore in order not to miss the steamboat. According to his promise, uncle Henry endeavored to take one of the round stones from the rock, but found it impossible to do so without a

hammer and chisel. Fan consoled herself with carrying away a small one, and with her brother's proposal to visit the falls again, better prepared to secure a good specimen. They all passed the pond without accident, and reached the shore before the steamboat came in sight. While waiting, uncle Henry entertained the group with stories of his two years' exile in California in search of gold, making them laugh and almost cry in the same breath at his droll adventures. By and by the boat appeared, and presently they were on board, enjoying a delightful sail down the lake. Nellie and Fan could not be persuaded to stop at Elmwood, as they were expected home. While the rest landed and went to the house, Frank remained on the shore to skip stones with his father, and to enjoy the splendid sunset. He was sorry when the pleasant day had all flown, for the next morning they were to leave Elmwood.

CHAPTER XX.

The Cabinet—*Bulimus Fasciatus*—*La Brillante*—*Glandina*
—*Cylindrella*—The Dissenting Regiment—Work for the
Army.

MUCH as Frank regretted leaving Elmwood, it was delightful to be again at grandpa Martin's. Every day was now especially precious, for his vacation and visit were almost over. As soon as he had received his kisses of welcome, he hastened to the tool-house to see if his partly built locomotive was safe, and to make some alterations in it, having observed more closely the engine of the train that brought them from the lake. So he hammered all the afternoon in the tool-house.

That evening Frank had a present. It was a small box of shells from a friend of his mother, and contained a variety of sea shells, and three or four species of tropical land shells, exceedingly brilliant and pretty.

"Now I certainly have a good beginning for a cabinet—have I not, mother?"

"Indeed, you have," she replied. "To-morrow morning, if you like, you can arrange them all in the large shallow drawer of the bookcase in my room. You will then know better what you have collected, and refresh your memory by classifying them. They will be in better order for packing, too."

Frank could hardly get to sleep that night, for thinking about the wonderful cabinet he should one day possess; and when his thoughts at last glided into dreams, and the dreams floated away, nobody knows where, he was in so profound a slumber that when the "rising bell" rang in the morning, he was sure the night had not been an hour long. If his eyes had not yet opened, he would have known it was a beautiful morning, because he heard his father's voice in the next room, singing with spirit,—

"Behold the morning sun
Begins his glorious way ;

His beams through all the nations run,
And life and light convey."

After breakfast and prayers, Frank gathered together all the shells that had been found during the summer. His mother spread a smooth, soft layer of cotton in the bottom of the drawer, so that when the drawer was opened the shells should not roll about, and then left him to select the helices, and place them by themselves. He did very well, though he labored a long time and made many mistakes. When he had written the names which he could remember on little slips of paper, and placed them under the shells to which they belonged, he called his mother.

"Very well done," she said, after surveying them and making some alterations. She grouped the helices, which had white reflected lips, and next them placed together all those with a simple lip. The succineæ came in the next row, and after these the new shells, which Frank had wrongly placed.

“Did you think they were helices?” she asked. “They were formerly classed thus, but are now separated into a distinct species, on account of the animal. They belong to the same family, however — ‘*Helicidæ*.’”

“What is their name, mother?”

“The name of the species is ‘*Bulimus*,’ so called because the animal eats so much. This variety is ‘*Bulimus fasciatus*,’ on account of these beautiful bands of green, rufous, yellow, and brown, which wind around the white whorls.” (See Frontispiece.)

“Do such shells grow in this country?” asked Frank.

“Yes; these are from Florida.”

“Are they?” he exclaimed. “Then perhaps we can find them some time. His mother smiled as she answered, —

“They are more abundant in tropical America, which, you know, includes part of the southern continent, than any where else in the world; so when you visit Sir Hugh Cum-
ing’s collection, and hear him say that some

of the finest bulimi are from Florida, you will be pleased, will you not?"

"Yes, indeed, said proud Young America.

"Ah, well," added his mother. "I should be pleased, too, that God had not forgotten us in his distribution of beautiful things."

"And where shall I look for them when I go to Florida?" he asked.

"You must go to Key West, or in the vicinity of Cape Ann, and look on the branches of the trees. I believe they never hide in the ground or under the leaves, as our variety does."

"Have we any such shells?" he asked, in surprise.

"There is one variety, about as large as a grain of wheat, which is found in all the States. It lives under leaves and the bark of decayed trees. It is thin, transparent, and so bright and shining that the French call it 'La brillante.' We must search for it the next time we are out. I should not forget to tell you that these banded shells are hatched from

blue eggs, like those of a pigeon, and are carefully kept out of harm's way by being hidden in little green bags."

"Why, mother, how can snails make bags?"

"Oh, they just glue a green leaf together, and then the egg is as safe as a bug in a nut, and the birds won't see it, nor the snakes either."

"How wise that is!" said Frank, admiringly.

"God's wisdom," added his mother.

"You make me feel as if God is just as kind as you or father, to think of such little things."

"Do you not remember the verse, 'As a father pitieth his children'?" What should we do, if He had not thought of each one of us in the midst of all the great universe, and so loved us, too, as to give his only Son, that we might not perish,— we whose bodies fade away into dust just as do the snails and worms? They are obedient to their instincts; but we, with all our knowledge, are so forget-

ful and so disobedient! What should we do without Jesus? And, Frank, did you ever think of him as the Maker of these mollusks?"

"No. God is the creator."

"Who is the 'Word'?"

"Jesus."

"Does it not say, 'the Word was with God, and the Word was God. The same was in the beginning with God.' All things were made by him; and without him was not any thing made that was made'?"

"So it does," said Frank, thoughtfully. "I shall like the shells better than ever."

"Here is another you have wrongly placed. It is different from either the helix or the bulimus. It is called 'Glandina.' The animal is carnivorous; that is, it eats animal rather than vegetable food. The tongue is provided with many rows of sharp hooked teeth, so that it is an anaconda among land shells. It has been known to swallow whole a partly decayed helix, and will attack its own kind,



Glandina Truncatus.

reach its slender tongue far into the shell, and draw out every morsel."

→ "I do not like those fellows. They make me think of the ant-eaters, reaching out their long tongues and drawing in the poor ants. But they have handsome shells. Is this brown?"

"I should call it a pale fawn-color, tinted with rose. The throat of the shell is salmon-color."

"Where is the throat? You never told me of that."

"Inside the mouth, as far as you can see. But do you notice these fine marks, reaching from the apex to the base of the shell? It would be called fluted. The columns of the piazza are fluted. Altogether, I think this a very beautiful shell."

"Is it varnished, mother?"

"No; that is the natural brilliancy of the epidermis."

"I thought we had no brightly colored shells in the State," said Frank.

"I spoke of the helix only when I so said. These inhabit the extreme southern States. And now I wish to show you one more shell, which I put away lest it should get broken. Here it is — a 'Cylindrella.'"

"What an odd looking shell!" exclaimed Frank.

"It is odd," replied his mother, "and so very delicate too. Long, round, and stretching and spreading its throat into the shape of a trumpet, finished with a white rim. How many whorls can you count?"

"Ten."

"There should be twenty-five. Does not the top look as if it had been broken off?"

"Yes. It is broken."

"One might rather say thrown off by the animal, because too long to carry. It is dragged horizontally after the animal, though some say it is poised in the air like a pole on the snail's back. The snail creeps more like a worm than other mollusks, with an undulating movement. The helix, you remember, crawls or drags along. There is another land shell, less beautiful, but is distinguished by having a door to its house."

"Is it on hinges?" asked Frank, laughing.

"It is fastened to the foot, and fits closely inside the mouth of the shell when the animal shrinks within. And then how do you

think it can cling to any object when the door is shut?"

"It can not. It must fall," said Frank.

"Ah, you forget who made it. It spins a thread like a spider, and hangs by that, swinging as comfortably as you would in a hammock."

"Where are these found?" asked Frank. "I wish you could say somewhere near us."

"All in Florida, and in the West Indies. Like the gay little helix, these are presumed to have made voyages and located in Florida. These are not abundant, but are found occasionally under the leaves on the ground. We must place these next to *Glandina*. Those limnææ must go in a corner by themselves, as they are fresh water shells."

"Now shall I not call grandpa to see them? I hear him walking in the hall."

His mother assented, and presently Mr. and Mrs. Martin and Fan came to see the precious cabinet. Each expressed surprise at the variety and beauty of even the home shells.

"And to think of finding such in our own

woods," said Fan. "I knew such things belonged in the world, but I never imagined I was walking among them."

Then Mr. Russell came into the house, heartily singing a national air, and went from one room to another, looking for some one.

"Here we are," cried Fan, over the banisters; "up here, in snail-dom. Come and see Frank's collection, and get ready to say 'Oh!'"

"Bravo!" he exclaimed, when he saw them. "A capital beginning. You have a good mother, Frank."

"I know it," said Frank, with a loving face.

After Mr. Russell had examined and admired the shells, he said he had news for them. "The regiment leaves this afternoon at four o'clock."

"We must go down town, then," said grandpa.

"A flag is to be presented in front of the hotel, on their way to the depot," continued Mr. Russell. "Will you go, Annie?"

"Yes; all must go," said grandpa. "The carriage shall be ready at half past three."

The shells were shut up, and forgotten the rest of the day. The hour for dinner speedily arrived, and the war and the departing regiment only were talked of. After dinner, Fan arranged an exquisite bouquet for one of the officers; while Frank, unable to wait the movements of older people, hastened down town to join the crowd which already filled the streets.

Four o'clock came, and with it a great cloud of dust rolling down the main street. The cloud had warlike music in it, and presently a mass of men in dark blue uniform, and with red, dusty faces, came marching into sight. Close to the ranks were many women, keeping as near as possible to the loved ones whose faces they might never see after that day. The sun poured hotly down, and the new soldiers, with their full and awkwardly packed knapsacks, looked tired already. But cheer after cheer ascended around them, flags

waved from many windows, and the drum and trumpet aided to raise their patriotic feelings above the home yearnings. But for all that, many tears were shed by stout men, and many a heart was almost ready to faint at the awful picture that lay before them. Then the beautiful flag was unfurled, and presented with due ceremony and speeches, and carried to the head of the column, amid deafening cheers for the good old Stars and Stripes. Tears were forgotten, every head was uplifted with devoted enthusiasm, ready to obey the final order to march. A "double quick" movement sent the whole regiment fleeing past friends and strangers alike. But a thousand voices said "Good by" as they went. How those words thrilled along the lines! A thousand uttering them, and a thousand mothers and sisters answering back with hearts almost breaking. What an indescribable sound! A myriad of farewells spoken for eternity,—the cries of Love laid on the altar of Liberty!

Fan and her sister Annie leaned back in the carriage and wept. Their mother's face glowed with the spirit of '76, as she tried to speak comfort to a poor sobbing girl who stood near. It was not to be long before she would herself need the same patriotic words and trust in Providence to sustain her in yielding up two of her heart's treasures. But she foresaw this.

All this time Frank had been standing on the steps of the hotel, close by the speakers, and was able afterward to repeat what the others had not been able to hear in the distance.

"What did the colonel say in reply to the presentation?" asked his father.

"He said he was a monument of the confidence of the people, and that the flag *never* should be dishonored, and much more about himself."

"It is not safe to boast before the battle," said Mr. Russell. "'The race is not to the swift, nor the battle to the strong, . . . but

time and chance happeneth to them all.'” And, truly enough, in just two weeks from that day the whole regiment, flag and all, were made prisoners, without being able to fire a single shot.

Even the knowledge of this would not have abated the zeal of the household in their daily work for the army. The summer evenings were nearly all spent in scraping lint and rolling bandages, or in making up garments for the soldiers, while some one read aloud the news of the day and the movements of the army. A military map of the seat of war was spread upon the table, the better to understand these movements, so that, without knowing it, they were all studying geography and modern history, and the art of war. Thus this evening was spent.

CHAPTER XI.

Fossils — Frogs — The Morning — Brook Snails.

FRANK spent part of the next day with his father, in the quarries on the north side of the town, searching for interesting minerals or fossils. They found a part of the skeleton of a fish in one layer of rock, and shells in others. Frank stretched himself on the flat ledges and chiseled out the shells from their stony bed, while his father hammered and talked with the workmen. One, who lived in a small brown house near by, said he had lately found a petrified snake, and when he went home at noon would get it. Frank went with him, and agreed that it looked far more like a coiled snake than any shell he had ever seen; but he told the workman it was an ammonite, and described to him how very large they sometimes were.

"Four feet across. What do you think of that?" said he.

"Nothing but serpents," insisted the workman, shaking his head. "Books may call them what they've a mind to, but I know they are snakes — nothing but snakes; and that is bad enough, without getting a worse name."

Frank did not think him a docile pupil; and, after showing the ammonite to his father, who paid the man his price, he added it to their already well-loaded basket.

"Ammonites are sometimes piled up with quartz and crystallizations," said his father, as they walked home. "When cut in two and polished they are very beautiful, showing the coil and the large number of wavy partitions within the coil filled up with transparent crystals of various colors."

"Will this look so when it is cut?" asked Frank?

"Not this. It is only filled with limestone. But we may sometime have the opportunity to obtain one such as I described."

On the way they met a gentleman lately returned from Europe. After saluting Mr. Russell, he stopped, attracted by the basket of minerals and hammers in their hands.

"You remind me of what I saw in Sweden," said he. "While I was visiting the mines, a flock of boys came with their professor, each having a sachel swung over his shoulder and a stout hammer in his hand. That is the true way of studying mineralogy, geology, or any other 'ology. Study is not all dry work now, as it was in my day." After a few words more to Mr. Russell, he passed on.

This led to a pleasant chat about other countries, that made the walk home very short. When they arrived, they found Fan and her mother too busily engaged in making jellies for sick soldiers to feel much interest in the fossils. Frank thought it a pity that boys could not work for the soldiers. His grandmother told him to rise early the next morning and pick currants, and that would help the soldiers and her too. He assented.

to this, and Fan offered to assist; and then his mother said she would join them.

When morning came, the birds did not have all the garden to themselves, but it was filled also with laughter, and singing, and pleasant voices. Even grandpa came down the walks, vigorously chanting, —

“ Lord, in the morning thou shalt hear
My voice ascending high.”

At the foot of the garden, a brook flowed by where the currant bushes grew. A rustic bridge was thrown across, and the little stream was made to fill its bed by two or three miniature dams, or grassy embankments. Breaks in these caused the water to be very low at this time, and in many places the sandy or pebbly bed was visible.

When Frank was shuffling along the banks, in the grass, from one bush to another, he was amused at the way in which the frogs sprang from their hiding-places, and plunged themselves into the water, as if the water could

conceal them as well as the grass. Then he went down to the edge of the water with a stick in his hand, I am sorry to say, to tease the foolish frogs; but something caught his eye which made him drop the stick. Wherever the brook was shallow lay clusters of small black shells, such as he had not seen before.

"So, you have jumped in here for your breakfast, Mr. Frog, have you?" said he, gathering up a handful. "I think you will have plenty without these; so, by your leave, I will help myself to part of your feast."

"Whom are you talking to?" asked Fan.

"Only to the people that live in the brook," he answered, and plucked a dock-leaf in which to place his shells.

"Have you found shells in that brook?" exclaimed Fan.

"Yes; and frogs eating their breakfast."

"The frogs swallow the snails whole," said grandpa; "but do you know what can swallow the frog whole in his turn?"

"Tell us! tell us!" said all the voices from the bushes.

"I once saw a snake which I knew from its appearance had just swallowed a frog. I killed it, and the frog jumped out unhurt and lively as ever, and plunged into the brook."

Various exclamations came from the bushes this time, and no one would have believed the story if grandpa had not told it.

"Frank," said Fan, "why do you not look in the brook and pond over at Mr. Cooper's, and see if there are not shells?"

"So I will, after breakfast," said he. When the baskets were filled to overflowing with the red, ripe currants, he carried them in. All who had joined in the gathering had to renew their toilet before appearing at breakfast.

"The poets may sing as much as they please about the loveliness of brushing the morning dew from the grass, but I am sure they never tried it," said Fan, holding up her wet sleeves, wet skirt, and wet shoes. "Just think of a her-

oine, in white dress and kid slippers, tripping through the dewy grass!"

"The inspired poets sing more truthfully as well as more beautifully," said Mr. Russell. "Think of a refreshing dew like this after a hot day in July, and then read the verse, 'I will be as the dew unto Israel; he shall grow as the lily, and cast forth his roots as Lebanon.'"

"There is another verse which is true of us all," added grandpa, "which says of Judah, 'Your goodness is as a morning cloud, and as the early dew it goeth away.'"

"The sun is drying up the dew already," said Frank, pointing to the floor of the piazza and the stones beyond. "Judah could not have been very good."

"Nor the favor of kings worth much," said grandpa, "which, Solomon says, is 'as dew upon the grass.'"

Breakfast was later than usual; and, afterward, Mrs. Russell was too busy preparing the currants for jelly to assist Frank with his

new shells. He left them in a cup of water, not afraid this time of their creeping away, for these were not land snails, and went over to the neighbor's pond. The owner sat on the piazza, reading his morning paper.

"Mr. Cooper, can I have the shells I find in your brook?" he asked of this gentleman.

"Shells in my brook? Bless your heart, boy, there are plenty of stones, but shells belong in the ocean." He laughed in his hearty way, shaking all over, at the boy's odd notion. "Yes; take the boat, and have a sail on the pond, if you like."

Frank thanked him, but instead of getting in the boat, he rolled up his pantaloons, took off his shoes and stockings, and waded about in the broad brook that formed an outlet to the pond. He stooped and picked so constantly that the old gentleman, looking over the top of his paper, could not sit still for curiosity, and went down to the banks to see what it meant.

"Do you really find shells?" said he.

"Yes, sir," promptly replied Frank, wading up to him and holding up a handful. Mr. Cooper laughed again at the muddy, homely little bits. Then Frank took one of the largest, removed the animal as well as he could with a pin, washed the shell in the brook, and gave it to Mr. Cooper. It was clear as crystal, yellow and shining.

"Upon my word!" he exclaimed. "That is pretty. But who would have thought of finding shells in my brook?" He seemed so well pleased that when Frank went home he told his mother about it, and together they prepared a number of them as for the cabinet, and placed them in a neat box upon cotton. Frank carried them to Mr. Cooper for his children, that they might know what beautiful things grew in the brook.

"And now please tell me about them," said Frank, when he came back.

"There is very little I can say," replied his mother. "They never grow very large, and usually are not as pretty as this transparent

variety. They are almost always dark colored, with a red ridge inside the lip, like those you found in the garden. I have seen them dark red, pale yellow, and white. They are called 'Physa,' meaning a pouch. You may know them from the limnææ by the reversed whorls, the mouth being on the left instead of the right side. There is a beautiful large variety found on the shore of the lake. We will go there once more before we return home."

CHAPTER XII.

Physa Vimos—*Pupa Decora*—The Thunder Storm—Snails
in Winter—Sea Shells—Pleasantness of the Study.

A FEW days only of the visit at grandpa Martin's remained. It was arranged to spend one of these at the lake. The first cool morning was selected. Grandma was up early, superintending the baking of biscuits and roasting of chickens, that they might have a substantial dinner in the woods. The gentlemen intended to fish and hunt, and would be tired enough to need a dinner. Notwithstanding all the preparations, they were ready for the trip before the dew was off the grass, and whirled away, in the carriage and chaise, at an hour when city people just begin to think about their breakfast. On the way they left a great basket of apples for the soldiers of the new regiment in camp.

They reached the lake before the sun was very hot, and Frank was able to look a while along the shore for shells. He was not long in finding some very pretty and remarkably



Physa.

large 'Physæ,' three quarters of an inch in length, of a delicate fawn color and polished surface, with a faint red border inside the lip. The largest were empty, though perfect, which does not often happen. The younger ones, smaller and more transparent, were plentiful near the shore, clinging to stones, and covered with a sediment which concealed them from any eyes but those accustomed to look for them. Frank did not see them till his mother pointed out the uneven surface of the stones. Concealed in the same way were numbers of limnææ, of a different kind and hue from those obtained at grandpa Russell's, being much smaller, more solid, and of a faint yellow. He secured an abundance of each kind, that he might exchange them for sea shells

with those who had not the opportunity to collect land or fresh water mollusks. There were other species, also, which Mrs. Russell was not able to name.

"Let us follow the bed of the little stream yonder," said Fan. Her mother had gone on in the carriage to see a friend, and the rest were ready to join Fan. During the warm months the stream was almost dry. A bridge crossed it, a short distance from the lake, but the banks were so high that they could easily walk beneath it.

"How cool it is here!" said Fan; "and now give me credit," she added. "See these mites, not much larger than a pin-head, clinging to the old logs."

"They are 'Pupæ,'" said Mrs. Russell, surprised at finding them. "They like old wood in damp places."

"And see what I have found!" shouted Frank, turning over the stones, and picking from them an abundance



Pupa Decora
magnified.

of small shells, shaped much like a sea shell called trochus, but made of fine grains of sand cemented together, looking like bobinet lace, and formed in whorls like any shell. His mother examined it closely.

"It is not a mollusk. It must belong to the crustacea. See, Frank, the animal is of a bright pea green, and its body is made up of tiny plates, like a coat of mail. It has also what I should call feelers, thread-like, and four of them, and its eyes are placed in front, where we should suppose all eyes belonged."

"What can it be, mother?"

"I can not tell. We must study it out at home."

When the brook wound into the woods, they left it, and went brushing about among the leaves. By careful search, they soon learned to find minute pupæ, hidden in the moss, under old bark; and, once or twice, in turning over damp boards, they were able to brush off a handful of these little mollusks, in

company with a small but brilliant variety of amber snails.

"Those mites are not worth the finding," said Fan.

"Do you know how wonderfully they are made?" asked her sister.

"No. They look like mere dots of mud."

"And yet," said Mrs. Russell, "they have eight whorls, a white, polished lip, and six teeth, almost filling the mouth of the shell." Frank and Fan both tried in vain to see what was described.

"You can not see them well without a magnifying glass. If you wonder at these, what will you think of a variety only one thirtieth of an inch long, with six teeth? But it is impossible to discover the teeth without a good glass."

"How can any thing be made small enough to live in it?" queried Fan.

"Ah, Fan, you forget the creatures that live in a drop of water. You forget that the very air you breathe is teeming with obedient, joyful life."

"Hark, mother! What is that?"

"Is it thunder?" asked Fan.

They thought it hardly possible, but hastened out of the woods to see. The sun was overclouded, and miles away, down the lake, a heavy storm was passing over. It was so far off that it seemed only a mist; but the lightning that shot down from the cloud, and the distant rolling thunder, were proof of the storm. The wind began to shake the tree-tops.

"Can we go home before the rain reaches us?" asked one.

"Yes," said another, "for here comes grandma, with the carriage." The gentlemen at the same time issued from the woods.

"We need not go yet," shouted Mr. Russell. "Don't let us fly like a flock of frightened birds." But the clouds grew darker and drifted nearer, and the rain poured down upon the lake in sheets.

"Believe me, the storm is crossing the lake, —not coming this way. Storm clouds travel

in circles. Wait, now, and see them prove it. We shall only get the fresh breath of the gale."

As he had said, a fresh breeze rocked the trees, — "the voice of the Lord was upon the waters," — the rain descended as if the windows of heaven were opened, and yet the waiting group stood upon the shore, watching the changing picture. The clouds drifted across the lake and over the hills, tossing, rolling, changing in their airy might, but perfectly fulfilling that for which they were sent. The clouds, as well as the wind and the sea, obey the Lord of all.

The rain now seemed only like mist on the hill-tops, as the clouds sailed slowly away to the south.

"If we go now, we shall arrive in town just in time for a drenching," said Mr. Russell.

"Let us wait, by all means," interposed grandpa, "for if it does rain here, we can find shelter." At this suggestion, all were ready to stay. The cool air was refreshing,

and the shading of the sun no unpleasant thing in the midst of a summer day. So they sat upon the grass, and spread the contents of the basket before them, intent upon doing justice to grandma's preparations.

"There is one comfort," said Fan. "This good breeze has blown away all the gnats, mosquitoes, and flies, and bugs innumerable have run and hid under the stones and big leaves, so we shall not have their inquisitive noses prying into our dessert."

"And when we have gone away," added grandma, "they will all come out and gather up the crumbs, like Jesus' disciples, so that nothing will be lost."

"Well, it is wonderful, when one thinks of it," said grandpa, "how economical are the arrangements of Nature! There is always a bird or a bug to pick up the crumbs; and when the bird and the bug die, there is another smaller race ready to feast upon them. If even a plant, or a leaf, or blade of grass dies, others spring up in their place, and draw life

from its dust. Nothing is wasted. What a Creator!"

"There goes the storm," exclaimed Mr. Russell, pointing to the clouds, now drifting rapidly to the west. "It is delightful to sit in the midst and watch the circling clouds, — the flashes and the rain, — as isolated from them as if one stood upon a mountain. But we can not safely remain here much longer."

All enjoyed it. But the possibility of a returning shower caused them to give up boating and fishing, and to make an early retreat homeward. When they arrived, the sky was clear again, the lawn was brightly green after the cool dash it had received, and the trees were dropping diamonds.

"Pleasanter than riding home in the dust, wasn't it, Frank?" said the good-natured Fan. So this last picnic day ended.

"We shall have to leave the snails to their winter's sleep, before we can search again for them," said Mrs. Russell, as they sat on the piazza after sunset.

"How can they sleep all winter?" asked Fan.

"They burrow in the ground, or gather in clusters under the leaves, and remain torpid till the warmth of spring awakens them."

"Do they not freeze?"

"Not unless the season is extremely severe. Then they sometimes perish in numbers. Some species keep themselves warm by making a door to their house and sealing it up tight; then retire further into the shell, make another partition, and continue this till they sometimes have as many as six ante-rooms to their winter bed-chamber."

"How long does it take them to do their carpenter work?" asked grandpa.

"Only an instant. The snail, after withdrawing into the shell, brings itself to a level with the entrance, and covers itself with a secretion something like thin glue. Then it gives a little puff, and the glue-like substance expands into a bubble. The snail draws back quickly, creating a vacuum, and the pressure

of the air outside bends back the bubble till it is flat. Thus it hardens. This happens at the first touch of frost. As the season grows colder, the snail retires further into the shell, and builds another partition, till, as I said, a helix will sometimes have as many as six of these walls."

"How can it breathe in there?" asked Frank.

"It does not breathe at all."

"How does it eat?" asked Fan.

"It does not eat at all."

"Then pray tell us, how does it live?" said both.

"Its heart stops beating, circulation ceases, and the animal becomes torpid, remaining safely thus through all the cold of winter."

"Yes, I understand," said Fan; "it is asleep all over."

"How can it get out of its prison when it wakes up?" Frank asked.

"Eats the partitions and creeps out." They all laughed at this droll way of getting out.

"The beautiful bulimus which you have, Frank, fastens itself upon trees during its torpid state, which happens in the hottest instead of the coldest season. You know it is never very cold in tropical regions, and the heat is as hard to bear as our frost. They seal themselves up from the heat then, and the secretion by which they glue themselves to the tree becomes so hard that either the shell or the bark to which it clings would break rather than this partition."

"Are not the snails very hungry after being shut up so long?" said one.

"Not so ravenous as you might think. How long do you suppose a snail can live without food?"

"Six months," Frank guessed.

"Five years!" replied his mother. "Pond snails have been kept that length of time, and on being placed in water, soon sailed about as lively as ever. A helix, brought from Egypt, was affixed to a tablet in the British Museum. After four years' imprison-

ment, he came out of his shell; but finding he could not get away, crept back again, and walled up the entrance as before. Some one discovered the fact, and placed it in warm water, when it came out again. You will find the picture of this little traveler in Woodward's Manual of the Mollusca."

"Annie, are the inhabitants of the sea as wonderful as the land snails?" asked Fan.

"Even more wonderful. They seem sometimes to possess the wit and wisdom of reasoning beings."

"Can we study them when we go home?" said Frank.

"If you like," was the reply. "But there is enough to occupy you for years. Solomon said truly, that the earth and the sea are full of the riches of the Lord."

Soon after this pleasantly spent evening, Mr. and Mrs. Russell and Frank bade farewell to the old homestead and the dear home faces till another year. Frank finished the locomotive, and gave it to his grandmother, who

was truly pleased with this memento of his persevering diligence.

“I hope you may have as good success in all your undertakings, my dear boy. You remember the words, ‘Seest thou a man diligent in his business? he shall stand before kings; he shall not stand before mean men.’”

And when grandpa bade him good by, he placed his hand tenderly on his head, and said, “‘With all thy getting, get *understanding*.’ Every thing else will pass away.”





