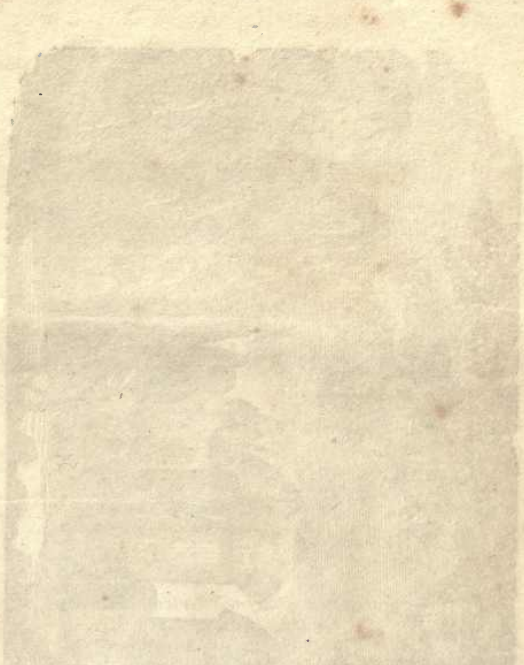

NESTS OF WHITE-ANTS, OR TERMITES. See page 43.

LIFE IN THE INSECT WORLD:

OR,

CONVERSATIONS

UPON

INSECTS,

BETWEEN AN AUNT AND HER NIECES

"The smallest insect holds a rank
Important in the eye of Him,
Who framed the scale of being."

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PREFACE.

In offering to my friends a little book, written under circumstances of peculiar disadvantage, I feel that justice to myself requires an explanation of these circumstances, and that this explanation will sufficiently account for my having conceived the idea of writing a book at all.

Confined to my bed with a painful disease, and suffering from an affection of the eyes which rendered me incapable of reading, writing or doing any thing which requires fixed sight, idleness became almost insupportable; I longed for something to do; something which would pleasantly and profitably occupy my time, and divert my thoughts from bodily suffering. But my situation seemed to cut off every resource. At length I procured an indented card upon which I learned to write with closed or bandaged eyes; and rejoicing in this newly acquired sense, for such it seemed to me, I was anxious to turn it to advantage.

From childhood I have been interested in insects. In their infinite variety and exceeding beauty; in the admirable construction even of the most minute among them; and in the operations of their instinct, they manifest in a peculiarly interesting manner, the power and goodness of the Creator.

"If you speak of a fly, a gnat or a bee," says Basil, "your conversation will be a sort of demonstration of His power whose hand formed them; for the wisdom of the

workman is commonly perceived in that which is of little size. He who has stretched out the heavens, and dug up the bottom of the sea, is also He who has pierced a passage through the sting of the bee, for the ejection of its poison."

With the view of impressing these truths, and exciting an interest, which would induce them to inquire further, I commenced my little stories about insects for the benefit of my nieces, and the children of some of my friends. When the manuscript was nearly completed, I was induced to show it to two or three scientific friends, who encouraged me to give it a wider circulation. This I have concluded to do, although well aware of its many imperfections.

The difficulty of writing as I do, can scarcely be conceived by those who have not tried it. We commonly read as we write; and sight is almost indispensable to facility of expression, and the proper arrangement of subjects. A bandage over the eyes, seems to obscure the mental, as well as the physical vision—we forget what we have said, and what we intended to say, and are liable to continual omissions and repetitions. Had I been differently situated, I might have written more interestingly; but, under the circumstances, I have done the best I could.

I have thought it better to give a pretty full history of a few insects, than to embrace a larger number, and say but little of each; and I have preferred those which are most common, and can be most readily observed, although I have not confined myself to the species which are indigenous. I have avoided the use of scientific terms, where they did not appear absolutely necessary, not wishing to puzzle children with hard names, which they would not be likely to remember.

I shall be truly thankful if my little book has the effect

to discourage that cruelty to insects in which children are so apt to indulge; but if it does no further good, it has already fulfilled an important part of its mission. It has made many an hour pass pleasantly, which might otherwise have been tedious, and almost caused me to forget at times that I was confined within the four walls of my chamber. It has carried me into the fields and woods, and renewed my admiration of the wonderful works of the Creator; and I have rejoiced in the conviction that He, who has so carefully provided for the wants of each helpless little insect, and condescended to become its teacher, will never fail to support and instruct those, who, although gifted with a higher order of intelligence, are equally dependant upon Him, both for strength and wisdom.

LIFE IN THE INSECT WORLD.

EVENING FIRST.

INSECTS IN GENERAL.

Mary. It will be just twenty-four days until the end of this month, and then we shall have spring. I am afraid it will seem like twenty-four weeks to me; how I wish it was over!

Aunt Mary. Time passes quite swiftly enough, my dear child; and if we are pleasantly and usefully employed, and are careful thate very day should be marked by some good action, it will not be very tedious to us. But what is to be done when spring comes? Unless the weather should be very warm, it may be many more

than twenty-four days before we shall see green fields and sweet flowers again.

Mary. Oh, I was not thinking of fields and flowers just now.

Aunt M. What then?

Mary. Little Jane Wilson has been talking to Anna and me about the ants, and says she is very fond of watching them at their work; and has told us some things which seem so strange, I could hardly have believed them, only I know she is a very good little girl, and would not say any thing that is not quite true.

Jane says they will not begin to work again until warm weather comes, and then we are going to watch them together, clearing out their little houses under ground, and carrying up one grain of sand at a time, and throwing it on the heap around their holes.

Anna. Jane told us she had sometimes seen an ant trying to drag a dead fly towards its nest, but finding it too heavy, it went back and brought a number of its friends to help it. She says she is sure insects talk to each other.

Aunt M. I think there can be no doubt that all animals have a way of communicating with

each other; a language of their own, which they perfectly understand, and which not only enables them to assist each other in their labors, but probably adds greatly to their enjoyment. Our Heavenly Father has provided for the wants, the comfort, and the happiness of every creature he has made—the smallest and most feeble, as well as the largest and most powerful; and while I shall be rejoiced to see my dear little girls interested in the examination of *any* of his wonderful works, I shall be particularly pleased to have their attention directed to the ingenious little insects which are almost every where to be found; because, while we observe with interest the larger objects which surround us,—while we admire the beasts, birds, and beautiful flowers,—these little creatures creeping about upon the ground, although equally worthy of our attention, and showing forth, as much as any other class of living beings, the power and goodness of God, are too apt to be overlooked, or carelessly, and often cruelly, trodden under foot. Some of these, particularly in warm countries, are exceedingly beautiful.

If the insect understood such things, it might

well laugh at the pride we take in our bright carpets and richly colored dresses, and spread out before us its own little wings, far more beautifully painted than them all.

Some insects are of the brightest green, some look like gold, others like silver, some are covered with the finest and most silky hair, and you probably know that all the furze on the wing of a butterfly is found, when examined through a microscope, to be composed of the most delicate feathery scales.

Their forms, too, are as various, and often as beautiful, as their colors; and although upwards of one hundred and fifty thousand different *species* or kinds of insects have been discovered, and many of them are so small that they cannot be seen without the aid of a microscope, yet each is perfect in all its parts, and admirably calculated for the station it is to occupy, and the duties it has to perform, in the creation.

Their singular habits, too, the many curious contrivances they resort to for the promotion of their own comfort and safety, and their provision for the wants of their young, are still more calculated to fill us with wonder and admiration.

As we may still have an hour to talk, I should like to tell you something more about these wonderful little creatures; but, in the first place, I must explain to you what an insect is.

Harriet. Oh, Aunt Mary, we all know what insects are.

Aunt M. What are they, then?

Harriet. Flies, spiders, ants, bees, and all such little animals are insects.

Aunt M. Not quite right. You have mentioned the names of a few insects, but even there you are a little out of the way; for the spider, although very similar in most respects, cannot properly be called an insect.

Mary. Spiders not insects! that is very queer. What is the reason they are not?

Aunt M. I will tell you what distinguishes insects from other animals, and you will then see why the spider cannot be classed among them.

The word Insect means *cut into*, and is only properly applied to those animals which have in their backs two deep cuts, separating the body into three distinct parts: the *head*, the *thorax*, or chest, and the *abdomen*, as perhaps you have

noticed in the fly, the bee, the beetle, the grasshopper, and others. The spider has but one of these cuts, consequently but two of these divisions, and for this and other reasons, which I shall explain presently, it cannot properly be called an insect.

Reneé. Then caterpillars cannot be insects, for they have not these divisions.

Aunt M. Caterpillars are in their infancy, and have to pass through many changes before they arrive at their perfect state; but when they become butterflies and moths, they all have these three distinct divisions.

The whole animal kingdom, by which I mean every thing which possesses animal life, is separated, by some naturalists, into two great divisions, called *vertebrated* and *invertebrated* animals.

Vertebrated animals are those whose bodies are supported on a frame of bone, including a *spine*, or back-bone, and ribs. In this division are included men, beasts, birds, reptiles, and fishes.

Invertebrated animals are without this frame of bones, and their bodies are soft; some of them are covered with a hard shell, or horny skin, to

protect them from injury, but others are without even this defence. The whole tribe of insects is included in this division.

Insects are also called *articulated* animals,—can you tell me what articulated means?

Harriet. Articulated means jointed—does it not?

Aunt M. Yes; and they are called articulated, because, though without any regular system of bones, they are composed of many jointed parts.

Vertebrated animals breathe through the mouth by means either of lungs or of gills; insects are without these, but have in their place little breathing tubes, placed along the sides, the openings of which are called *spiracles.*

All insects, when they arrive at maturity, have six legs; although caterpillars, which, as I have told you, are still only in their youth, are provided with sixteen little members which serve the purpose of legs, and are very important to them, by enabling them to cling to the tree or leaf to which they have attached themselves, and to climb up fences and bushes.

The eyes of insects are very remarkable. You

know that animals, generally, have but two eyes, and can only look in one direction at a time; but it is necessary that insects, in order that they may be able to catch their prey, and make their escape on the approach of danger, should see in every direction at once, and they have been accordingly provided, not with two single eyes, but with a collection of eyes; that is, their eyes are furnished with a great number of little lenses, through each of which they can see as through a perfect eye, and by means of which they are able to look in all directions, before, behind, above, and below them, without being obliged to turn their bodies.

The butterfly has thirty-five thousand of these lenses in its two eyes, which, when examined through a microscope, appear like a diamond beautifully cut on all sides.

I have read of a naturalist, named Puget, who took out the eye of a flea, and placing it in his microscope, looked through the microscope, and through the eye, at a soldier who was before him; but instead of seeing but one soldier, he saw what appeared to be a whole army of little soldiers,—and the flame of a candle looked like

thousands of lamps. Do you understand how that could be?

Reneé. Yes; but the idea of looking through the eye of a flea! Why, a flea is so small that you can scarcely see its whole body.

Aunt M. So it is; but you know a microscope makes things appear much larger than they really are.

Reneé. How was it, then, that the soldiers appeared so small.

Aunt M. The lenses of the eye have quite a contrary effect from the microscope; for while they multiply the object, they lessen its size.

And now that I have told you of some of the distinctions between insects and other animals, I can make you understand more clearly why the spider is not ranked among them.

Instead of six legs, it has eight; instead of the two compound eyes I have described to you, it has eight single ones in different parts of its head; and instead of the *spiracles*, it breathes through leaf-shaped gills.

Mary. Aunt Mary, what are those little

things which look like horns, that I have often noticed on the heads of insects?

Aunt M. Those are their feelers, or *antennæ*, as they are called. They are hollow and jointed, and extremely sensitive, and are used by insects for many purposes; but are particularly useful in enabling them to feel their way as they travel from place to place.

Many insects are also furnished with a *proboscis*, or trunk, with which they obtain food; differently formed to suit their various wants. In those which suck the juices of plants and animals, this proboscis is hard and sharp; while in the butterfly it is long enough to reach to the bottom of a flower, to drink the nectar it contains, and capable of being rolled up to keep it out of the way when the insect is not feeding.

The proboscis of the common house-fly has at the end a sort of lip, with which it can readily take up sugar, molasses, milk, or any thing else suited to its taste.

The changes through which insects have to pass before they arrive at their perfect state, are so curious and wonderful that I should like to

give you some account of them; but I shall not have time now.

Harriet. Let us come to-morrow evening, then. I am beginning to feel quite an interest in the little creatures, and should like to know something more about them.

Aunt M. Very well; I shall be glad to see you.

EVENING SECOND.

TRANSFORMATIONS OF INSECTS.

Aunt M. Nature is full of wonders; the most astonishing changes are constantly going on around us: and just because they are *constantly* going on; because the sun rises *every* morning and sets *every* evening, and the stars shine nightly above our heads; because the plants come up *every* spring from the seed which has been sown in the earth, and put forth their beautiful leaves and blossoms; and because animals may *always* be seen around us; they often cease to excite our admiration and our gratitude. But I do not wish that this should be the case with you. I want that your eyes should be open to perceive the wonders and

beauties of creation, and instead of feeling inclined to pass by any object merely because it is common, you should, on that very account, be disposed to examine it more closely.

If you do this, you will find wonders where you least expected them, and will be continually supplied with sources of innocent gratification. Kirby and Spence, in an interesting work written upon insects, say:

"Were a naturalist to announce to the world, the discovery of an animal which, for the first five years of its life, existed in the form of a serpent; which then, penetrating into the earth and weaving a shroud of pure silk of the finest texture, contracted itself within this covering into a body without external mouth or limbs, and resembling, more than any thing else, an Egyptian mummy; and which lastly, after remaining in this state, without food and without motion, for three years longer, should, at the end of that period, burst its silken cerements, struggle through its earthy covering, and start into day, a winged bird,—what, think you, would be the sensation excited by this intelligence?"

Yet these changes are constantly going on in the insect world. From the egg deposited by the butterfly, moth, or other insect, a worm is hatched, entirely different in appearance and habits from its parent, or the animal it is itself afterwards to become.

These worms are called *larvæ*, which is the Latin name for mask, because they contain in them all the organs of the perfect insect, under the appearance, or mask, of a worm. I want you to try to remember these terms; because, if you should hereafter read books upon insects, as I hope you will, you will constantly meet with them, and if you do not understand them, you can scarcely tell what you are reading about.

The *larvæ* spend most of their lives in eating, and subsist chiefly upon the leaves of plants. Their bodies are covered with several layers of skin, and, as they increase in size, the outer one becomes too small, and the worm bursts it open and crawls out of it, leaving it behind as a worn out garment. After a while, the second skin also becomes too small, and is cast off in the same manner; and in this way the different

kinds of larvæ change their skins a number of times before they attain their full size.

When the time has arrived for them to undergo another important change, they leave off eating and commence their preparations. These preparations are as various as the worms are different: some descend into the earth, where they remain several years before they acquire wings; some weave a silken web, in which they wrap themselves as in a shroud; some make their covering of dried leaves; while, with others, the last skin becomes hard and tough, and encloses them as in a case.

In this state they are called *Pupæ*, *Aurelias*, or *Chrysalides*. Most *Chrysalides* are apparently dead, neither moving nor eating; but others both move and eat. These are called *Nymphs*.

When the proper period has arrived for them to escape from their confinement, they burst the case which covers them, and come forth, no longer crawling worms, but beautiful winged insects, with new wants, new pleasures, and a new life. The insect is now called an *Imago*, (which is the Latin name for image,) because,

having thrown off its mask, it has become a perfect image of its species.

Most insects, in their perfect state, eat but little, and do not increase in size. Some live but a few days after they have acquired wings; some a few weeks, some a year, and others longer.

Those which live through the year, generally pass the winter in a state of torpor or apparent sleep. Ants retire to the bottom of their nests, and there remain, sluggish and sleepy enough, until revived by the warm airs of spring.

You know that insects lay their eggs in the summer, and that they are not hatched until the following spring; and although the mother has never felt the cold herself, and the eggs are generally laid in the hottest part of the season, she is always careful to protect them against the storms and frosts of winter. They are generally deposited upon the twigs and branches of trees, and sometimes upon walls and fences, to which they are firmly glued with a sort of cement which insects have the power of producing, and are frequently covered with a coating of the same substance, which serves the purpose of water-proof varnish.

Several kinds of moths cover their eggs with down taken from their own bodies.

The cochineal insect lays her eggs under her, glues herself fast to them, and dies, making her own body a shelter for her eggs; while another insect covers hers with the pupa case from which she has just escaped.

How do you think the insect knows that all these precautions are necessary to defend her eggs from storms and frosts she never felt?

Reneé. God taught her.

Aunt M. Yes; God taught her, and she has obeyed his teaching; and shall we despise or wantonly kill the little insect over which HE so carefully watches? I hope not.

Insects are very useful to man. The bee gives us its delicious honey; the silk-worm supplies us with silk; and in the body of the cochineal insect is contained the beautiful color of which the paint called carmine is made: it is also used in dyeing, and in the preparation of several kinds of medicine. These insects are considered so valuable, that the plants upon which they feed are carefully cultivated, and at

the proper season, they are taken off, killed, dried, and sent to different parts of the world.

The nest of the gall-fly forms the principal ingredient of which ink is made; and the Spanish fly (so called because it abounds in Spain) is used in making blistering ointment.

Anna. I have noticed little bright green specks in the blistering ointment; are they the flies?

Aunt M. Yes, they are the flies ground to powder; their color is beautiful, but they have a disagreeable smell.

There are other and more important uses of insects, of which I may tell you at a future time, if you agree to the proposal I am about to make you.

Anna. What is that, Aunt Mary!

Aunt M. I have been telling you of insects in general; of the way in which they are formed, &c.; and although these things are very important to be known, they are not likely to be as interesting to children as accounts of their habits and modes of living. Now, if you think you would like to hear it, I shall be glad to spend a part of each evening, when I am not otherwise

engaged, in giving you the history of some of those which we are in the habit of seeing every day, as the ant, the butterfly, and so on.

Harriet. I am sure we shall be delighted to hear it.

Reneé. That we shall. May we come to-morrow evening?

Aunt M. I do not know of any thing to prevent. What would you like me to begin with?

Mary. Oh, the ant—begin with the ants.

Aunt M. Very well, we will begin with the ants. But it is time to go to bed now; so good night.

EVENING THIRD.

ANTS.

Harriet. Here we are, Aunt Mary; lessons finished, books put away, and all ready to hear about the ants.

Aunt M. That is right, business first and pleasure afterwards. I am glad to see you.

I have always felt a particular interest in ants. There were a number of ant-hills in our school-house yard, and when I was quite a little girl, I used to take much pleasure in watching them, and was greatly distressed when any of my mischievous school mates kicked them over for the purpose of teasing me. I thought how the poor ants must be dismayed when they found a shower of sand coming down upon them, and saw thus destroyed in a moment the patient labor of many days.

There were two or three of these hills to which

I had taken a particular fancy, and considered especially my own. Every day I watched my little favorites, until I had learned to regard them with a sort of motherly affection. I frequently carried cake and sugar with me from home, which I scattered sparingly around their habitations.

One morning I filled my little paper with sugar, concluding my friends should have a generous treat. I strewed it thickly over the pavement, and soon had the satisfaction of seeing the whole swarm of ants partaking of the delicious food.

After remaining with them as long as I could, I left them still enjoying their feast. The next morning I started full of interest to see how they fared after their repast; when lo! what was my consternation, on approaching the hills, to find them still covered and surrounded, not with living, eating ants, but with the dead bodies of my little favorites, increased to nearly twice their natural size. The greedy little beings had stuffed themselves to death, and I was the cause of all this mischief. I believe I never fed an ant afterward.

I was always much interested in observing the ants meet each other as they passed to and

from their habitations. I noticed that they always stopped and touched together their antennæ, as if they were saying, "How do you do, this morning?"

Sometimes I have seen two long lines of ants meet, who were marching in regular order, (I suppose in search of food,) when each one would successively stop, courteously salute his neighbor, fall again into the line with his companions, and march on as before. But I should have been still more interested had I known as much about them as I have since learned.

Ants always live in families; and if you are surprised at the understanding they display by going, at the request of one of their companions, to assist in conveying the dead fly to their nest, how greatly would your astonishment be increased if you could see the interior of one of their habitations.

Naturalists have taken great pains in the examination of these, by carefully removing the earth which covered them, and have found them, not great holes, as you might suppose, but regularly and neatly built dwellings, consisting of

separate rooms of different sizes, communicating with each other by passages or entries, and often many stories in height. In making these, the ants scrape the earth from the bottom of their nests, and so fasten the particles together, by pressing against them with their feet, as to form solid walls. They prefer working when the earth is moist, so that it can be readily moulded, and will easily adhere; and often take advantage of a light shower to carry on their building, which is afterward dried and hardened by the heat of the sun.

A celebrated naturalist, named Huber, gives an interesting account of the proceedings of a family of little brown ants adding a new story to their dwelling.

A light shower was falling, when he saw a number of these little creatures come up out of their nest and look around them. They immediately descended, and each bringing a little lump of earth in its mouth, they commenced their operations. He sat quietly by them for several hours, and saw them raise regular columns and walls at different distances from each other, forming large and small rooms, and wide

and narrow entries, after which the whole was skilfully covered with a sloping roof.

The form and size of these dwellings differ with different kinds of ants. The nests of the wood ants are very large and strongly built, containing many separate stories, some very deep in the ground, and others a considerable height above it; the lower, intended to receive the young in cold weather and at night, and the upper, for their use in the day-time.

I have frequently seen the nests of a species of wood ant in the pine woods in the southern part of New Jersey, which were from two to three feet in height. The ants themselves were nearly a quarter of an inch in length.

It is believed that some kinds of ants work both day and night, requiring no rest but that which they get through the winter; but the wood ants and some others retire in the evening to their inner rooms, and close the hole in the top of the nest; always, however, leaving two or three of their number to stand without as guard.

Every family of ants is composed of a King and Queen, the soldiers, and the workers; so

called because they are always observed to perform these separate offices in the family.

Reneé. How do they know the difference between them, Aunt Mary? all ants look alike to me.

Aunt M. If you examine them closely, you will find that there is considerable difference in their form; but a very important distinction between them is, that all of them, except the workers, come out of their pupa cases winged insects; but after one or two flights in the air, they shed their wings, and are afterwards satisfied to travel only upon land, and perform their part in the management of their little home.

The queen ant is the mother of the whole tribe, and both she and her royal husband appear to be waited upon by their numerous children with the greatest possible kindness and respect. A large room is always provided solely for their accommodation, which they never leave, and a large body of soldiers and workers are constantly in attendance upon them.

These dutiful children manifest the greatest affection for their queen mother; sometimes crawling gently over her, and sometimes seem-

ing to caress her with their antennæ, and at others standing on their hind feet, frisking about her in the liveliest manner.

If an ant hill is attacked, all the passages and galleries leading to the royal chamber are immediately filled, and it is said the faithful little creatures will die under its walls, rather than suffer it to be entered by an enemy.

The workers build the houses and procure the food; while the soldiers guard the hills or nests from the attacks of neighboring ants and other insects. As soon as the eggs of the queen are laid, the workers take them and place them in rooms or cells built for their reception; and when they are hatched, feed them constantly until they are able to take care of themselves.

In that care and tenderness for their young which is common to all created beings, insects are by no means deficient; and although it would be impossible for the ant-mother to attend to the wants of her many thousand little ones, her kind and faithful attendants perform this duty so cheerfully and affectionately, that she has no need to feel any anxiety on their account.

I will relate to you an anecdote which will

show the strength of their attachment to the young which have been confided to their care.

An ant hill had been broken open, and the inhabitants were seen eagerly seizing certain little white substances, (their young ones,) and hurrying with them to a place of safety. A gentleman who was watching them, cut one of the ants in two. We should suppose that it would immediately have dropped its burden, and forgotten every thing but its own sufferings; but instead of this, it contrived, with the remaining half of its body, to carry ten of the young ones to the inside of the nest before it laid down to die.

The nests of ants have sometimes been disturbed, and grains of salt mixed with the eggs, in order to prove whether hey would be able to distinguish them from any other white substance. But the little creatures were not to be deceived, and as soon as they were again left to themselves, they went actively to work, picked out the salt, threw it aside, and arranged the eggs as before.

After they are hatched, they require feeding several times a day. The manner of doing this is very curious: the old ants swallow the food,

and then throw it up from their stomachs into the mouths of the young ones.

Harriet. Oh, that is too disgusting! I had no idea that any animals fed their young in that way.

Aunt M. No doubt it tastes very good to them, as it appears that this mode of feeding is not altogether confined to the young.

Huber says that he once followed a party of the large wood ants, which he found a considerable distance from their habitation. As they approached the ant hill, several of their companions met them, who probably supposing them to be hungry after their journey, and being themselves well supplied with food, gave it to them in this way. But I have something to tell you, stranger, even, than this. Do you know that ants have cows?

Mary. Ants have cows? Oh, how funny!

Aunt M. Funny enough; but nevertheless true; and these cows are those little green insects commonly called plant lice, which we may see at any time clustered together upon the tender stalks of rose bushes and many other plants. Their proper name is Aphides. It is said they even hold these insects as property.

They are thrown into great consternation if they see an ant, belonging to another nest, attempting to climb the stalk of a plant covered with the insect cows which they consider especially their own, and drive him off with little ceremony. Some kinds of ants carry large numbers of these insects to their nest, and let them feed on the stalks and plants around it; while others secure them in a pen, by building a wall around the place where they are kept. They take the entire charge of their eggs, putting them in a place of safety when the nest is attacked, and carrying them out in warm, dry weather, that they may be early hatched by the heat of the sun; thus absolutely rearing the cattle which afford them so large a supply of good and wholesome food.

A naturalist tells us that one day, as he was looking at a plant covered with these little Aphides, he saw an ant creeping up the stalk. He was at once interested, and carefully watching its motions, observed that it passed several of the insects without disturbing them. At length it stopped, and tapping one of them on each side with its antennæ, the gentlemen ob-

served a drop of fluid issue from its body, which the ant immediately drank. It then went to a large one, which it tapped in the same way, and which yielded a larger drop than the first; then to a third, and so on, until it had thus tapped and drunk from seven or eight of its tiny cows, when it appeared to have satisfied its hunger. This fluid is the honey dew which the insect obtains from the plant on which it feeds.

Ants have the power of throwing from their bodies a very strong smell, which, it is supposed, greatly assists them in finding their way back to their nests, after the long journies which they sometimes make in search of food. It is believed they scent the track, and return by the same road over which they came.

Although ants appear to live in much harmony in their own families, they defend themselves vigorously when attacked, biting severely, and throwing poison into the wound. Most insects have been provided by their Creator with some means of self-defence. They are not capable of reasoniug with each other as we are; and as they are constantly liable to meet with injuries from which they could not be otherwise

protected, they have been permitted to follow those instincts of their nature which lead them to defend themselves, even at the risk of injuring others.

But *we* are very differently situated. Upon us alone has our Heavenly Father bestowed the higher powers of reason; we alone have been created in his own image: that is, he has given to us many of those good feelings and dispositions which constitute his own nature; and he asks that we should exercise these; that we should manifest our affection and gratitude to him by our kindness to the beings he has created; and that, instead of feeling disposed to return injury for injury, we should love our enemies, do good to them that hate us, and pray for them that despitefully use us and persecute us. Let *our* means of defence consist in continual acts of kindness and of love; let us always endeavor to "overcome evil with good."

It is nearly bed time, but, before you go, I will relate to you an anecdote, which will illustrate what I have told you of the soldiers and workers in ant hills always attending solely to

their own business, without interfering with, or even understanding, that of the others.

Huber says, that he once took from the nest of the large wood ant about thirty or forty of the soldiers, with a considerable number of eggs, and put them into a garden vase, the bottom of which was covered with earth; he placed a little honey in one corner, and covered the top with glass.

The poor ants wandered about without seeming to know what to do, either with themselves or the eggs; they did not even attempt to dig out a dwelling, scarcely tasted the food, and, at the end of two days, about half of them were dead. He then threw in one of the workers, which he had taken from the same nest. The poor soldiers manifested their pleasure at seeing their companion by gathering around it, and caressing it with their antennæ. It immediately went to work, made for them a habitation in the earth, took charge of and properly arranged the eggs, and induced its companions to eat the food prepared for them.

Thus the lives of fifteen or twenty were saved by the exertions of a single ant.

A traveller in South America says, that there are a kind of ants in Brazil which travel in large companies, and make a regular journey through the country every year, giving notice of their coming by the rustling of the dried leaves over which they pass. It is a common practice with many of the inhabitants to leave their houses on their approach. The ants enter them, and after effectually clearing them of rats, mice, roaches, and all other annoying little animals, start off again upon their march.

Another kind of ants, also found in South America, make their nests of green leaves, and may be seen marching in long lines, each carrying in its mouth a piece of leaf large enough to cover it, as if to screen it from the sun. From this circumstance, they have sometimes been called the Parasol ants.

As these processions of ants move along, the path, for three or four inches in width, is often perfectly green with them. They make their nests, which are sometimes as large as a hogshead, in the branches of trees. Here they rear their young and pass the winter; but preferring life and liberty in the open air, spend the summer ranging about the woods.

I want to give you an account of the White ants, or Termites, as they are called, which are found in Africa and some other warm countries; but we must leave it until another evening.

EVENING FOURTH.

WHITE ANTS, OR TERMITES.

Aunt M. You have been surprised at what I have already told you of the buildings of ants, but those of the Termites far exceed any others in size, strength, and workmanship. Indeed, these little creatures are the greatest builders in the world.

They are from a quarter to half an inch in length, and their hills are generally from ten to twelve feet high, and so hard on the top that several men can stand on them without breaking them.

A celebrated traveller tells us, that he once saw a number of these hills which were from fifteen to twenty feet in height. Think of an

ant, a quarter of an inch long, raising a building three times as high as a man.

Harriet. That is wonderful.

Aunt M. Yes; their buildings are more than five hundred times their own height.

Reneé. Aunt Mary, if a man could build a house five hundred times as high as himself, how high would it be?

Aunt M. It would be more than half a mile high; four or five times the height of the Pyramids of Egypt.

Anna. Such a house could not be built, could it? or, if it could, it would tumble down.

Aunt M. Such a house never has been, and probably never can be, built; and yet these little Termites, with no other tools than their own jaws and feet, raise buildings as high in proportion to their size as a house a mile high would be to that of a man.

Some of these buildings have forty or fifty stories, each containing many separate rooms, connected by entries; the principal of which communicate with other rooms under ground, and are often carried to the distance of several feet from the hill.

Here are regular rows of columns and arches; the royal chamber, with the rooms of the attendants around it; the store-rooms which are always well stocked with provisions; the nurseries, for the accommodation of the young, and many other rooms used for various purposes.

Reneé. What kind of provision have they in the store-rooms, Aunt Mary? Flies and so on?

Aunt M. No. Although the Termites will eat almost any thing, they prefer vegetable food, and that which they store away has been found to consist principally of the gum of trees.

It is singular, that, while all the rest of the dwelling is of earth, the room used as a nursery is made of pieces of wood fastened together, and nicely lined with clay. To and from this nursery some of the faithful workers are almost continually travelling; first carrying the eggs of the queen, (which, you may suppose, requires no small labor, when I tell you that eighty thousand have sometimes been laid in twenty-four hours,) and afterward feeding the young, who, as soon as they are old enough to leave

the nursery, are taken out and, it is said, are shown through the numerous rooms and galleries of their great building, and instructed in their employments. They pass from one room to another by means of sloping roads, which serve the purpose of stairs.

Experiments have frequently been made upon these ant hills by striking upon them with a stick, and breaking off a part of them; when a soldier ant immediately appears at one of the openings, walks rapidly over the hill, as if to ascertain the extent of the danger, and then retires to give the alarm, whereupon a large number of soldiers issue from the numerous holes with which the building is perforated, and stand ready to defend their home.

If, at this time, they come in contact with the hands or feet of the person who has thus injured them, they will bite severely, and will sometimes suffer themselves to be torn limb from limb, before they are willing to let go their hold. If, however, he retires to a little distance from the hill, and remains quiet for about half an hour, they suppose the enemy has left them, and return into the nest; the workers then come out,

each carrying a particle of earth in its mouth, and commence repairing the breach.

Although thousands are thus employed at the same time, constantly passing and re-passing each other, no confusion appears amongst them —all is industry and order. One of the soldiers alone remains, who walks leisurely around, without taking any part in the labor; but occasionally raising his head, he strikes with his pincers upon the new work, and makes a noise so loud that it may be heard at the distance of several feet from the hill. At this sound, the laborers are always observed to increase their diligence. If, while all is thus quietly going forward, the person who is watching again strikes upon the hill, the scene immediately changes. The workers vanish through the passages and galleries, and the soldiers take their places. When all is again quiet, the soldiers retire, and the laborers return, laden as before, and if permitted to remain undisturbed, continue their work until it is completed.

These little insects often do much mischief by getting into houses and ware-houses, sometimes destroying all the wood work in a single night: but a very curious part of it is, that (having a par-

ticular dislike to eating in the light) they hollow out only the inside of the wood, while the outside appears to be untouched, but will crumble to pieces with the slightest blow, being often no thicker than a sheet of pasteboard.

They dig long galleries under ground, from their hills to the neighboring houses, entering them through the floors or the posts that support the roof. They destroy all the books and papers in their way, as well as cloth and linen, boots and shoes, and indeed almost everything except glass and metal. They then travel back through their long galleries, carrying fragments of wood or any thing else they may wish to take home with them.

An English lady, who has lately returned from India, where she resided several years, told one of my friends, that when she left England, she took with her a trunk containing silk and woollen dresses; but she found the climate so warm that she had no use for this clothing, and the trunk remained unopened for several months. At length she concluded to unpack her dresses, and send them as presents to some of her friends in England; when, what was her astonishment

upon opening her trunk, to find within nothing but a heap of dust. The white ants had eaten through the wooden bottom, and destroyed every article it contained.

Harriet. I was thinking, a few minutes ago, how I should like to see some of these large ant hills, but I am sure I am very glad we have none of them in this country. What troublesome little creatures these ants must be. I do not see what they have been made for.

Aunt M. Very troublesome, it is true, but very useful also.

Our Heavenly Father has created nothing in vain; and they, too, are doubtless designed to serve one of those wise and benevolent purposes which are to be seen in every part of His great plan. In the countries where the Termites abound, there are very extensive forests, and immediately as a tree falls, (as they frequently do from old age,) these little animals attack and soon destroy it; whereas, if it were suffered to remain long upon the ground in a state of decay, (and in these warm climates vegetation decays more rapidly than with us,) it would not only render the country unhealthy,

but would check the growth of valuable plants. They are particularly fond of wood that is old and dry, or beginning to decay; while they have no relish for healthy, vigorous trees, which do not require to be destroyed.

Insects are particularly useful in clearing away all animal and vegetable substances, and have sometimes been called the "Scavengers of Nature."

These ants are considered excellent food by some of the African nations. The Hottentots eat them, raw or boiled, and frequently become fat upon them. They bring large kettles full of them to their houses, and sometimes parch them in iron pots over a gentle fire, and in this state, without sauce of any kind, serve them up as a delicious dish; they are said to taste much like sugar and cream. In the East Indies they catch them in large quantities, and make pies of them.

You do not appear to be at all tired of my Ant story, but I believe I have now told you as much as I can recollect. Do you think of anything else you would particularly like to hear about?

Anna. Tell us about Butterflies, Aunt Mary; they are so beautiful.

Reneé. Oh, yes—do tell us about Butterflies.

Aunt M. I shall be very glad to tell you about them, but it is now nearly nine o'clock; so good night.

EVENING FIFTH.

BUTTERFLIES AND MOTHS.

Aunt M. Anna says, tell us about butterflies, they are so beautiful. They are indeed beautiful; coming with the spring, and hovering about among the flowers, looking, as some one says, like flying flowers themselves—they delight both children and grown people; and they may delight us still more if we look at them as another evidence of the kindness of our Heavenly Father, who has not only given us those animals and vegetables which are really necessary to our support, but has filled the earth with beautiful and pleasant things, to please the eye and gratify the taste. He has painted the flowers with the richest colors, and has given them the sweetest smell; he has covered the

Feathery scales on the wings of the Butterfly—greatly magnified.
See page 59.

earth with different shades of green, the color which is better suited to the eye than any other; and he has so beautifully painted the wings of the butterfly, that although we may attempt to imitate, it is impossible for us to equal its richness.

Every leaf and every blade of grass is perfect in beauty; the fruit which hangs upon the trees is as beautiful as it is delicious; the pretty birds sing their cheerful songs; the little insects go flying through the air; the butterfly flutters about among the flowers; and every thing in creation seems to say, "Rejoice and be thankful—be good and be happy."

Do you remember what I told you the other evening, about the changes through which insects pass?

Harriet. I do.

Aunt M. What are they?

Harriet. There is first the egg, and then the worm, and then the chrysalis, and then the insect with wings.

Aunt M. That is all just right; but what is the chrysalis?

Harriet. The worm shut up in a case.

Aunt M. Yes; and this case is called its cocoon. But what is the worm called before it is shut up in its case?

Harriet. Oh, I cannot remember that hard name.

Aunt M. Can either of you remember what the worm is called?

Reneé. It is called *larva.*

Aunt M. And why is it called larva?

Reneé. You told us larva meant a mask, and that the butterfly was inside of the worm; but I do not understand how that can be.

Aunt M. I will tell you. Have you never pulled to pieces a green rose bud, and seen the leaves of the flower closely folded up in it?

Reneé. Oh, yes, I have often seen that.

Harriet. And so have I.

Aunt M. The green rose bud is as little like the rose as the caterpillar is like the butterfly; and yet there is the perfect rose folded up inside of it: you may see the same in any other flower bud. Just so the butterfly is concealed within the body of the worm; but as you cannot see the leaves of the flower until the bud is pretty fully grown, so the butterfly cannot be distinctly

seen until the caterpillar is nearly prepared for its chrysalis state.

Harriet. Do they cut the caterpillar open to see this, Aunt Mary?

Aunt M. The caterpillar is killed and put into boiling water, when the outer skin can be peeled off, and the butterfly, with its wings folded closely to its body, and enclosed in several thin skins, or membranes, may be distinctly seen.

I do not want to tire you by repeating anything I have already said; but as the changes of insects are most conveniently seen in the butterfly and moth tribe, I should like to give you a more particular description of them.

Although, as I have told you, the butterfly lives entirely upon the sweet fluid contained in flowers, the caterpillar, requiring more substantial nourishment, eats the leaves and buds of plants; and directed by that wonderful faculty which the Creator has bestowed in a superior degree upon the lower animals, and which we call *instinct*, the butterfly never fails to place her eggs upon those plants upon which the future caterpillar is to feed; and although the va-

rious species of butterflies and moths lay their eggs upon very different kinds of plants, they are always those which are best suited to the wants of their young; and if they are removed from these and placed upon others, they generally die.

The young caterpillar grows rapidly; and after casting its skin four or five times, in the manner I have already described to you, it ceases to eat, and commences making its cocoon.

The different kinds of caterpillars place themselves in different situations for the purpose of making this curious covering. Some descend into the earth; some attach their cocoon, which is made of dried leaves or bark, to the boughs of trees; some suspend themselves by a silken cord, which they fasten around their necks; and others are simply glued to any convenient place.

Some kinds of caterpillars remain in this state many months; while others become perfect in a few weeks. During this time great changes are going on: the different parts of the butterfly become perfect and strong; the wings are co-

lored, and the insect acquires new life — the caterpillar is changed into the butterfly.

When it is prepared to make its escape from its confinement, it destroys the end of the cocoon with an acid with which it is provided, or bursts it open in its struggles to release itself, and comes forth in all its beauty.

Reneé. I thought butterflies gnawed off the end of the cocoon.

Aunt M. No; they have nothing to gnaw with. Caterpillars have jaws, or *mandibles*, as they are called, with which they chew their food; but as butterflies live altogether upon fluids, they have no need of these. In some cases, where the cocoon is made entirely of silk, the butterfly or moth pushes aside the elastic threads on the end, and works its way out.

I have told you that the down upon the wings and body of the butterfly is composed of beautiful feathery scales. The forms of these scales or feathers differ in the different species, and even in different parts of the same insect. They are attached, like the feathers of birds, by very minute quills, and lie folded one over the other, like the scales of a fish. It is the color of these

feathery scales which forms the beauty of the butterfly; and when they are rubbed off, the wings are gauze-like and transparent as those of the common fly.

Leuwenhoek, who, by means of a powerful microscope, has made many interesting observations and discoveries, counted upwards of four hundred thousand scales upon the wings of the silk worm moth, which, you know, is quite a small insect compared with many of our butterflies.

We will now go back to caterpillars, as I want you to know what ingenious little creatures they are.

All caterpillars have the power of spinning silk from their bodies of different fineness and color, generally white, yellow, black, brown, or gray, which they use for various purposes. If a caterpillar sees a bird approaching, or if it is in danger of being blown off a tree by a gust of wind, it throws out one of these silken threads and drops gently to the ground; and when the danger is over, it sometimes draws itself up by the same thread, and takes its place again upon the branch. But the silk is particu-

larly useful in making the little tents of leaves in which some of them live, and in spinning their cocoons.

Have you ever noticed the caterpillars which draw together or roll up the leaves of the rose bush?

Harriet. Oh, yes, I have often seen them; we have plenty of them in our garden.

Anna. And so have I.

Aunt M. Did you ever see them fasten the leaves together?

Harriet. No; but we have often pulled them apart, and seen the worm inside.

Aunt M. The eggs of these caterpillars are often laid on the fence or wall above the bush, instead of on the bush itself. They hatch about the time that the young leaves make their appearance, and the little caterpillars fall down upon them, and immediately begin to draw them together, to make a covering to conceal themselves from observation.

I have watched them at this, and it is really a very curious operation. The little head moves rapidly from one side of the leaf to the other, spinning its fine silken thread as it goes, and

drawing the edges together; but it is not satisfied if the smallest crack remains open; and after this is done, it goes into the middle of the leaf, and taking hold of the threads on the under side, draws them down, so as to bring the edges of the leaf together, when they adhere as if they had been glued. The caterpillar, thus hidden from view, feeds upon the buds and leaves of the plant.

There are many different kinds of leaf-rolling caterpillars, some of which curl up the leaves like a roll of paper, and fasten them securely with silk. Some caterpillars cut out pieces of leaf, which they fasten skilfully together, so as to form a little tent or house, in which they live.

But the ingenuity of caterpillars is chiefly displayed in their preparations for their chrysalis state. They seem to know that they are now about to be placed in a very helpless situation, and resort to very curious contrivances to conceal themselves from observation. Some retire to dark, out-of-the-way corners, and fastening themselves to a fence or wall, weave over them a silken web.

Those which are satisfied with this flimsy

covering, remain in their chrysalis state but a few weeks; but others, which are many months undergoing their change, make their cocoons of more substantial materials.

Some cut off pieces of grass, of which they form a little case, fastened together with silk and gluten, and lined with silk.

Some make them of pieces of chickweed, curiously woven together; while others use pieces of leaves or thin bark. They are generally lined with soft silk, so that the caterpillar has a snug little nest to lie in. No doubt you have all noticed these cocoons hanging to the branches of trees, looking like rolls of dried leaves.

Anna. Oh, yes, we have often seen them.

Aunt M. They are so made as to be very tough and strong. It is almost impossible to tear them apart, and they are so firmly attached to the branch that they cannot be shaken off. I have sometimes watched them during a severe winter's storm. The rain came pelting down upon them, and the wind blew, until it seemed as if the branches themselves would break; but, although the little cocoons swung violently back-

ward and forward, they remained firm and strong as the tree itself.

A gentleman placed one of these caterpillars in a box, without providing it either with leaves or bark, and then watched it to see what it would do. But the little creature did not appear to be at a loss; it crawled to the side of the box, and tearing off pieces of the marble paper with which it was lined, made, in a few hours, a snug little cocoon, which it fastened so firmly with silk and gluten, that he could scarcely cut it with a pen-knife.

Many kinds of caterpillars are not satisfied with merely hiding themselves in their cocoons, but take pains, also, to conceal the cocoon itself. When one of these, which is sometimes called the earth-mason caterpillar, is about to prepare for its chrysalis, it goes into the ground to the depth of several inches, scoops out a little cell, and selecting pieces of earth of a suitable size, and kneading them to the proper consistency, fastens them to the sides of the cell, and binds them together with silk. In this way, it builds several walls, one inside of the other, all of which are made firm and strong with silk and

gluten, and the little nest is then neatly lined with fine silk.

Reneé. I had no idea caterpillars had so much contrivance. How I should like to see them making these nests!

Aunt M. It is very difficult to get a good view of them, as they work so far under ground, unless you take the plan of a French naturalist, named Reaumur; who, after permitting the caterpillar to construct a part of its nest, dug it up and placed it in a box. We should have supposed, that being thus disturbed and exposed to the light, it would have stopped work; but insects feel so strongly the necessity of providing for the great change, that they cannot easily be prevented from carrying on their operations. Accordingly, as soon as the poor caterpillar was safely lodged in the naturalist's box, it drew itself out of its unfinished nest, and began to look around for building materials. A little earth was then placed within its reach, from which it soon selected a piece suited to its purpose, which it fitted into the wall, and secured with silk; it then picked out another, which it fitted in the same manner, choosing the larger and

coarser pieces for the outside, and the smaller and finer for the inside of the nest, which it made perfectly smooth.

When the sides were sufficiently high, it wanted to close the opening in the top of the nest, and this, too, must be done with earth and silk, and must be made as strong and solid as the walls.

You know the earth was on the bottom of the box, and when the caterpillar wanted a piece, it had to reach out and get it; but it could not do this any longer, because it had now to shut itself in, and must, of course, work altogether inside of the nest, and yet the top must be made of earth.

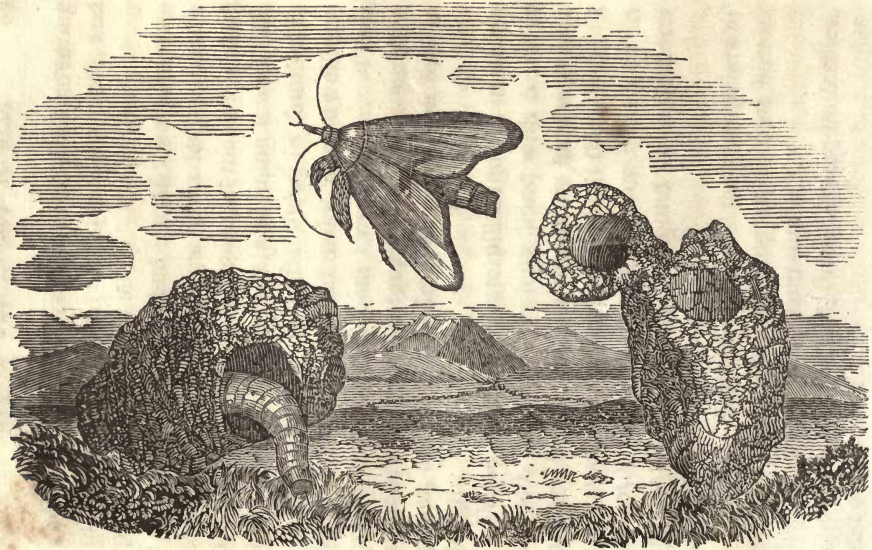
How would you have managed to do this, if you had been in the caterpillar's situation?

Harriet. Indeed, I cannot tell.

Mary. I would have done without a top.

Reneé. I think I know what I would have done. I would have taken some of the earth into the nest with me, and then tried if I could not work it over the top from the inside.

Aunt M. And the caterpillar did just so. It carried a quantity of earth with it into the nest,



Nests of the Earth-mason Caterpillar, with the perfect Moth, &c.

and then weaving over the top a thick covering of silk, took up the earth, piece by piece, and pushed it up into the silk.

The naturalist watched it until the top became so thick that he could see it no longer, but he found the little creature was still moving about; no doubt finishing its nest, and lining it with silk.

Some caterpillars prefer living in families to being always alone, and make large dwellings, where hundreds of them live together. These nests are formed of a tough material resembling paper, and are sometimes two or three feet in length.

When these social caterpillars go out in search of food, they travel in long lines, with a leader at their head; and their nests are kept well supplied with the leaves upon which they feed. I do not know that they have ever been seen in this country, but they are found in some parts of Europe.

Reneé. Aunt Mary, do all the caterpillars of which you have been telling us, become butterflies, or are some of them moths?

Aunt M. Some of them become butterflies, and others moths.

The larvæ of butterflies and moths are called caterpillars; those of beetles, bees, wasps, &c., grubs; and those of flies, maggots. Many people, however, call the whole race worms; but entomologists, by which I mean those who understand the science of insects, which is called Entomology, generally make these distinctions.

Anna. Are moths and millers the same?

Aunt M. Yes; moths are frequently called millers.

Harriet. What is the difference between butterflies and moths?

Aunt M. One of the most important distinctions between them is, that butterflies fly only in the day, and moths generally fly at night. A few species of moths, however, may frequently be seen in the day-time. There is a difference, also, in the form of their antennæ; those of butterflies being thicker at the end, while those of moths are pointed.

The chrysalides of moths are generally wrapped in cocoons of silk, and are mostly somewhat egg-shaped; while those of butterflies are without this silken covering, and are of different forms.

Harriet. I should like to know something about the moth that eats woollen clothes. I have often heard mother say that our woollen clothes must be put away, or they would be eaten by the moths. It is a very queer thing to eat; I should not think it would be at all good.

Aunt M. I am very glad to be reminded of this moth, because it is a very curious little insect, and I should like you to know something about it. Are Anna and Mary sleepy?

Mary. No, Aunt Mary; just look at me,—my eyes are as wide open as ever.

Aunt M. And how are Anna's?

Anna. I am not sleepy, neither.

Aunt M. Then you may stay a few minutes longer, while I tell you about the woollen moth.

This little moth can make its way through very small openings, and even if the closet door is locked and the drawer closed, it will often contrive to glide through the crack or key-hole, and lay its eggs upon any woollen garment it may find there; being careful to place them at considerable distances apart, so that the young

caterpillar may find plenty of materials around it, both for food and clothing; for, like some others of which I have told you, it will not remain uncovered, and as soon as it is hatched, it goes to work to make itself a little garment, or case, of wool. For this purpose, it cuts off the long hairs or nap of the cloth, and using its own body (as is the practice with caterpillars) for a measuring rule, makes a little case just its own length, with a hole in the end, out of which it thrusts its head when it eats, and feeds upon the shorter hairs which form the body of the cloth.

As the caterpillar grows, its case becomes too small, and it is obliged to enlarge it. For this purpose, it cuts it open on one side, and sets in a piece of cloth, more neatly than a tailor could put a stitch in a coat; it then opens the other side, which it pieces in the same manner. It has grown longer, too, and the case is of course too short, and it is obliged to lengthen it by putting a piece on each end;—so that if the original color of the case be white, and the caterpillar, when it is ready to enlarge it, should be placed upon green cloth, it would have a green stripe down each side, and a green piece at each end.

There are at least four different kinds of moths, which will destroy clothing of wool, silk, fur, and leather.

But it is quite bed time; so good night.

EVENING SIXTH.

SILK WORMS.

Aunt M. The rearing of silk worms was so common amongst us a few years ago, that I suppose you have all seen them.

Harriet. Oh, yes, I know all about silk worms. I had some eggs given to me, and when the little worms came out, I took care of them, and fed them with mulberry leaves; but they all died except three, which lived to make their cocoons.

Reneé. I have seen them, too, though I never had any. How pretty their cocoons are!

Aunt M. Suppose Harriet tells us what she knows about them. What color are they, Harriet?

Harriet. Some of them are white, and others gray.

Aunt M. Did you ever see them change their skin?

Harriet. Yes, I have seen them several times. The head came out first, and then the body, and one of them died while it was struggling to draw out its tail.

Aunt M. And how did they spin their cocoons?

Harriet. Father got me a branch of a tree, and two or three little papers rolled up, and one of them then went on the branch, and the two others into the papers. I do not remember much about it, only that the one that was on the branch spun threads of silk from one twig to another, and then spun silk round and round itself, until it was entirely wrapped up in it, and looked like a beautiful little yellow egg. The two other cocoons were white.

Aunt M. That is a very good description; but what about the moths that came out of the cocoons?

Harriet. I only saw one of them come out, but I remember they were pretty, white moths,

and laid their little yellow eggs on a sheet of white paper, upon which mother put them.

Aunt M. Harriet has told us so much, that there is not a great deal for me to tell.

The silk worm, like most other caterpillars, changes its skin four times, and soon after the fourth moult, (as the changing of the skin is called,) it begins to spin its cocoon. This is composed of three different kinds of silk; the loose silk which forms the outside is called floss, and is probably designed to protect it from the rain, as you must remember the silk worm was not intended to be reared in the house, but to live in the open air. The second covering is composed of fine silk, which keeps off the cold, and it is this portion of the cocoon which is principally used in our manufactories. Immediately around the body of the insect, the silk is made firm and tough with gum, which effectually defends it, both from air and moisture. After remaining a short time in its chrysalis state, it destroys the end of the cocoon, and comes out the beautiful little white moth which Harriet has described; but this breaks the thread, and it cannot be wound off. Those, therefore, who keep them for the

purpose of making silk, only allow a few of them to come out, to lay eggs for a future supply; while they remove the floss from the others, throw them into warm water, and stir them about with twigs, so as to wash off the gummy substance that may have adhered to them while the worm was spinning.

They then take the threads of several cocoons at once, and wind them off upon a reel, after which the refuse, consisting of the floss and gummy silk, which I have told you was immediately around the body of the caterpillar, is carded like wool, and used for making coarser stuffs.

The thread which is wound off after the floss is removed is unbroken, and is from six hundred to a thousand feet in length; and yet the cocoons are so light, that it takes upwards of ten thousand of them to make five pounds of silk. Only think what an immense number of worms must be employed to make the vast quantity of silk we now use.

Silk worms were originally brought from China and the East Indies, where the first silk was manufactured many hundred years ago, and sent from thence to Europe in small quan-

tities. But it was sold at such an extravagant price, that it was considered too expensive to be worn even by kings; so that when the Emperor Aurelian was asked by the Empress if he would give her a silk dress, he answered that he could not afford it; and James the Sixth of Scotland borrowed a pair of silk stockings from the Earl of Mar, to appear in before the English ambassador.

The Roman people could not imagine of what the beautiful article was made; some thought it was the inside of a spider-like insect, that was first fed upon a sort of paste, and afterwards upon the leaves of the willow, until it burst with fat; some thought it was produced by a shell-fish; some that it grew upon trees; while others believed it to be made by a worm, which built nests of clay, and collected wax.

Some of these insects were afterward sent into Persia, and they were soon spread over various parts of Europe, where the mulberry trees (upon the leaves of which they feed) were cultivated, and the manufacture of silk was extensively carried on.

There are several other species of caterpillars,

besides the common silk worm, which weave silk capable of being manufactured; but it is of a coarser kind, and has not yet been made of much use.

I remember having heard Reneé repeat a pretty little piece, called "The Silk Worm's Will." If she can recollect it now, I think we shall all be glad to hear it.

Harriet. Oh, yes, Reneé, do repeat it to us.

Reneé. I will, if I can remember it; I have been thinking about it this evening.

THE SILK WORM'S WILL.

On a plain rush hurdle a silk worm lay,
When a proud young princess came that way.
The haughty child of a human king
Threw a sidelong glance at the humble thing,
That took, with a silent gratitude,
From the mulberry-leaf her simple food,—
And shrunk, half scorn and half disgust,
Away from her sister child of dust;
Declaring she never yet could see
Why a reptile form like this should be,
And that she was not made with nerves so firm
As calmly to stand by a "crawling worm!"

With mute forbearance the silk worm took
The taunting words and the spurning look;

Alike a stranger to self and pride,
She 'd no disquiet from aught beside,
And lived of a meekness and peace possessed,
Which these debar from the human breast.
She only wished, for the harsh abuse,
To find some way to become of use
To the haughty daughter of lordly man,
And thus did she lay a noble plan
To teach her wisdom, and make it plain
That the humble worm was not made in vain;
A plan so generous, deep, and high,
That, to carry it out, she must even die.

"No more," said she, "will I drink or eat!
I'll spin and weave me a winding-sheet,
To wrap me up from the sun's clear light,
And hide my form from her wounded sight.
In secret then, till my end draws nigh,
I'll toil for her; and when I die,
I'll leave behind, as a farewell boon,
To the proud young princess, my whole cocoon,
To be reeled and wove to a shining lace,
And hung in a veil o'er her scornful face!
And when she can calmly draw her breath
Through the very threads that have caused my death;
When she finds, at length, she has nerves so firm
As to wear the shroud of a crawling worm;
May she bear in mind, that she walks with pride
In the winding-sheet where the silk worm died!"

Anna. That is a very pretty piece, but the silk worm could not think all that.

Aunt M. Of course not; but the piece is intended to show that it is wrong for us to despise any living thing, and it is an excellent reproof to those silly people, who, while they are vain of their silken finery, look with scorn upon the little animal that made it.

EVENING SEVENTH.

DEATH WATCH, &c.

Anna. Is the Death-Watch an insect, Aunt Mary? I remember a little girl once telling me, that for several nights before her father died, they heard the death-watch ticking in his room. She said that some one told her the noise was made by an insect, but she did not believe it. She had always before heard it was a sign of death, and she was now perfectly sure that it was so. For a long time afterward I always covered up my head when I went to bed at night, for fear I should hear the death-watch.

Aunt M. I am glad to be able to satisfy you upon this point.

The death-watch is an insect; very small and perfectly white, with a yellow mouth and red

eyes. It is very much afraid of being discovered, and generally chooses to make its habitation in old wood, sometimes in old books, or the paper on walls, and frequently in the back of an old bureau, where it has little fear of being observed, or intruded upon; and lives very snugly, quite unconscious of the alarm it may occasion by its ticking, which is produced by the striking of its head and wings against the wood where it has taken shelter.

Some ignorant persons have supposed that because they heard the sound, without seeing any thing which could produce it, it must be intended as a sign to them of approaching death; and as the noise very much resembles the ticking of a watch, it has, from this circumstance, been called the Death-Watch. This foolish notion has been handed down from father to son, and even now, it appears, causes little girls to tremble, and cover up their heads at night, lest they should hear the dreaded sound.

I recollect some amusing lines of Dean Swift's, which I will repeat to you:

"A wood worm
That lies in old wood, like a hare in her form,

With teeth, or with claws, it will bite, it will scratch,
And chamber-maids christen this worm a Death-Watch;
Because, like a watch, it always cries click—
Then wo be to those in the house that are sick!
For, sure as a gun, they will give up the ghost,
If the maggot cries click, when it scratches the post.
But a kettle of scalding hot water injected,
Infallibly cures the timber affected:
The omen is broken, the danger is over;
The maggot will die, and the sick will recover."

Anna. I am sure I shall never be afraid of the death-watch again.

Aunt M. I hope not.—There are some other insects which have also been regarded by the ignorant with superstitious feeling; one called the Death's-head Moth, which makes a sort of crying sound, as well as several different kinds of beetles. It seems rather hard that the poor little creatures are not allowed to use their natural language, without being looked upon with dread and horror.

There is an insect called the Praying Mantis, which the ancients considered sacred, and would not suffer to be killed; because, as it was frequently observed holding up its fore paws in the attitude of prayer, they believed it to be extremely devout. But more enlightened observation

proves that it only throws itself into this position, that it may be able more readily to pounce upon its prey.

While the life of the Mantis has been thus carefully preserved on account of its devotional attitude, the Turks have considered it an equally solemn duty to destroy a certain species of Lizard, common in the East, because, by always going about with its head bent downward, they believed it intended to mimic them at their prayers.

Superstition has always been one of the greatest enemies to the improvement and happiness of man; but as the world is becoming more enlightened, many of these foolish notions are gradually passing away. About one hundred and fifty years ago, persons afflicted with any disease which affected them strangely, and which could not be accounted for, as well as those suffering from derangement of mind, or manifesting any striking peculiarities, were believed to be possessed of evil spirits, or, as they termed it, bewitched; and the individual who was suspected of having exerted this influence over them, was liable to be tried before the

court, condemned, and cruelly put to death. It used to be a common practice to nail a horse shoe on the outer door of a house, to keep off the witches.

But although people have become convinced of the absurdity of these notions, there are some things, almost equally ridiculous, which still cause much unhappiness to persons of weak minds, and often sadly frighten innocent little children.

When a looking-glass, for want of a secure fastening, falls upon the floor and breaks; when a piece of furniture, as it expands and contracts with the changes of the weather, makes a cracking sound; when a dog happens to stop and howl under the window; or a harmless little insect chirps in its secret hiding place; they believe it to be a sign of death to some individual in the house, and thus often occasion themselves a vast deal of unnecessary misery.

Reneé. But, Aunt Mary, suppose a death should follow immediately after the sign, as it did with the father of the little girl Anna spoke of a while ago, what are we to think then?

Aunt M. That the sign had nothing at all

to do with it; or rather that it was no sign at all. Was the little girl's father sick at the time they heard the sound?

Anna. Yes.

Aunt M. And he would have died whether the insect had ticked or not, and it would have ticked whether he had died or not; although, probably, the family might not then have noticed it, or, if they had, it would soon have passed from their minds, and been entirely forgotten. It is very probable that they may have heard the same sound, or others equally ominous, twenty times before; but as no death followed, no account was taken of it.

Although you are little girls, you can readily see, that if a sign is a true one, it must be true always; if it fail in one single instance, then it is certainly proved to be false: it cannot be a true sign if it has ever been known to fail.

I want you, my dear little girls, not only to rid yourselves of all these silly superstitions, but to try to convince those poor little children, whose opportunities for gaining the right kind of education are far more limited than your own, that there is no cause whatever for their

foolish fears; and that many of those things which they have been taught to look upon as signs and omens, can be explained entirely to their satisfaction, and found to proceed from perfectly natural causes. Remind them, and always keep in remembrance yourselves, that we are all under the care of a kind and loving Father, who sleeps not by night, nor slumbers by day; that not a sparrow falleth to the ground without His notice; and surely He who careth for the sparrows, will never forget his dependant children.

But we have talked about superstition till it is so late, that I will not commence the subject I had proposed for our conversation this evening. I intended to tell you something about Crickets; but perhaps our time has been quite as profitably employed, and we will leave them for the present.

EVENING EIGHTH.

CRICKETS.

In our city houses we have not much opportunity of becoming acquainted with the little crickets which, in the country, often chirp so merrily in the chimney corner, of a winter's evening.

There is nothing very remarkable about this little insect, neither is its chirping particularly musical, but it seems to have a peculiarly pleasant and soothing effect upon the mind; and it is probably on this account that we see it so frequently and pleasantly alluded to, even by our best writers. The celebrated poet, Milton, chose to pass many of his thoughtful hours in a spot where crickets resided:

> "Far from all resort of mirth,
> Save the cricket on the hearth."

Crickets are of the same tribe or family of insects as the grasshopper, which they resemble in appearance. The sound of which I have been speaking is made under the wings, and only by the male cricket; the female is always silent.

They do not require as much of the mother's care as most other insects; for as soon as they are hatched, they are sufficiently strong and active to seek their own food, and may be seen hopping about the hearth when they are not much larger than a flea.

They do not provide houses or nests for the accommodation of themselves and their young, but establish themselves in warm chimneys or ovens, where they scrape out holes in the mortar, and take up their winter quarters. They generally prefer a kitchen chimney where there is a constant fire, and where they can readily supply themselves with board as well as lodging; for they are fond of bread, vegetables, broth, and pot skimmings, and are very willing, also, to have a little animal food occasionally, in the form of a cockroach, or some such dainty. They have often been known to destroy wet

woollen clothes, which have been left hanging around the fire at night, but it is believed it is not the wool they fancy, but the moisture it contains.

Harriet. I have sometimes heard crickets, but I never could get to see them.

Aunt M. They are very much afraid of noise and light, and do not often make their appearance in the day-time; but when the house is quiet and dark, they come out of their hiding places, and hop about the room in search of food. If a light is brought, they are alarmed, and may be seen quickly and lightly hopping back to their holes in the wall. This jumping motion and their lively music has probably given rise to the common saying, "as merry as a cricket."

A woman, whose chimneys had been for a long time the resort of crickets, had become exceedingly tired of them, and tried various means to get rid of them, but in vain. At length she succeeded by accident. She had a wedding in her house, and a band of music for the entertainment of the company. The noise of the drums effectually frightened the poor crickets;

they left the house, and never afterward returned to it.

Although these little creatures, like ourselves, love a warm fire in the cold winter season, yet as soon as summer comes with its soft airs and warm sunshine, they prefer fields and gardens, where, in the bushes, among rubbish, or in the cracks made in the ground by dry weather, they will chirp merrily enough; but on the approach of winter they return to their old retreat in the wall.

There are several kinds of crickets: those about which I have been telling you are called House Crickets.

There is also the Field Cricket, which is of a beautiful green color, and lives in a hole made in the ground, about five or six inches in depth. In passing by a field on a warm summer evening, you may sometimes see great numbers of these pretty little insects standing at the entrance of their holes, and singing their evening song; but it is almost impossible to get near enough to examine them, for as soon as they observe you, or hear the sound of your footsteps, their song ceases, and they quickly disappear under the ground.

It is said the Africans and Spaniards keep crickets in cages, for the sake of their music, as we do singing birds.

Anna. What a shame, to take the poor little things out of the fields, where they are so happy, and confine them in a close cage!

Harriet. It is no worse than keeping birds in cages. When I was in the country last summer, and saw the birds flying about, and heard them singing in the trees, I thought how wicked it would be for me to take one of the pretty little creatures, and shut it up in a cage. I saw, too, what I never saw before—a nest in a bush, with several young birds in it. I often went to see them, but was very careful not to go near enough to frighten them. One day I saw the old bird coming toward the nest with a worm in her mouth; I hid myself behind a bush, and stood quite still. The little ones all began to chuckle, and the old bird dropped the worm into the mouth of one of them, and then flew away and brought another, and another, until she had fed them all. The little ones seemed so glad to be fed, and the mother so happy in feeding them; and then I thought, suppose I was to

take away the mother, how the little ones would grieve, and wonder what had become of her, and at last die for want of food; and she, poor thing, would be shut up all the time in my painted cage, and every time she sang I should think she was mourning for her young ones, and begging me to let her go to them.

Aunt M. She would, indeed, have mourned sadly, pecked at her prison bars, fluttered her wings, and struggled to get out. And she would not only have grieved for the little ones she loved, but for the freedom she had always before enjoyed, and perhaps wondered what dreadful monster had deprived her of it. How she had rejoiced in the free use of her wings, flying through the air for miles together;—how she had sat in the trees, and sung in the fulness of her joy, or chattered merrily with her companions;—how she and her beloved mate had twittered over the straws, as they wove their nest;—how carefully she had tended the dear little ones, searched for food for them, and taught them to fly—and what is her situation now? Deprived of all these sweet pleasures, fed upon unnatural food, and confined in a

space so small that she cannot use her wings, and is only allowed to hop from one perch to another. After a while she might become so far resigned to her hard lot as to try to amuse herself by singing in her cage; but which of us could listen with pleasure to the song of the poor prisoner.

Reneé. I would not, for any thing, keep a bird in a cage that had been taken from the woods; but how is it with canaries, Aunt Mary? I have heard they were born in cages, and could not live out of them.

Aunt M. Canary birds are natives of warm climates, but were originally taken from their own woods, and brought to our country. The Americans were so much pleased with them, that they took pains to rear them themselves, and most of those we now see have been born in cages, and could not live if set at liberty. Still I should rather not *own* a canary bird, and should be very unwilling to *buy* one.

Reneé. Why so?

Aunt M. I do not like to see birds in cages; it reminds me of the liberty of which they have been deprived; and, besides, if *I* have a right

to keep a canary bird, of course every one else has the same right; and if every one did so, the demand for them would be so much increased, that it would be an inducement to persons trading between here and the Canary Islands, and other places where they are found, to bring a fresh supply of them from their native woods; and if I were to happen to meet with such a trader, and tell him that I thought it very wrong for him to bring these poor creatures from their own country, to make them prisoners in this, he would very naturally and properly say to me, "Why it was for you and such as you that I brought them. If I had not seen that the Americans were so fond of these birds that almost every one of them had one in a cage, I should never have thought of doing so." Do you not see, then, that I should be giving encouragement to the cruel act?

Mary. But what are people to do who have canaries, Aunt Mary? I suppose they are not to kill them.

Aunt M. Keep them, and take good care of them. They should be provided with a very large cage, so that they can use their wings, and

should be allowed to come out frequently and fly about the room.

Harriet. Are not squirrels taken from our own woods?

Aunt M. Yes; and it is quite as cruel to make prisoners of them as of birds.

But we have almost forgotten the crickets, and the evening is nearly spent. There is one more species, however, of which I must tell you before we leave the subject. This is the Mole Cricket, which burrows in the earth, and makes extensive galleries under ground, like the Mole, from which it derives its name. For this purpose it is provided with large, powerful arms, and strong, sharp claws, while its breast is covered with a thick horny case to protect it from injury. Thus armed, it readily makes its way through gardens and hot-beds, eating off the roots of vegetables as it goes, much to the annoyance of the farmers, who are very unwilling thus to be deprived of the produce of their land. But the cricket has no scruples upon this point; it has a perfect right to its share of the good things with which the earth is abundantly filled, and takes them freely.

When the cricket is ready to lay its eggs, it makes a little hollow in the ground, places them in it, and covers them lightly with earth, sufficient to conceal them from observation, but not enough to prevent them from receiving the benefit of the sun's warmth, as it has been wisely taught that heat is necessary to hatch them. But we have talked quite long enough; so farewell.

EVENING NINTH.

AMERICAN LOCUSTS.

Aunt M. Neither of you can remember the last appearance of the locusts in this part of the country, as it is now ten years since they were so abundant amongst us.

Reneé. Why, Aunt Mary, *we* have seen locusts. As Mary and I were going along the street one day last summer, we met a little boy who had one, which he was treating very cruelly. He tied a long string to one of its hind legs, and holding the other end in his hand, he let the locust fly as far as the string would allow it, and then jerked it back again. In this way he had broken off one of its legs, and was tying the

string to the other, when we were so distressed about the poor thing that Mary cried, and we both begged him to give it to us; but he only laughed at us, and said he intended to have a great deal of sport with it yet. We were on our way to a candy store, and I had some money in my hand, which I offered him, and he then gave us the locust.

Mary. Yes, and it was so pretty that I should have been very glad to keep it, but I only held it a minute, while I stroked and patted it, and then opened my hand, and away it flew, glad enough to get off.

Aunt M. You have good cause to remember the locusts, my dear children; and, I have no doubt, the satisfaction of setting the poor insect at liberty was far sweeter than any thing your money could have bought you. The gratification of eating candy would soon have been over, but the recollection of a benevolent action will be sweet for ever.

The kind of locusts of which you have spoken may be seen every summer; but they appear only in small numbers, and are much less remarkable than those of which I am about to

tell you, which are called, for distinction, the Seventeen Years' Locust, as it is a very curious fact that these insects do not appear in the same part of the country more than once in about seventeen years; when they come up out of the earth, where they have so long lain buried, scatter themselves over the trees, bushes, and ground, and fill the air with their music.

When the locust leaves the ground, it is in its chrysalis, or nympha state, as you may remember I told you that those chrysalides which eat and move (as is the case with the locust) are called nymphs. It immediately makes its way to the nearest tree or bush, fastens itself to it, waits a few minutes until its skin becomes dry, when it bursts it open in the back, works itself out of it, gradually expands its delicate wings to the sun and air, and in a few hours flies away, leaving its shell behind it.

For several weeks before it leaves the ground, it ascends to the top of its hole in the day-time, in warm, dry weather, apparently for the purpose of receiving the benefit of the sun's warmth, and descends to the bottom in cold weather and at night. The sides and top of the hole are

nicely cemented, for the purpose of excluding water.

The Seventeen Years' Locust is about an inch and a half in length, and of a reddish-brown color, with transparent, gauze-like wings. To each of its feet are attached two claws, and it may frequently be seen carefully cleaning these, and removing from them every particle of dust and dirt, that they may be kept fit for service.

Like the cricket, the male alone is musical; and the sound, which is a loud humming noise, is produced by rubbing upon an instrument situated under the wings. During the last locust year, I spent several weeks in the country, and was interested in making some observations upon the locust, and found, that by pressing my fingers upon the upper part of the wings, I could produce the sound made by the insect. In an apple orchard, which we visited, there were thousands of them upon the trees, fences, and ground, keeping up a loud and continual concert.

Reneé. I hope I may be in the country next locust season. I suppose we should not see any thing of them in town?

Aunt M. They have sometimes been very abundant in our public squares, and have even been seen coming up between the bricks of the pavement.

About a week after leaving the ground, the female locust selects a small branch of a tree or shrub, in which, with a sharp, hard instrument, resembling a knife, attached to the extremity of her body, she cuts a deep groove, deposits her eggs in it, and carefully seals the opening with a sticky cement, with which, as I have told you, insects are provided. Soon after this she dies. Indeed the locust season lasts but a few weeks; and it must seem curious, after having seen them thickly strewn over almost every tree and bush, and listened to the incessant sound of their music, to find they have entirely disappeared, leaving no traces of their wonderful visit except the holes which they have made in the ground, the skins still fastened to the trees, and the withered twigs in which they have deposited their eggs. This is the only injury they commit, and this is of no great importance, for the branches do not always die, unless several deep cuts have been made in them, so as to obstruct the circulation of the sap.

In about six or seven weeks after the eggs are deposited, they hatch, and the little insects creep out and enter the ground. There they often attach themselves to the tender roots of grasses and other vegetables, and, it is supposed, live upon the moisture from their surfaces. Thus they live and grow for *seventeen years*, and when this long under-ground life is over, they come up out of the earth, as their parents did before them, burst the shell which covers them, enjoy for a few weeks the air and sunshine in their new state of existence, lay their eggs, and die.

Locusts are eagerly sought after by various kinds of animals. Rats and hogs hunt them out, and eat them before they leave the ground; and as soon as they make their appearance, they are devoured by squirrels and birds. A friend of mine tells a curious story of a duck, which had swallowed so many living locusts, that they made a loud noise and violent struggling in its throat. But having once secured its prisoners, it had no disposition to release them, and kept them down despite their efforts to escape.

It is said the Indians think them an excellent dish when fried.

During the last locust season, some of the economical housekeepers of New Jersey made pretty good soap of them.

And now, if one of you will hand me that box that stands on the table, I will shew you something curious.

Mary. Here it is. Oh, what a pretty little bottle full of water! and what are these little things in it?

Aunt M. The bottle is filled with alcohol, and those little things are locusts.

Reneé. Locusts! Why I had no idea locusts were so small; they are not more than quarter the size of a pin's head.

Aunt M. These are the locusts just as they issued from the egg. They were collected by a gentleman during the last locust season, and were sent me by a friend a few days ago.

Harriet. How did the gentleman manage to get them, Aunt Mary?

Aunt M. He placed a bottle on a branch immediately under the eggs, and, when they hatched, the little locusts fell into the bottle. My friend says that they were very active when alive, scrambling over each other so rapidly

that he was obliged to look very closely to see the perfect shape of the body, which was plump and purely white. You see they are a little colored now, from having been kept so long. Now I want you to look at one of them through the microscope.

Mary. Oh, yes; I have never seen a microscope.

Anna. Neither have I.

Aunt M. Very well, you shall all see it. Here it is. But we will first take one of the little fellows out, and put him on this piece of black silk. Now shut one eye, and look through the glass with the other; that is right. How does it look now?

Mary. Why it looks very large.

Aunt M. How large.

Mary. Oh, I don't know, but very large; a great deal larger than it did before.

Aunt M. Suppose we give the microscope to Reneé now, and let her tell us how the locust looks.

Reneé. It looks nearly half as large as a pea, and I can see its little head and legs.

Aunt M. How many legs has it?

Reneé. One, two, three, four, five, six. I

remember, Aunt Mary, you told us insects always have six legs.

Aunt M. So I did; and I am pleased to find you remember it. I told you, too, that most insects begin their existence in the state of a worm, but you see the locust is different in this respect, being of the same form when it is hatched from the egg, that it is when it comes out of the ground, seventeen years after,—in its nympha state,—though the perfect insect is then formed under the skin which covers it, which it bursts open and casts off, as I have described to you.

Now you may all look at the little locust, and we will then put away the microscope, for it is getting late.

Mary. I wish I could see a horse through a microscope; it would look as big as a house.

Reneé. What a queer idea! Do you suppose you could see a horse through such a little glass as that?

Aunt M. We can see horses well enough without looking at them through microscopes; but we will put it away now.

I have much to tell you, that is interesting, of the African Locust, but we will leave it until another evening.

EVENING TENTH.

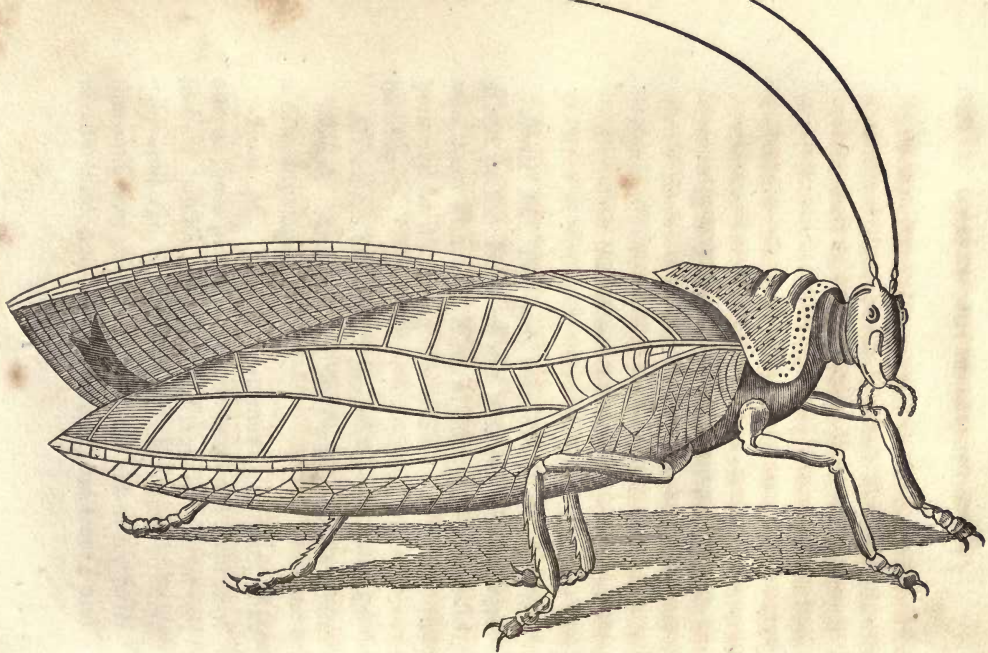
AFRICAN LOCUST.

Aunt M. Do you remember the account given in the Bible of the plagues which were sent upon Pharaoh, King of Egypt, because he persisted in detaining the children of Israel in bondage?

Harriet. Oh, yes, I remember it very well.

Reneé. And so do I, for I was reading it but a few days ago.

Aunt M. You may remember, then, that one of these plagues was an immense swarm of locusts, which, in the language of Scripture, "covered the face of the whole earth, so that the land was darkened, and did eat every herb of the land, and all the fruit of the trees; and



DESTRUCTIVE LOCUST OF AFRICA—Natural Size.

there remained not any green thing in the trees, or in the herbs of the field, through all the land of Egypt." It is of such locusts as these that I am now about to tell you.

They are so different, both in habits and appearance, from those of which I have already spoken, that it seems hardly proper to call them by the same name. They are very much like our common grasshopper in shape, although much larger, being about three inches in length. They are of a reddish color, beautifully variegated with yellow and black, and their wings are of different shades of green. Their long hind legs enable them to leap to a considerable distance, and their large gauze-like wings carry them rapidly through the air. They are the most destructive insects of which we have any knowledge. They are common in Africa and the southern part of Asia, and have sometimes been seen in Europe, passing over the country in vast swarms, tearing off the twigs and leaves of trees, devouring young plants, and, in short, destroying almost every green thing that comes in their way; but of this I will give you a particular account presently. It is better to begin

at the beginning; and we will first see how these insects are hatched. The eggs are laid in a hole or cell made in the ground, the inside of which is carefully lined with cement, and the top sealed over with the same substance, and then covered with earth. Each of these cells contains about a million eggs, all of which hatch nearly at the same time, and the little insects, each covered with a shell or case, such as I have described to you in the account of the American Locust, creep out and commence their march in search of food, all travelling in the same direction. And now the work of destruction commences; for the hungry little beings devour every thing as they go, making the country desolate before them.

They eat and grow so rapidly, that in about a week they are ready for their change; when they climb up the stalk of a plant, burst the skins which cover them, and come forth the beautiful, winged insects I have described to you.

For several days they leap about the ground, and try their wings with short flights; but as soon as they feel themselves sufficiently strong,

they fly off in swarms, headed, it is said, by a king or leader, whose flight they watch, and whose motions they observe. When he alights, the whole swarm follows his example, and when he rises, they rise also. It must be almost impossible, without seeing them, to form an idea of the appearance of these great flights of locusts, making a noise with their wings, as described in Scripture, "like the rushing of horses unto battle." Whole fields of grain are destroyed by them in a few hours; the air is darkened with their numbers, and the trees bend under their weight.

They always travel with the wind, which frequently blows them toward the sea, and as they are unable to remain long on the wing, they are often obliged to alight upon the water, and thus great numbers of them are destroyed, and either become the prey of fishes, or are washed back by the waves upon the shore. I have read an account of a swarm of locusts which passed over Italy, about one hundred years since, which so obscured the sun at noonday, that people could not see each other's faces a short distance apart. They were about four hours in passing.

In Southern Africa, in the year 1797, the ground, for the space of nearly two thousand square miles, was covered by these insects, which destroyed every leaf and blade of grass in the neighborhood. A strong wind at length drove them into the sea, and when washed upon the shore, they formed a heap of from three to four feet in height, for fifty miles in extent; and when this enormous mass decayed, it tainted the air to the distance of one hundred and fifty miles.

It is said, that the governor of one of the provinces of Africa, once sent out four thousand of his soldiers to destroy the locusts.

Reneé. That seems odd enough; but still, I think it was better employment than killing their fellow beings.

Aunt M. Far better, and far less degrading.

Many interesting accounts of locusts are given by persons who have travelled in the countries where they are found; a few of which I will mention.

Dr. Clark says that a swarm of locusts alighting in the road over which he was travelling, completely covered his horses and carriage, and

he could compare them to nothing but heavy flakes of snow, so thickly did they fall around him.

Captain Riley, the commander of an American vessel, who was cast away upon the coast of Africa, and taken prisoner by the Arabs, says, that as he was travelling with some of the natives, through one of the most fertile provinces, he saw what he supposed to be a great cloud of smoke, rising with the wind, and rapidly approaching them. He remarked to one of his companions that "there must be a monstrous fire in that quarter." "No," he replied, "they are only locusts." As they approached nearer, every man who was at work in the fields left his employment, and stood gazing at them with consternation and dismay, fearing that his field might become the prey of these devouring insects, and all the fruits of his labor be destroyed in a few hours. They passed on, however, and descended at a short distance from them. As the party moved on in the same direction, they found the ground thickly covered with them; and as they rose to avoid being crushed to death by the mules, they were con-

stantly coming in contact with their faces and bodies. Captain Riley covered his face with his handkerchief, to protect his eyes from injury, and pushed on his mule as fast as possible. They covered the earth for about eight miles in length and three in breadth, and the party were two hours in passing them.

I have so far spoken only of the mischief which these little animals do. Let us now see if we cannot find that they are also of some use to the inhabitants of the countries where they abound. It appears that, from the days of Moses to the present time, they have constituted an important article of food to many of the Eastern and African nations. Moses, in his instructions to the children of Israel, has particularly mentioned the kinds they were at liberty to eat: "Even these of them ye may eat, the locust after his kind, and the bald locust after his kind, and the beetle after his kind, and the grasshopper after his kind." We read in the New Testament that John the Baptist lived upon locusts and wild honey, while in the wilderness of Judea. It is most probable it was this kind of locust.

Archibald Robins, one of Captain Riley's crew, who was also made prisoner by the Arabs, gives an interesting account of the manner of catching and cooking the locusts, in the Great Desert of Zahara, where he lived with his Arab master. I have had the Journal brought, thinking it would be interesting to you to hear it in his own words. If Reneé will turn to page 170, we shall be glad to hear her read it to us.

Reneé. Here it is. He says: "In and about this valley, were great flights of locusts. During the day they are flying around very thickly in the atmosphere, but the copious dews and chilly air, in the night, render them unable to fly, and they settle down on the bushes. It was the constant employment of the natives in the night to gather these insects from the bushes, which they did in great quantities. My master's family, each with a small bag, went out the first night upon this employment, carrying a very large bag to bring home the fruits of their labor. My mistress Fatima, however, and the two little children, remained in the tent. I declined this employment, and retired to rest under the

large tent. The next day the family returned loaded with locusts, and, judging by the eye of the quantity produced, there must have been about fifteen bushels. This may appear to be a large quantity to be gathered in so short a time; but it is scarcely worth mentioning when compared with the loads of them gathered, sometimes, in the more fertile part of the country over which they pass, leaving a track of desolation behind them. But as they were the first, in any considerable quantity, that I had seen, and the first I had seen cooked and eaten, I mention it in this place; hoping hereafter to give my readers more particular information concerning these wonderful and destructive insects, which, from the days of Moses to this time, have been considered, by Jews and Mahometans, as the most severe judgment which Heaven can inflict upon man. But whatever the Egyptians might have thought in ancient days, or the Moors and Arabs in those of modern date, the Arabs who are compelled to inhabit the desert of Zahara, so far from considering a flight of locusts as a judgment upon them for their transgressions, welcome their approach as the means, sometimes, of saving them from

famishing with hunger. The whole that were brought to the tent at this time were cooked while alive, as indeed they always are, for a dead locust is never cooked. The manner of cooking is by digging a deep hole in the ground, building a fire at the bottom, as before described, and filling it up with wood. After it is heated as hot as is possible, the coals and embers are taken out, and they prepare to fill the cavity with the locusts confined in a large bag. A sufficient number of the natives hold the bag perpendicularly over the hole, the mouth of it being near the surface of the ground. A number stand around the hole with sticks. The mouth of the bag is then opened, and it is shaken with great force, the locusts falling into the hot pit, and the surrounding natives throwing sand upon them to prevent them from flying off. The mouth of the hole is then covered with sand, and another fire built upon the top of it. In this manner they cook all they have on hand, and dig a number of holes sufficient to accomplish it, each containing about five bushels. They remain in the hole until they beccme sufficiently cooled to be taken out with the hand.

They are then picked out, and thrown upon tent-cloths, or blankets, and remain in the sun to dry, where they must be watched with the utmost care, to prevent the live locusts from devouring them, if a flight happens to be passing at the time. When they are perfectly dried, which is not done short of two or three days, they are slightly pounded, and pressed into bags or skins, ready for transportation. To prepare them to eat, they are pulverized in mortars and mixed with water, sufficient to make a kind of dry pudding. They are, however, sometimes eaten singly, without pulverizing, by breaking off the head, wings, and legs, and swallowing the remaining part. In whatever manner they are eaten, they are nourishing food."

Aunt M. It is not only by the inhabitants of the Great Desert that the locusts are hailed with joy. The Hottentots also give them a hearty welcome, and make many a hearty meal upon them, too,—not only eating *them* in large quantities, but making a sort of coffee-colored soup of their eggs.

Locusts are cooked in various ways; roasted,

boiled, and fried. Sometimes they are ground up in hand mills, or pounded between two stones, and then mixed with flour, and made into cakes and baked. They are also salted and smoked, and packed away against a time of scarcity. It is said they taste very much like fish, and are particularly light, delicate, and wholesome food. They are carried into many of the towns of Africa by wagon loads, as we bring poultry to market.

Harriet. The Africans seem to be particularly fond of eating insects; I confess I do not admire their taste.

Aunt M. It is well for them that they are willing to eat such things as Providence has placed within their reach; but I do not know that it is any worse to eat locusts than oysters, —we eat *them* whole, and often raw.

Anna. Oh, Aunt Mary, I think it is a great deal worse.

Aunt M. Why so?

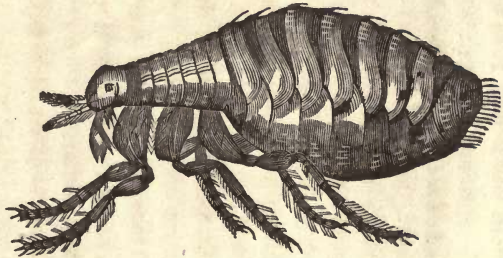
Anna. Why I don't know exactly, only we know oysters are very good, and——

Aunt M. And we do not know how good locusts are; we have been accustomed to eat-

ing oysters, and we have never eaten locusts—that is about all.

We have now had a long talk, and I think when you read again in the Bible about locusts, you will feel as if you knew more of their history than you ever did before.

The Children. Indeed we shall.



FLEA—AS SEEN THROUGH A MICROSCOPE.

EVENING ELEVENTH.

FLEAS.

Aunt M. Have you your lessons ready for to-morrow ?

Harriet. Oh, yes; we learned them all before supper.

Aunt M. Then if you will come into my room, we can have a little talk about insects. What do you say to that ?

Harriet. That will be delightful; it has been so many weeks since we have heard any thing about them, I began to be afraid we were not to hear any more.

Aunt M. I did not think, when I gave you the account of the locusts, that it would be so long before I should be able to spend another

evening with you. In the meantime the weather has become warm, and the evenings short, but we may still have an hour; so come into my room, for I have a curiosity to show you.

Mary. Well, Aunt Mary, what is the curiosity?

Aunt M. What do you think?

Reneé. Indeed, we can't guess—do tell us.

Aunt M. It is a flea which worried me considerably last night, and which I succeeded in catching this morning, and have put into a little box with a glass top.

Mary. Only a flea! I thought it was a curiosity.

Aunt M. It is a great curiosity, as I will show you presently. I want you to look at it through the microscope.

Mary. Oh, the microscope!—the microscope! I forgot all about the microscope.

Aunt M. Here, then, is the flea, and here is the microscope. Now let us have the lights properly arranged, and get the glass in the right position. Do you see him now, Anna?

Anna. Oh, yes; who would have believed the flea was that shape?

Aunt M. How does it look?

Anna. It has a little round head, and large eyes, and its body is long and roundish; there are its feelers, too, looking just like little feathers: but what is that little thing growing out between them, right in the middle of its forehead?

Aunt M. That is the proboscis, the instrument through which it sucks the blood. It stands straight up and thrusts this little sucker into the flesh, and when it has completely filled itself, instead of going away satisfied, it begins to throw off the blood, and suck again; and if it does not happen to be killed or driven away, it will continue for hours sucking and throwing it off.

Harriet. Now let *me* see; what curious, hairy-looking legs it has!

Aunt M. Those legs are powerfully strong, and have several joints; and when the flea is prepared to leap it folds them up closely, and then lets them all spring out at once, which throws its body to a very great distance. It has been calculated that if a man possessed the strength and agility of a flea, in proportion to

his size, he could leap from Philadelphia to New Orleans at a single jump.

Some time since, a man was travelling about the country, amusing the people by exhibiting fleas harnessed to a carriage, at least fifty times their own weight, which they pulled along with great ease; another pair drew a chariot, and a single flea a brass cannon. I have heard of a watch-maker in London, who made a little iron carriage, with four ivory horses, the figures of four persons inside, and two horses behind it, all of which were easily drawn by a single flea.

A gentleman travelling in Italy saw a number of fleas for sale, with little steel and silver collars around their necks; he purchased one of them, which he permitted at particular times to suck the palm of his hand, and it enjoyed this privilege for several months, when the cold killed it.

It is not very common, however, for people to be fond of fleas, or take much pains to cultivate their acquaintance; though I have read of an old lady who expressed her surprise at the complaint of one of her young friends, who was

confined to the bed with a broken limb, and was sadly annoyed by fleas. "Dear miss," said she, "don't you like fleas? Well I think they are the prettiest, merriest little things in the world; I never saw a dull flea in all my life."

In the West Indies, and some other warm countries, there is a small sand flea, which makes its way under the skin, particularly under the toe nails; and as it enters without being felt, and causes no other sensation than an unpleasant itching, it is sometimes neglected, and suffered to remain until it becomes as large as a pea. It lays its eggs under the skin, and if they are not taken out, they hatch, and produce running ulcers.

The natives are very dexterous in extracting these fleas, or chigoes, as they call them; breaking the skin and carefully taking them out with a needle. The removal of the eggs is a delicate operation, as they are contained in a bag or bladder, which, if not skilfully extracted, is apt to break, and leave some of the eggs behind to produce more chigoes.

I have heard of a man who, being anxious to study the history of these insects, permitted a large number of them to establish themselves in one of his feet; but it was not long before his foot mortified, and had to be taken off.

We have none of these things to dread in our country; our fleas occasioning us no further inconvenience than a little itching when they come to make a meal upon us.

Among the Indians, however, they are very troublesome. My brother says that when they remove from their tents, or wigwams, as they call them, the ground for many yards around is often completely covered by these insects. He once rode out, with several of his friends, to see a wigwam which had been deserted by its inhabitants. His companions remained behind, but he, forgetting the fleas, jumped from his horse and entered the wigwam; it was summer, and he was dressed in white, but he had not been there many minutes before he was so completely covered with fleas, that it would have been difficult to tell the original color of his clothes. He immediately ran to a consider-

able distance from the wigwam, and brushed them off with his hands; then to another place, and brushed off more; and so continued until he succeeded in clearing himself of them, as he supposed, effectually; though after his return to the place where he stayed, he found thirty of them in his stockings.

I recollect a curious old English verse, recommending wormwood as a preventive against the attacks of fleas:

"While wormwood hath seed, get a handful or twaine,
To save against March to make flea refraine:
Where chamber is swept and wormwood is strown,
No flea for his life dare abide to be known."

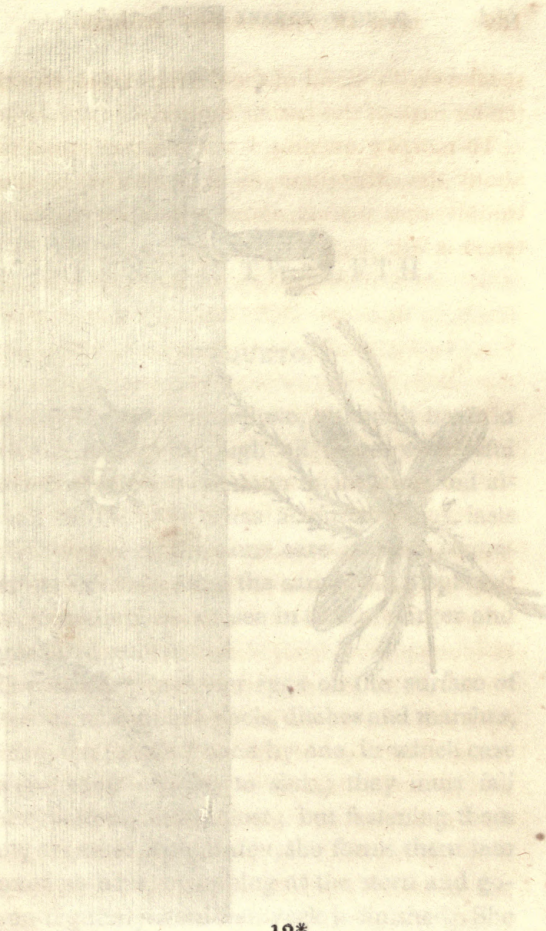
Harriet. Are fleas of any use in the world?

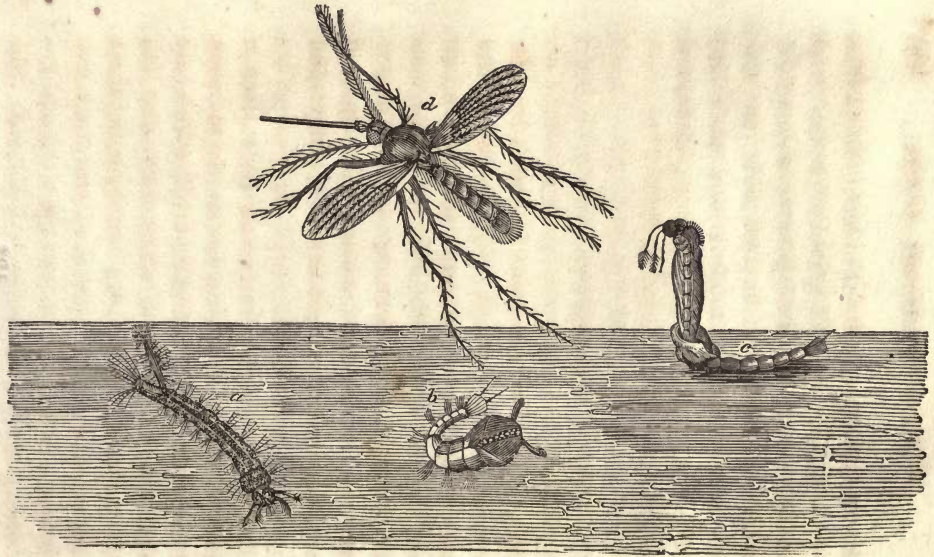
Anna. I suppose God would not have made them if they were not.

Aunt M. That is an excellent answer; one with which we may rest quite satisfied. I suppose fleas enjoy their existence—that is something. Whether they are of any use to man, I do not know; it is quite probable they may afford food to other animals. In the formation of *many* of the creatures which God has made, we can trace the benevolent design; in *all* we may

see the skilful hand of the divine Artist, and the tender care of the loving Father.

To-morrow evening I will tell you something about the Musqueto, as it is another of those troublesome insects about which very little interest is felt.





MUSQUETO IN ITS DIFFERENT STATES.

Fig. *a*. Larva. *b*. Chrysalis. *c*. Musqueto leaving the water. *d*. Perfect insect. All magnified.

EVENING TWELFTH.

MUSQUETO.

Aunt M. The musqueto, although born in the water, passes through all those wonderful changes which are common to insects; and although its life, after it has acquired wings, lasts but a few weeks, the same care is taken to preserve its existence, and the same skill displayed in its formation, as we see in that of larger and longer lived animals.

The mother lays her eggs on the surface of the water in stagnant pools, ditches and marshes, not dropping them in one by one, in which case (being heavy enough to sink,) they must fall to the bottom and be lost; but fastening them firmly together with gluten, she forms them into a complete boat, beginning at the stern and going on regularly until her work is finished. She

understands boat building better than we do in some respects, as her little boat will not fill with water, and cannot be made to sink.

A naturalist, determined to prove this, placed half a dozen of them in a tumbler half filled with water, and then holding a quart bottle a foot above them, poured a heavy stream upon them. But although this treatment was so rough as actually to throw one of them out of the glass, the remaining five continued to float, without a drop of water in them. They were afterward pushed to the bottom of the glass, but immediately came up, apparently as dry as before.

Each of these boats contains from two hundred and fifty to three hundred and fifty eggs, which are soon hatched, the grubs issuing from the lower part.

Soon after they are hatched, they may be seen floating on the surface of the water, swimming about, generally with their heads down and their tails up, having in the latter a sort of funnel-shaped tube for breathing. In this state they live upon those very minute animals which are always found in water, and which are so small that they cannot be seen with the naked eye,

although they afford food to a great number of insects. They are called *animalcules.* The musqueto catches these, and conveys them to its mouth by means of little hooks attached to its head.

After existing for a short time in the state of a worm, it becomes a chrysalis; and enclosed in its little case, it lies coiled up on the surface of the water, taking no food, but unrolling itself and descending to the bottom when disturbed.

When the proper time has arrived for it to leave the water and take its place among the inhabitants of the air, it stretches itself out at full length, bursts its skin at the top, and drawing itself out with its wings closely folded around it, it raises its head, and using its skin, which is still attached to the lower part of the body, as a boat, begins to float to land. This is a dangerous moment; for if a drop of water gets into its little boat, or a puff of wind blows it over on its side, it may sink instantly. It generally arrives safely, however, and spreading its wings, goes whirring and whizzing about in the air, as if it had never known any other element.

And now, if I have succeeded in making you

feel some interest in the musqueto, I should like to show you one through the microscope.

Reneé. I did not know before that there was any thing curious about musquetoes, but I am beginning to feel quite an interest in them. I think I shall not be so provoked at them when they bite me again.

Aunt M. It is very wrong to be provoked at them; we should remember that they are only taking their food, without being at all sensible that they are doing us an injury. They are very annoying, it is true, and we are at liberty to protect ourselves against their attacks as much as possible; but we do ourselves far more injury, by becoming irritated and giving way to our tempers, than these little insects have it in their power to do us. Let us now take a look at the little fellow.

Reneé. Why I thought its body was smooth; but it is covered with scales and hairs. Just look at it, Harriet, and see its wings how beautifully they are marked.

Harriet. Yes, I see them; and its antennæ look like feathers.

Aunt M. Now let Anna and Mary look at it; do you see its sucker?

Mary. Yes, I see it.

Aunt M. This little sucker, which, you see, is finer than a hair, has enclosed within it five separate lancets, several of them having teeth on one side. These lancets cannot be seen without the aid of a powerful microscope, and it would of course be utterly impossible for the hand of man to form any thing so small; yet they are all fashioned with the most exact nicety. With these it pierces the skin, and then throws a poisonous fluid into the wound; it is supposed for the purpose of thinning the blood, and rendering it easier to suck.

Musquetoes require very little food, and it is believed that when they cannot get blood, they are satisfied with sucking the juices of flowers and fruits. It is said indeed that the male musqueto never tastes blood.

In marshy places musquetoes are often very abundant, and have sometimes been seen rising in columns from four to five feet in width, and to the height of forty or fifty feet; looking so much like thick columns of smoke, that persons at a little distance have given the alarm that there was a fire in the neighborhood.

They are, of course, very annoying to the in-

habitants, who are obliged to keep their doors and windows closed to prevent their intrusion into their houses.

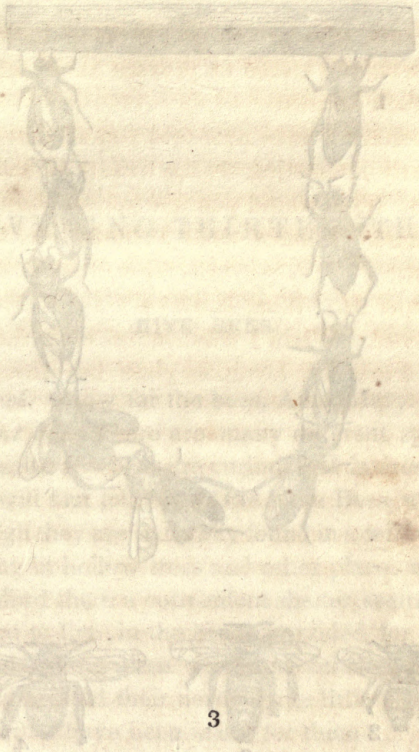
I believe I have now told you all that is particularly interesting in the history of the musqueto. What would you like to hear about next?

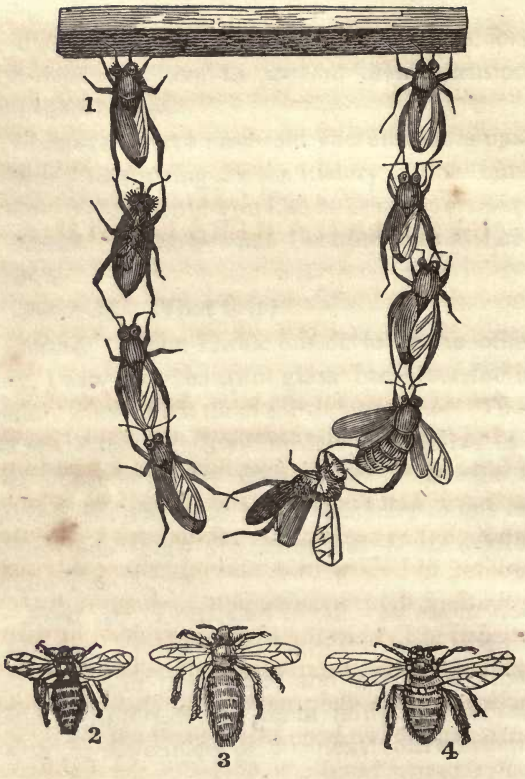
Reneé. I know what I should like to hear about.

Aunt M. What is it?

Reneé. When I was out of town the other day, I saw five beautiful glass bee-hives full of bees. I watched them for a long time. They were constantly in motion, but I could not find out what they were doing; and I thought to myself, I wish Aunt Mary was here to tell me what those bees are about, but I will ask her when I get home.

Aunt M. I intended to tell you about Bees sometime, as they are among the most interesting insects in the world; and as Reneé is particularly interested in them now, we will take them for the subject of our next conversation.





HIVE BEES.

Fig. 1. Wax-workers secreting wax. 2. Working Bee. 3. Queen Bee. 4. Drone.

EVENING THIRTEENTH.

HIVE BEES.

Reneé. Now for the bees, Aunt Mary.

Aunt M. There are many different species of bees, all of which are curious and interesting; but I will first tell you of the Hive Bees, which, although they are naturally found in a wild state, building in hollow trees and other places which will afford them a convenient shelter, seem well satisfied to live in the hives provided for them by man, as the wren and some other birds are willing to build their nests in the little boxes or houses that have been made for them.

For many hundreds of years, the habits of these wonderful little insects have been carefully studied. We read of one man who spent his

whole life in forests, for the purpose of examining them. But it was not until the invention of glass hives, a hundred and thirty years ago, that their proceedings could be distinctly observed. Since that time they have been carefully studied by many naturalists, who have spared neither time nor labor in ascertaining the important facts respecting them.

Three kinds of bees are found in the hive: the queen bee, the drones, and the working bees.

The queen bee is the mother of the family, and governs the hive; the drones are males, and live a life of idleness, taking no part in the labor of the household; while the workers build the cells, take care of the young, collect the honey, and perform all the labor of the family.

You know the honey combs are made of wax; and no doubt you have all noticed the beautiful regularity of the little cells that form them. These cells are six-sided, the form which is better suited to the purposes of the bee than any other, because they fit together so perfectly that not a particle of wax is wasted, and they have the largest space with the least material.

The working bees are divided into two classes, called wax-workers and nurse bees. It is the particular duty of the wax-workers to supply the wax of which the combs are made, which is obtained, not from flowers, as has been supposed, but from their own bodies, as I will presently explain to you. The nurse bees take care of the young, and assist in the building of the cells. Both classes collect honey.

When a swarm of bees is placed in an empty hive, they are immediately in want of cells in which to store their honey and rear their young; and the first thing to be done is to provide the wax of which these cells are to be made. This is done by the wax-workers, who, after swallowing as much honey as their stomachs will contain, are obliged to remain perfectly quiet for many hours; and for this purpose they hang in clusters from the top of the hive, each clinging to the legs of the other, while the wax forms in scales under the rings of their bodies. But I can give you a better idea of the whole operation by describing some of the experiments of M. Huber, who devoted much time to the ex-

amination of the habits of these curious little insects.

He put a swarm of bees, and a basin containing syrup of sugar, into a large bell-shaped glass, in the top of which he had glued several pieces of wood, knowing that the glass would be too smooth for the bees to cling to.

As no young ones had been placed in the glass, and the nurse bees had nothing to do at home, they went out in search of food; but the wax-workers crowded around the edge of the basin, and having filled themselves with the syrup, two of them crawled up the side of the glass and clung by their fore feet to the wooden strips with their bodies hanging downward. Two others then mounted, clinging with their fore feet to the hind legs of the first. Many others followed their example until they formed a sort of festoon or curtain. In this state they remained perfectly motionless for about fifteen hours, and toward the latter part of the time the scales of wax might be seen projecting from under the rings of their bodies, making them look as if edged with white. At length one of them separated itself from the rest, and selecting

a suitable place in the centre of one of the slips of wood, removed a scale of wax with its claw, and drawing it backward and forward through its mandibles, and using its tongue as a trowel, it moulded it to its liking and fastened it to the wood. It then drew out another which it prepared in the same manner; and when it had removed them all it quietly walked off, leaving its companions to carry on the work it had begun. A second and third followed in succession, but by this time other workers had so crowded in front of the little builders that the naturalist could not see their further operations.

But he was too persevering to be easily discouraged; so he placed another swarm in a hive, in the bottom of which he put several large pieces of honey comb, the cells of some containing honey, and others grubs. He glued several thin strips of wood across the lower part of the hive a few inches above the combs; thinking he would have a better opportunity of seeing the bees at work if they built upward from the bottom, instead of downward from the top of the hive. This experiment succeeded completely. The nurse bees immediately dis-

played their usual activity; they dispersed themselves throughout the hive, some feeding the young, and others arranging every thing to suit their convenience. The pieces of comb had been roughly cut, and in some places broken. They beat down the old wax, kneaded it with their mandibles, and used it for repairing the damaged parts and binding the edges of the comb.

While all this was going on, the wax-workers, instead of taking any part in the labor, remained perfectly quiet; and after continuing in this state for about twenty-four hours, wax was formed under their rings, and they were ready to commence the building of a new comb.

Again one of them was seen to select a suitable place for the foundation and to deposit its scales of wax. Others followed, and a wall of wax was soon raised, solid and irregular, but without any appearance of cells.

At this time one of the nurse bees separated itself from the group which was attending upon the young, and mounted the waxen wall. After examining it carefully on every side, it scooped out a portion of the wax and began to form a

cell. After working diligently for a little while it walked off, and another took its place. Others followed in succession, forming cells on each side of the wall.

More wax was soon needed, when some of the wax-workers which had not yet removed their scales, came and added materials to the block, so as to enable the nurse bees to carry on their work.

Thus each one performed its part quietly and harmoniously, coming at the moment when it was needed, and doing what was required.

But the cells were not yet finished, for wax is not the only material employed in their formation. If they were composed of wax alone, they would be too tender and brittle to answer the purpose of the bees; and they therefore make use of a gummy substance called *propolis*, to strengthen, cement, and varnish them.

It appears that this substance is principally obtained from the buds of the poplar tree. While some are busily engaged, as we have seen, within the hive, preparing the wax and forming the cells, others fly away into the fields and woods; some in search of propolis, and

some of pollen, which they use in the preparation of food for their young. Do you know what pollen is?

Harriet. Pollen is the yellow dust found in flowers, is it not?

Aunt M. Yes, it is found on the stamens or little threads around the centre of the flower.

Bees have a hollow in each of their hind legs, somewhat in the shape of a basket, the bottom hard and smooth, and the sides lined with hairs; in which they carry propolis and pollen.

When they have packed these curious little baskets with propolis, patting it down so as to make them hold as much as posible, they return with their treasure to the hive. Their arrival produces an interesting scene of active industry within their little home. Some of their companions unload them; some pile up the propolis in heaps on the floor of the hive; others hasten to spread it out in flakes before it becomes dry; and others, taking small portions of it in their mouths, begin to cement and varnish the cells.

Those who are thus engaged in finishing the

cells never leave the work until it is completed; and, as they occasionally need refreshment, there are waiters constantly in attendance to supply their wants. When one of them is hungry, it lowers its trunk to show that it has an inclination to eat. One of the waiters immediately approaches, and putting its trunk to that of its companion, gives it a few drops of honey, after which it returns to its employment.

When the weather is very warm, a number of bees may be seen standing at the entrance of the hive, busily engaged fanning those who are at work within.

Mary. What do they fan them with?

Aunt M. They fan them with their wings. One of my friends told me that he witnessed this operation only a few days ago. Fifteen or twenty bees stood before the entrance of the hive, with their faces turned towards it, moving their wings so rapidly that he could scarcely perceive that they had wings at all. The day was very warm, and there was not wind enough to stir the leaves upon the trees; yet when he hung a heavy feather behind the bees, nearly a foot from the entrance of the hive, it was imme-

diately blown aside by the current produced by the motion of their wings. Occasionally one of them flew away, probably wearied with its exertions, and its place was immediately supplied by another.

Besides cementing and varnishing the cells, the bees strengthen the weaker parts with a sort of mortar made of a mixture of propolis and wax. The propolis is also used for various other purposes. If an intruder, which is too large to be carried out by the bees, venture into the hive, a snail for instance, they sting it to death, and cover its body with propolis to prevent the unpleasant smell that would otherwise arise from it. But if a snail with a shell happen to get in, as is sometimes the case, they manage it with less difficulty; for the moment they sting it it retreats into its shell, and they immediately seal up the opening and fasten it in for ever.

Reneé. The poor snail! But how smart it is in the bees to think of shutting him up in his shell. I think they are the most wonderful insects we have heard of at all, except the ants.

Aunt M. They are indeed, and I have many

curious things to tell you of them yet. Do you think you understand all I have told you about the building of the cells?

Harriet. I think I do.

Reneé. And so do I; only I should like to know whether the young ones are all in one great cell, or in many little cells.

Aunt M. They are not all in one cell, though the cells are of different sizes. Those in which the eggs of the workers are deposited, are smaller than those built for drones, because the grubs of the drones are larger, and, of course, require more room. The royal cells, as they are called, are also larger, and in these the queen occasionally lays an egg, which in time becomes a queen. When there is a sufficient quantity of comb in the hive, the wax-workers, instead of retaining the honey in their stomachs to form wax, empty it into the cells; and as soon as a comb is filled, the cells are sealed with wax, and it is reserved by these provident little creatures for winter use, when, as flowers are not blooming, honey cannot be otherwise obtained.

Although the cells are never opened during the summer, a small quantity of honey is kept

constantly on hand to supply the daily wants of the family. But they are never wasteful, even of this; each individual being allowed to take as much as it requires, but no more.

I have not yet told you much about the government of the family; but as I should not be able to get through with my story to-night, we will leave it now, and begin afresh another evening.

EVENING FOURTEENTH.

HIVE BEES.

Aunt M. The attachment of bees to their queen is one of the most interesting traits in their character. They wait upon her with the greatest kindness and respect, supply her wants, and follow her as a guard when she moves. If she die, or if any accident deprive them of her, those who first discover the loss communicate the sorrowful intelligence to the rest, and in a few minutes the whole hive is in confusion. Work is at an end, and consternation and distress prevail throughout the family.

If she has been taken out of the hive, they immediately go in search of her; and if she is

dead, they faithfully watch and guard her body, and will not suffer any one to touch it.

Anna. How strange! I suppose they do not bury her.

Aunt M. No; but if, at the time of her death, there are no eggs or grubs in the cells, they seem to feel that they have nothing left to live for, and refusing to eat, they die in a few days. But if there are any grubs in the royal cells, they are diverted from their sorrow by their attention to them. They watch them constantly until they are ready to leave their pupa cases, when one of them becomes their queen.

If there are no royal grubs, they take the grub of a worker, and putting it into a royal cell, or throwing three of the worker cells into one, by knocking down the partitions between them, they feed it upon the kind of food which is commonly given only to the queen grubs, which seems to change its nature, for it grows much larger than an ordinary worker, and in time becomes a queen.

Sometimes a new queen has been placed in the hive immediately after the death of the old

one; but the bees appear to look upon her as an intruder, for, instead of manifesting their affection as dutiful and loyal subjects, they either starve or smother her. But when the first sorrow for their loss is over, and they have become quiet and calm, a new queen is well received, and immediately acknowledged as their sovereign. They walk around her in circles, offer her honey, and follow her about when she moves.

Mary. I think I should like to live awhile in a bee-hive, and just see how they go on.

Reneé. Live in a bee-hive! Why you would soon be stung to death.

Mary. Oh, but I would be a bee, just like the rest, and then I should understand all they did, and know what they were thinking about.

Anna. Would you be a queen, or a drone, or a worker?

Harriet. I am sure I would never be a drone; the lazy creatures! I should think they would not be happy at all.

Anna. I think I should like to be a queen, and have all the bees to love me.

Mary. No, no; I would be a worker, and

always be busy, and how I would wait upon the queen.

Harriet. Our mother is our queen; is she not, Aunt Mary?

Aunt M. Yes, she should be your queen, and you should be her loving workers.

Your occupations are much more interesting than those of bees, and you need never be at a loss for plenty of useful and agreeable employment. You need never have to say, "Oh, what shall I do next? I wish I had something to do." You can wait upon your parents, watch over your little brothers and sisters, be diligent and attentive in your school, and improve your minds by reading instructive books.

And then, when you are at liberty to run and play, how much you will enjoy it! Everything will look fresh and bright and beautiful. Your work will have given you a relish for your play, and your play will refresh you, so that you can return with increased interest to your employment.

Reneé. And besides this, we might sometimes make a frock or an apron for some poor little child, who cannot do it herself, and whose

mother has to work so hard that she has not time to do it for her.

Harriet. Or we might learn to make gruel, and such little nice things, and carry them to sick people.

Reneé. Or we might go and read to them sometimes.

Last summer I used often to go to see a poor old woman who lived near our house, and who was very sick. She could not read herself, and she loved to hear me read; and when she saw me coming, she would sometimes say, "Oh, here comes that sweet child with her book; she is the Lord's own blessing to me. Her visits do me more good than all the doctor's medicine." One day I took her a bunch of flowers out of my own garden, and she was so pleased, she held them up, and looked at them awhile, and said, "How pretty they are! What beautiful things our Heavenly Father makes for us!"

She was a dear old woman, but she has gone to Heaven now.

Aunt M. And my dear little Reneé has the satisfaction of knowing that she added something to the enjoyment of her life. It is a great privi-

lege to able to do good; and there is no surer way of becoming happy ourselves, than by trying to make others so.

But we must not forget the bees. What was I telling you about them last?

Harriet. About their affection for their queen.

Aunt M. Oh, yes; and I have one or two anecdotes to tell you which will illustrate this.

A gentleman took a hive in which a swarm of bees had settled the day before, and shaking them all out upon the ground, he stirred them about with a stick until he found the queen. He seized her and a number of her attendants, and putting them into a box, carried them into his parlor. He then raised the lid, when the queen immediately flew towards the window, followed by her attendants. But he again caught her, and cutting off one of her wings, returned her to the box. It was not long before the whole swarm of bees which had been left upon the ground discovered that their queen was missing. They immediately spread themselves about, as if in search of her; appeared greatly agitated and distressed; and uttered a mournful sound.

At length they all alighted upon a hedge; but instead of clustering together, as they would have done if their queen had been among them, they separated themselves into small companies on different parts of the hedge. While they were in this state, the gentleman brought them their queen. The poor creature had but one wing, and, of course, could not fly; but the bees immediately gathered around her. Their cry of sorrow was instantly changed into one of joy, and they clustered together as usual.

That night they were all put into the hive, and the next morning he again took away their queen. Again the poor bees went about in search of her, manifesting their distress as before. At length she was again brought out, and laid first in one place and then in another; but wherever she was carried the bees followed, gathering around her, and marching up and down before her.

They were tormented in this way for several days and nights—their queen being taken from them in the morning, and returned to them in the evening; but, during the whole time of their separation, neither she nor her affectionate

subjects could be induced to eat, and, in about five days, they were all dead.

Harriet. Oh, the poor bees!

Mary. It seems to me they are almost as knowing as people.

Reneé. Yes, and as loving, too.

Aunt M. Their knowledge is very limited, compared with ours, but they have enough to answer all their purposes, and they appear to make use of all they have.

I will tell you another story.

In a hive, in which there was a small family of bees, the queen was seen lying on a piece of honey comb, apparently dying. Six bees stood around her, with their faces turned towards her, their wings quivering, and their stings uncovered, like soldiers with drawn swords. Honey was offered to them, but they refused to taste it. The queen died on the following day, but the bees continued to guard her body; and, although supplied with honey, they gradually pined, and died in a few days.

A gentleman, named Wildman, used to perform wonderful feats with bees. He seemed to be able to do any thing he pleased with them.

He could make them settle on his head, or his arm, or hang from his chin like a beard; and then command them to leave him, and alight somewhere else. Those who were present, and saw these things, could not comprehend them. It really appeared as if the bees understood his language.

But Wildman himself explains the whole mystery. He found that when he turned up a hive, and made a few taps on the bottom and sides, the queen would immediately appear. He knew her instantly, and catching her tenderly in one hand, he carefully slipped her into the other, and held her until the bees, missing her, were all in confusion, and flying about in search of her. He would then place her in view, either on his head, or his arm, or any where he pleased, knowing the bees would immediately collect around her, and, in this way, he could make them follow wherever he chose to lead them.

Harriet. I suppose he was careful to conceal the queen from the people who were looking on.

Aunt M. No doubt he tried to do so; and, in order to make it appear still more wonderful

to them, he would *command* the bees to settle, now upon his head, and now upon his arm, and so on. They did not know that he held the charmer in his hand.

"Such was the spell which round a Wildman's arm,
Twined in dark wreaths the fascinated swarm,
Bright o'er his breast the glittering legions led,
Or with a living garland bound his head.
His dexterous hand, with firm yet hurtless hold,
Could seize the chief, known by her scales of gold,
Preen, 'mid the wandering throng, her filmy wing,
Or o'er her folds the silken fetter fling."

I expected to finish my story of the hive bees to-night, but the evenings are short now, and it is already bed time.

Reneé. I should like to hear every thing about bees; they are so interesting.

Aunt M. Very well, we will talk more about them at another time.

EVENING FIFTEENTH.

HIVE BEES.

Reneé. What is meant by swarming, Aunt Mary? I heard the gentleman who owned the bee-hives I saw in the country the other day, say, that the bees in one of the hives swarmed three times last season, and twice this. What did he mean by that?

Aunt M. The queen bee sometimes lays from sixty to seventy thousand eggs in the course of the season; and if all the bees produced from these, in addition to those already in the hive, were suffered to remain, it would be too small to accommodate them. This is prevented by large parties or swarms of bees occasionally leaving the hive.

I will explain to you how this is brought about.

In the spring the workers build a few royal cells, in which the queen deposits a small number of eggs. When the oldest royal grub produced from these is ready to be changed into a pupa, the mother queen, collecting around her a large number of workers of different ages, leaves the hive. They generally alight on the branch of a tree, from which they hang in a cluster, clinging to each other's legs as the wax workers do when secreting wax. Some of these clusters or swarms contain as many as forty thousand bees.

When they are found in this state, a hive is put under them; they are shaken into it, and there they take up their abode, and form a new family.

We will now go back to the home they have left, and see what is going on there. The eldest royal grub is now released from her pupa case, and is ready to become a queen. But the workers, instead of acknowledging her as their sovereign, treat her with indifference. She becomes agitated, and marching about the hive,

appears to communicate her feelings to a portion of the workers, and very soon, attended by them, she also leaves the hive.

These cluster together like the first, are placed in a hive, and become another family. And now a second queen is set at liberty; but she too is treated with indifference, and leaves in the same manner. This is swarming.

There are still other royal grubs in the cells, and one of these becomes queen of the parent hive, and is treated with the respect she deserves.

For several nights before a swarm of bees leaves the hive, a singular sound may be heard within it, which appears to proceed from a single bee, while all the rest are unusually silent. What this strange sound means, or whether it is made by the queen bee, is not known, although many curious notions have been entertained respecting it. A fine, clear day is always chosen for the departure of a swarm, and if there should be any appearance of rain, even after they have left the hive, they will return to it for shelter, and wait until the sun again invites them forth. On the day of their departure, most of the bees

remain at home, and do but little work. A number of drones and workers may be seen about the entrance of the hive, and within all is confusion, until the travellers, (if we may so call them,) having partaken of a hearty meal, are prepared for their departure.

Reneé. How curious it is!

Aunt M. I have told you that the drones lead an idle life; and, as this is the case, it would seem hardly fair that they should live, through the winter, upon the honey which the industrious workers have spent the summer in collecting. The workers seem to think so, too; for, toward the latter part of the summer, all the drones are killed.

And now I want to show you the sting of a bee, which has been sent me by a friend. You shall see it through the microscope. But, in the first place, I should like you to look at this needle. You see how beautifully it is polished, and what a fine point it has. It appears perfectly smooth, does it not?

Anna. To be sure it does.

Aunt M. We will now look at it through the microscope.

Mary. Oh, but that is not the needle.

Aunt M. Yes, it is the very same needle. Why not?

Mary. Why, it looks blunt and rough, and full of scratches; it is not smooth at all.

Aunt M. And yet it is one of our finest needles; and you see that out of the glass it appears bright and smooth as possible; but the microscope shows all the defects.

And now we will look at the sting of the bee. You see it is beautifully polished also.

Harriet. So it is; but it does not look brighter than the needle.

Aunt M. We will examine it more closely. Here, Harriet, is the microscope. How does it look now?

Harriet. Why it looks just as bright and smooth as before, although a great deal larger.

Aunt M. And is the point blunt and rough, like that of the needle?

Harriet. No; the point is so fine I can scarcely see it at all.

Aunt M. I want you particularly to notice and remember this. We will lay the needle and the sting side by side. You see, that while one

is rough and blunt, and full of holes and scratches, the other is bright and smooth, and beautiful as possible, without scratch or defect of any kind. A more powerful microscope than this would discover still more imperfections in the needle, but none in the sting of the bee. You will always find this difference between nature and art; between the works of God and of man. If you take the leaf of a flower, and examine it through a microscope, you will discover new beauties, but you will never perceive a defect. But if you have a copy of that flower drawn and colored by the most skilful artist, and look at it through the glass, it will appear like a mere daub. Man can do wonders, and many of his works are exceedingly beautiful, but he can never equal nature.

But you have only seen the outside of the sting of the bee — the sheath or covering in which the sting is enclosed. It is so fine that I am afraid I cannot open it to shew you the real sting, and I do not know that you would be able to see it if I did. There, I have succeeded in separating the sheath. Can you see any thing inside?

Reneé. I think I see too very fine hairs.

Aunt M. Those are the darts which form the sting. A stronger microscope would show you ten very fine teeth, like those of a saw, upon the end of each of these.

At the lower end of the sting is a little bag, containing a poisonous fluid; and when the bee thrusts its sting into any thing, it causes a pressure upon this bag, and the poison is thrown into the wound. If the substance is soft, the bee can draw out its sting uninjured, but if it thrusts it into the tough skin of a man's hand, it breaks in the attempt to withdraw it, and the end of it remains in the flesh. This breaking of the sting always occasions the death of the bee.

I have now given you a pretty full account of the habits of the domestic bee. There are also many species of wild honey bees, some of which are found in America, and some in other places.

A little black bee, without a sting, which is found in the Island of Guadaloupe, generally builds in the clefts of rocks, or in hollow trees. But instead of having the little six-sided cells,

common in our bee-hives, for the reception of its honey, it is contained in waxen bags of a deep violet color, about the size of a pigeon's egg. These bags hang in clusters like a bunch of grapes. Another kind, found in Brazil, makes its nest in trees. These nests are about two feet in diameter, and the outside is composed of hard clay; but in these the cells are arranged very much like those in our bee-hives, and contain an abundance of honey.

Other species form their nests somewhat in the shape of a sugar-loaf, and suspend them from trees, instead of placing them in a hollow. The honey collected by these bees is said to be the finest in the world. They are common in Yucatan.

Wild bees also abound in Africa, and the natives are assisted in finding their nests by means of a little bird, which, from this circumstance, has been called the Honey Guide.

The Honey Guide seems to be aware that it is not powerful enough to overcome a whole swarm of bees, and feeling a strong desire for a portion of their honey, it invites the assistance of man. For this purpose, it flits from tree to

tree, uttering a peculiar sort of cry, which is readily understood by the natives, who seldom refuse to follow it. It always leads them to some rock or hollow tree, in which they find a bees' nest, generally well filled with wax and honey. Of this they always give the bird a share, as it would be considered little less than robbery to deprive it of its due.

There are some other interesting species of bees, of which I intend to tell you; but it is now time to bid good night.

EVENING SIXTEENTH.

HUMBLE, CARPENTER, MASON, AND UPHOLSTERER BEES.

Aunt M. No doubt you are all well acquainted with humble bees—I suppose you have seen them many a time.

Anna. Oh, yes, I have often seen them.

Harriet. So have I. Do they make honey too? I have seen them sucking the flowers.

Aunt M. Yes; they live upon honey, and keep a small supply in their nests; but they do not store it away in large quantities like the hive bees, as they all die about the close of autumn, except a few of the females, which survive the winter.

Early in the spring, each of these solitary females selects a suitable place for her nest, which

is made under ground, and entered by a long, winding passage, just wide enough for two bees to pass each other.

Here her little family, composed of males, females, and workers, grows up around her. After this, like the mother of the hive bees, she always remains at home; but, unlike her, she, as well as every other individual of the family, takes her share in the labors of the household. There are no idlers, no drones, among them.

The cells are irregularly formed, and are composed of brown wax.

There is a sort of mite which frequently gets upon the body of the humble bee, and annoys it exceedingly. When one of them is thus infested, it goes to an ant hill, and there kicks and scratches, and makes such a terrible fuss, that it disturbs the little family below, and brings some of them out of the nest to see what is the matter. They soon perceive the mites on the body of the bee, and gathering around him, quickly take them off. Both are thus benefitted. The bee flies away, happy enough to get rid of his tormentors; and the ants are supplied with a comfortable meal.

Anna. How funny that is.

Aunt M. All the bees of which I have been telling you live in families, and unite their labors for the common good. But this is not the case with every species of bee.

Many of them live alone; the female builds the nest, deposits her eggs in it, and never sees them afterward.

This is the case with the Carpenter bee—so called from the circumstance of its being a worker in wood; and a most complete carpenter it is. There are several kinds of carpenter bees; but I will describe the nest of one of them, which will give you an idea of their manner of building.

The bee selects an old post, into which she cuts a hole, or tube, about a foot in length, and half an inch in width. This, as you may suppose, requires a vast deal of labor. It is no small matter for a little bee to cut a hole a foot long in a wooden post. But the work is beautifully done: the sides are made perfectly smooth, and every chip and particle of sawdust taken out of the tube. But these chips are not thrown away, for the little carpenter has further use for them; and she therefore piles them up in a heap at a short distance from her nest. The long

tube which she has bored is now to be divided into cells, as it is necessary that each of the young grubs should be entirely separated from the others. In the bottom of the hole, or nest, as we may now call it, she lays an egg, which she covers to the depth of nearly an inch with the pollen of flowers mixed with honey, upon which the grubs of all bees appear to feed.

Harriet. I suppose this is intended as food for the young one, when it is hatched from the egg.

Aunt M. Yes; and although the mother has never before seen a nest made, and cannot, of course, remember the one in which she was herself reared, nor the quantity of food she required, she knows just how much it is necessary to provide for each of her little ones, and furnishes it accordingly. This is particularly important in her case. Many insects feed their young daily, and others are placed in situations where they can obtain a sufficient supply for themselves. But the grub of the carpenter bee is completely fastened in its little cell, and never leaves it until it has passed through all its changes and become a perfect insect; neither can its mother have access to it; so that if it

were not provided with a sufficient quantity of food, it must die of starvation. But she has received her instructions directly from her kind Creator, and guided by the wonderful instinct which he has bestowed upon her, she goes straight forward with her work, apportions the proper quantity of food for each little individual, and it is exactly enough.

But I have not yet told you how the cells are finished.

After the bee has laid the first egg, and covered it with pollen mixed with honey, she carries a parcel of her chips into the nest, and glueing them together, forms a ceiling over the first cell, which also serves for the floor of the second. Upon this she lays another egg, and covering it also with pollen paste, ceils it in the same manner; then a third, and so on. When the nest is finished, it contains from ten to twelve cells, the upper one being covered like the rest.

Harriet. But I do not see how the young bees are ever to get out, if they are so completely fastened in.

Aunt M. The mother has provided against this difficulty. The young, as I have told you, do not attempt to escape until they have be-

come perfect insects. But, even then, their teeth would not be strong enough to cut through the hard wood, although they can readily make their way through the thin partitions which separate the cells. The mother therefore bores a hole from the inside of the lower cell to the outside of the post, and another of the same kind from the middle cell, and through these the young ones make their escape.

Another species, called the Mason bee, makes its nest of clay or earth, and the patient little laborer is sometimes obliged to carry its materials a considerable distance, conveying them in its mouth by small particles. When the nest is finished, it consists of several cells about the size of a thimble. Each of these contains an egg, and a supply of pollen, mixed with honey.

Another of these solitary bees has been called the Upholsterer bee, because it lines its nest with the green leaves of plants, or the colored leaves (which botanists call the *petals*) of flowers.

One of these makes choice of the scarlet leaves or petals of the poppy. She forms a hole in the ground, three or four inches in depth, and larger at the bottom than the top, the inside being made

perfectly smooth. Then flying to the poppy, she cuts out a piece of leaf with her mandibles, and carrying it to her nest, spreads it smoothly over the bottom. If it happen to be rather large, or do not fit exactly, she clips off the edges, and throws away the parings. After covering the bottom with three layers of these leaves, she cuts out other pieces, with which she lines the sides, extending them beyond the entrance. She then fills the bottom of it with moistened pollen to the depth of about half an inch. In this she lays one egg, and carefully folding over it the poppy leaves from above, she fills the top of the nest with earth, which effectually conceals it from observation.

Another of these little Upholsterers, sometimes called the rose-leaf cutter, displays still more ingenuity in the construction of her nest. She makes a hole from six to ten inches in depth, and cutting out pieces of leaf exactly suited to her purpose, forms them into cells about the size and shape of a thimble, which she places one within the other, as you have sometimes seen a row of thimbles in the show-case of a jeweller's shop.

I will try to make you understand how this is done.

She generally chooses the green leaves of the rose bush, although she sometimes makes use of those of other plants. Each of the cells is composed of from nine to twelve pieces of leaf, and when the bottom one, which is, of course, formed first, is finished, she puts into it a quantity of pollen paste, in which she deposits an egg, and covers it with three layers of leaves, each of which is cut perfectly round, and exactly fitted into the thimble. Another cell is then made and fitted into the first, as I have described to you. This being also supplied with pollen, and covered with leaves, a third is placed within it, and so on until the nest is completed.

I remember having read a story of a superstitious French gardener, who, having accidentally dug up one of these nests, thought it so wonderful an affair that it must certainly be the work of a magician, who had placed it there with a a design to injure him. He accordingly sent it to his master in Paris, with the request that he would take measures to have the evil spirit driven out of the place. The master carried it

to the priest, who, it appears, was a better naturalist than either of them; for he soon discovered it to be only the nest of an innocent little insect, which had been merely exerting the powers bestowed upon it by its Creator to make provision for the wants of its young.

I have now told you a long story about bees, but I hope I have not tired you.

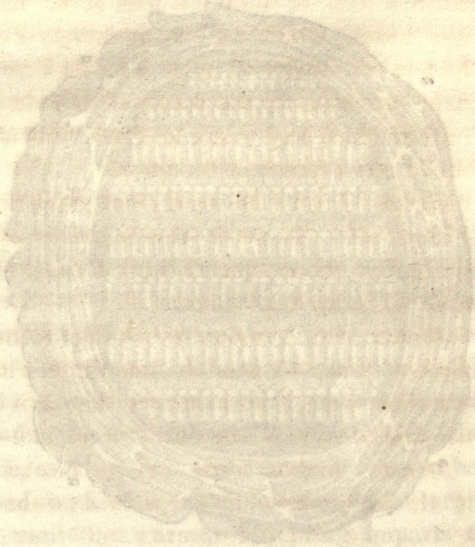
Anna. I am sure we are not at all tired.

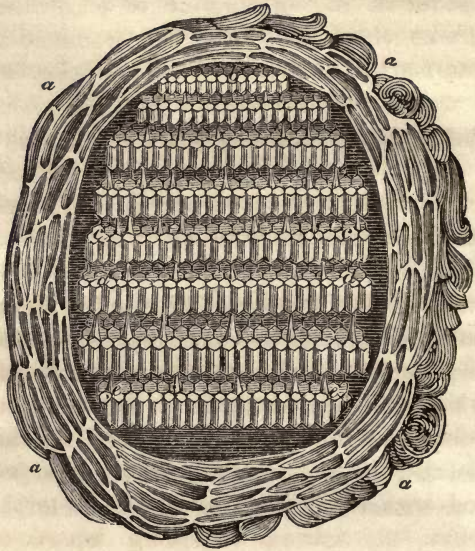
Aunt M. There is another class of little mechanics about which I think I must tell you next. I mean the Wasps.

Anna. Oh, it makes me shudder to hear the name of wasp—I was so dreadfully stung by one once, when I was trying to knock it off the window.

Reneé. And it stung you to defend itself. It did not know what harm you meant to do it.

Aunt M. Their sting is very painful, but they are ingenious little creatures, and we will see if we cannot find something to interest us, even in them.





INSIDE OF A WASP'S NEST.

a a, *a a*, the walls. *b*, *c c*, five small platforms of cells for the workers. *d d*, *e e*, three rows of larger cells for the males and females.

EVENING SEVENTEENTH.

WASPS.

Aunt M. The families of wasps, like those of humble bees, are completely broken up at the close of autumn; and of the many hundreds which usually inhabit one nest, only ten or a dozen of the females live through the winter. All the rest die, and the few which remain are so benumbed with cold that they are in a torpid state, until the warmth of spring imparts to them new life and energy. They then leave the old nest, and separate from each other for ever; for each has now her particular duty to perform, entirely independent of the others.

Let us follow one of these female wasps, and see what she is about. Her winter sleep is now

fairly over, and she is as lively and active as ever. She is anxiously looking about for a suitable place for her nest. She seems to have decided upon one now; she has carefully examined the ground all over; and we may almost fancy that we can see her nod her head, and hear her say, with a self-satisfied air, "Yes, this will do. Here I will dig out a fine long gallery, and have a large chamber at the end of it; and then I will build my snug nest, and soon have a nice little family around me."

But there is no time to be lost, and she goes immediately to work to carry out the plan. She digs the long passage, which is about an inch in width and two feet in depth, with wonderful ease and rapidity, throwing the earth out of her way as she proceeds.

But this is only the beginning of her labor; for at the end of the passage she must scoop out earth enough to make a hole from one to two feet in diameter, for the accommodation of her nest. This is a great labor, but she does not appear to be at all discouraged. She and her little ones must be provided with a home, and her exertions must obtain it for them. She con-

tinues diligently at her work for several days, scarcely allowing herself time either to eat or to rest. At length this part of her labor is completed; her gallery is dug, and her room is made; and now the nest is to be formed. This is made of paper; a paper which the wasp makes herself, for *her* ancestors were paper makers long before *ours* knew any thing about the art.

Harriet. Did not people write upon bark before the invention of paper?

Aunt M. Yes; some made use of the bark of trees, the leaves of plants, or the skins of animals prepared in a rough manner; and others, more advanced in civilization, wrote upon wax with a pointed instrument made of steel or silver, which they called a *style* or *stylus.* But their more important records were made upon stone, brass, lead, and wood. They wrote but little, however, and it was with difficulty that they were able to write at all.

It was at length ascertained that the leaves of the papyrus, a beautiful Egyptian plant, when dried, pressed, and polished, would answer the purpose better, and they were soon very exten-

sively used, although they were almost too brittle to be written upon with freedom.

After several thousand years, during which these various substances were used, and men had been exercising their ingenuity in attempting to manufacture a more suitable material, they discovered that cotton and linen rags, and some other vegetable substances, when ground, made into a pulp, spread out to dry, and sized with glue, would make a firm, good paper, upon which they could write with ease.

Reneé. Is this the way in which our paper is made?

Aunt M. Yes; and the wasp had been making it upon very much the same plan ever since her creation, although man had never understood it before.

Harriet. But, Aunt Mary, how does the wasp make paper?

Aunt M. We will go back to our little friend the wasp, whom we left awhile ago, just as she had completed her under-ground chamber, and see how she makes the paper of which she is now about to form her nest.

She has alighted upon an old wooden post,

and after mashing the wood with her mandibles, she tears off a quantity of fine strips which she makes into a bundle with her feet, and carries to her nest. We will follow her there too, and see what she intends to do with this little bundle of wood. She has now softened it with a gummy fluid from her mouth, and kneaded it into a paste. This done, she walks backward and forward over it, and spreads it out into an even sheet, thinner than our letter paper, but equally strong and firm.

Reneé. And this is the wasp's paper, is it ?

Aunt M. Yes, and it is a very good paper, too.

Harriet. But it cannot be white if it is made of old wood.

Aunt M. No ; it is generally of a bluish gray color ; but it serves the purposes of the wasp as well as if it were white.

Reneé. I did not know that paper could be made of any thing except linen and cotton.

Aunt M. Some of our coarse paper is made of old rope, and some of straw. Other vegetable substances may also be manufactured into paper, but linen and cotton are preferred.

When the wasp has thus made one of her sheets of paper, she begins to form her nest. She commences at the ceiling, and goes on adding sheet after sheet, until her roof is composed of fifteen or sixteen layers of paper, and is nearly two inches in thickness.

Reneé. I thought the wasp's paper was thinner than ours; but I am sure a whole quire of letter paper would not make a wall half an inch thick.

Aunt M. The wasp does not lay her sheets one upon the other, as they are placed in a quire of letter paper, but contrives to fasten them together so as to leave small spaces between each of the sheets; as, by this means, the inside of her nest is more effectually protected from moisture. When she has finished the roof, she makes a platform, or floor, at a little distance below it, which she attaches to the ceiling by beautifully formed pillars, also made of paper. Upon this floor she forms a large number of little six-sided cells, very much like those in a bee-hive, only that they are made of paper instead of wax. But these cells are not intended to contain honey, (for the wasp, although fond of honey,

does not store it up in her nest,) but as nurseries for the young grubs. Her nest is not yet finished, but when it is thus far completed, she deposits a number of eggs in the little cells, and soon has the satisfaction of seeing the young ones for whom she has taken all this care and trouble. Her whole attention is now devoted to them; she puts her head first into one little cell, and then into another, to see how they are getting along, and to supply them with food. She waits upon them with the most untiring patience; watches over them with a mother's anxiety and love; and cannot be induced to desert them. Even if her nest should be dug up, exposed to the light, and cut in pieces, she would remain by the young ones, apparently regardless of her own life in her anxiety to prolong theirs.

In a few weeks after they are hatched, the young are able to assist their mother, and the parent and children then labor together to complete the building of the nest. They form side walls of the same thickness as the roof, and add twelve or thirteen floors or stories similar to the first; each attached to the other by pillars,

and each completely covered with cells. When the nest is finished, it is about a foot in diameter, and contains upwards of fifteen thousand cells.

Harriet. What do they want with so many cells, if none of them are used for honey?

Aunt M. They require them for the accommodation of the young; for the old wasp is not, like the queen of the hive bees, the mother of the whole family. As the young ones grow older, they also deposit eggs; so that she has not only her children, but her grand-children, around her, and this makes a very large family.

The male wasps are not an idle race, like the drones of the hive bees. They do not procure building materials, nor aid in nursing, but they assist in carrying burdens, and attend to keeping the nest clean, clearing out any dirt or rubbish which may happen to get into the cells; and as they make themselves useful in the family, they appear to be treated with as much kindness as the rest, instead of being killed like the drones.

Mary. Aunt Mary, what do wasps eat?

Aunt M. They live upon honey, the juices of flowers and fruits, as well as flies, caterpillars, and some other insects. If a wasp attempt to carry home a load, and find it too heavy, and none of its companions are at hand to assist it, it will stop, divide its burden, and return for the remaining half. Dr. Darwin tells a story of a wasp which was attempting to carry off a fly it had found on a gravel walk. The wind was blowing, and the wings of the fly fluttered so much that the wasp was frequently whirled aside, and found it very difficult to fly; so it descended to the ground, and clipping off both the wings of the fly, it carried off its body with ease.

Some kinds of wasps suspend their nests from the branches of trees, and some cover them with a sort of varnish to protect them from the weather.

Harriet. Are the nests of hornets just like those of wasps?

Aunt M. The nests of hornets are very similar to those of the wasps, except that the paper of which they are made is coarser. They

are generally found in trees, or under the eaves of barns and out-houses. Have you ever seen one?

Harriet. Yes, I saw one once; but I did not care about it then, and did not notice it particularly. I wish I could see it now; I should like to examine the paper, and see how the little cells are made.

Aunt M. One species of wasp, found in Africa, has been called the card-maker, because the paper which forms the outside of its nest is white and hard, and elegantly polished like a card. It is larger at the bottom than the top, and the rain cannot penetrate it.

Do you remember what I told you last evening about the carpenter bee, who deposits her eggs in a hole bored in wood, and separates them by partitions made of the chips and sawdust she has scooped out?

Mary. Oh, yes, we remember that.

Aunt M. The nest of the carpenter wasp is made in the same way, only that the work is not so neatly done; but instead of supplying the little cells with a quantity of honey, as is

done by the mother bee, the wasp drops into each of them a few living flies and gnats as provision for the young grubs.

Anna. Live flies and gnats! What strange food! I should think pollen was a great deal better.

Aunt M. I suppose flies and gnats are better suited to them. No doubt they are very nourishing. The wings, however, are not eaten; and when the grub is ready to go into its pupa state, it weaves them into its cocoon.

The mason wasp, like the mason bee, makes its nest in a wall, or in a hard bank of earth, and stores it with living spiders or caterpillars, for food for the little one when it shall be hatched from the egg.

One species of mason wasp makes a hole in the earth about two inches in depth, and selecting ten or a dozen caterpillars of a particular kind, it twists them into a spiral column, and so fastens them that they are unable to alter their position, although they remain alive. The wasp grub devours all these before it is ready to change into a pupa. Another species does not give the grub the whole of its food at once, but

deposits at first only a single caterpillar, and when it has had time to finish that, it removes the covering of the nest and drops in another.

The evenings are now so short that I think we shall not be able to continue our pleasant conversations much longer; at least, regularly. But you may now have an opportunity of observing insects for yourselves, for I see they are all coming out of their hiding places.

Reneé. Oh, yes; I saw two beautiful little yellow butterflies yesterday, and I have seen several fire-flies. The little green caterpillars are on the rose bushes, and yesterday Harriet and I watched them fold up the leaves and draw them together, just as you told us they did. How we were delighted! I scarcely ever go into the garden now but I am looking about for insects.

Aunt M. I cannot tell you how it pleases me to find that you are so much interested in these things. Have you seen any spiders?

Harriet. I saw one this morning. It was a little fellow, striped with grey and black. It was crawling along the wall when I first saw it, and there was a fly on the pavement below

it. At first it did not seem to notice the fly, but presently it stopped, looked at it, and then dropped right down upon it, and killed it in a moment. I felt so sorry for the poor thing!

Aunt M. That was a vagrant spider. They are called vagrants because they have no settled home. They do not make webs, as most spiders do, but go prowling about, seizing their prey wherever they chance to find it.

I want to tell you something about spiders before we give up our evening conversations. I told you they were not insects, although they very nearly resemble them; but they are very curious and interesting, and you ought to know something about them.

Harriet. I am sure we shall be very glad to spend as many more evenings together as you please; but I am afraid we shall never be much interested in spiders, they are so ugly and disagreeable.

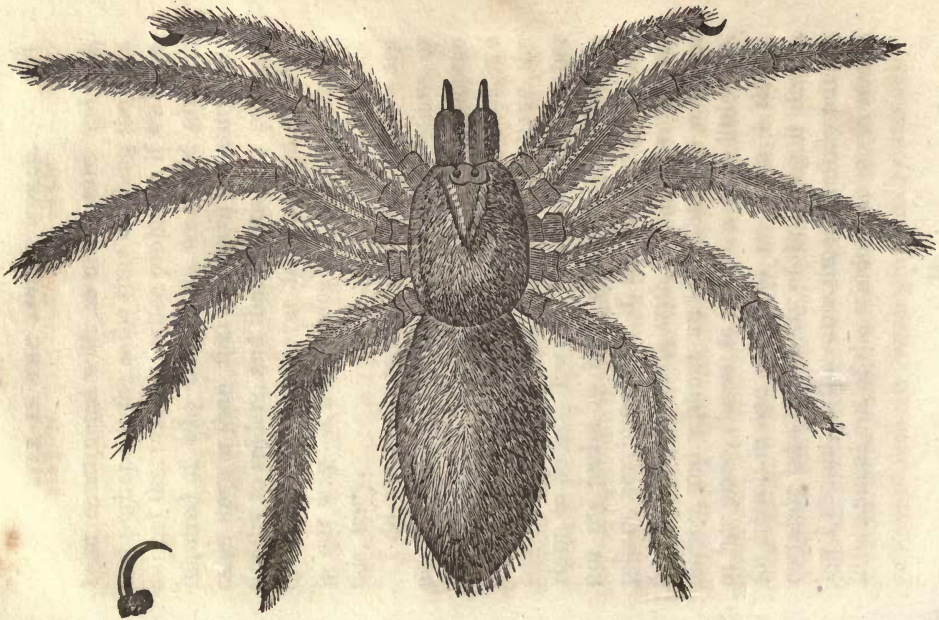
Aunt M. We shall see.

EVENING EIGHTEENTH.

SPIDERS.

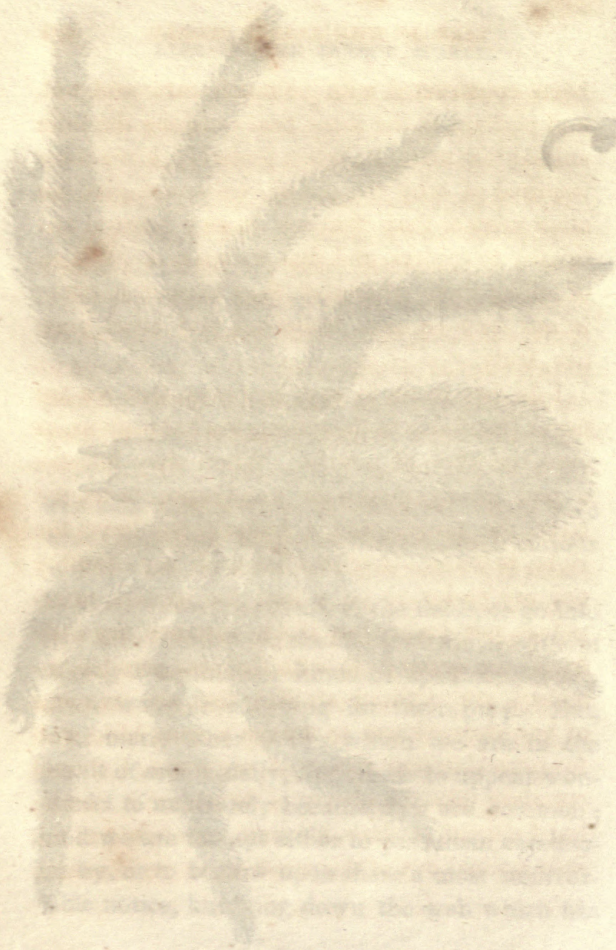
Aunt M. Spiders fall so constantly under our observation, that they seem to invite us to an examination of themselves and their curious workmanship.

We can scarcely walk in the fields, or go into our little gardens in the summer time, without seeing the different kinds of spiders weaving their webs or watching for their prey. But, like many other things which we are in the habit of seeing daily, they cease to appear wonderful to us, merely because they are common; and we are too apt either to pass them carelessly by, or to bestow upon them a most unfavorable notice, knocking down the web which has



Tooth.

South American Tarantula—Natural Size. See page 219.



been constructed with so much care and toil, and perhaps at the same time crushing the little animal that made it; when probably, if we were inquired of why we did so, we could give no other answer than that we have a natural antipathy to spiders, and that we make a practice of killing them whenever they happen to come in our way—a most unfeeling and cruel practice, truly.

I do not mean to say, however, that we are never justifiable in destroying the habitations, or even the lives, of insects. When they become a real inconvenience or annoyance to us, we have the power, and, I believe, we have the right, to do so. I would not wish my chamber nor my parlor to be a nest for spiders, caterpillars, nor bugs; but if, for instance, my little friend the spider had, with the best possible intention, and without an idea that she was out of her place, chosen to weave a snug little web for herself in one corner of my room, I should certainly take the liberty of brushing it down; but I should, at the same time, carefully put the little animal out of the window, to go in search

of some more suitable place in which to build her habitation.

I have said that we have a right to destroy insects when they are a real annoyance to us; but it is a right which should be exercised very carefully and very conscientiously.

We will now examine a little into the peculiar habits of the spider, and I think we shall all be willing to acknowledge, that although we have not been accustomed to consider it handsome, it has certainly proved an interesting subject.

In the lower part of the body of the spider are from four to six little cells, containing the fluid of which the web is composed. Corresponding to these, on the outside of the body are the same number of prominences, called *spinnerets*, completely covered with very small tubes, communicating with the cells. The animal has the power of throwing the threads which form the web from any or all of these tubes at once; and at a short distance from its body they become united and form one thread. Upwards of a thousand tubes have been counted upon each of the *spinnerets;* so that when the

spider throws its threads from all of them at once, the cord is composed of more than four thousand strands. These separate threads are so fine that they cannot be seen without the aid of a microscope; and yet, when thus united, they are strong enough to bear six times the weight of the spider that spins them. This is a wonderful arrangement of Providence. The spider requires a very strong web for its purpose, and you probably know that a number of threads united are much stronger than one would be of the same thickness.

The feet of spiders are furnished with claws, which serve the purpose of fingers; and with these they can readily handle and arrange their slender threads according to their pleasure. Solomon says: "The spider taketh hold with her hands, and spreads her snare in kings' palaces."

You know the webs of spiders are intended as snares in which to entrap their prey, and the ingenuity displayed in their construction is really wonderful.

Have you ever observed the house spider weaving its web in a corner of the room?

Reneé. I was very much interested in watching one, one day last summer; but I was called away before it had spun many threads, and I have never happened to see one at work since.

Aunt M. Can you tell us how it commenced, and how it arranged these few threads?

Reneé. Yes, I can; for I took particular notice of it. I was just about to knock the spider down, when, as I stooped to strike it, I saw it press the lower part of its body against the wall, and then walk slowly around the corner to the opposite wall, spinning a thread as it went, which it seemed to be guiding with one of its hind feet, for it held it out all the time. When it reached the opposite side, it gave the thread a pull, and then pressed it against the wall and fastened it. It then walked back over this thread, and spun another, which it fastened to the other wall. I saw it walk backward and forward until it had spun five or six threads, and then I was called away.

Aunt M. When the spider pressed her *spinnerets* against the wall, she was glueing her first thread; and, as she walked, she held it off with her claw, to prevent it from adhering to anything

until it reached the point where she wished to attach it.

Reneé has given a good description of the commencement of the web. The spider completes it by spinning a multitude of threads in various directions, until she has formed a gauze-like texture, which is strong, light, and elastic.

One species makes a sly little nest in the back part of the web, or at a short distance from it, into which she may retire and conceal herself from observation while waiting for her prey. But as if to save herself the trouble of watching constantly at the entrance, she fastens a thread to some convenient part of the web, and carries the other end with her into the nest; and then woe to the poor fly that may chance to become entangled! for the moment it finds itself fast, it struggles to free itself; this shakes the web, and of course the little thread which the spider holds. She feels it, darts out, binds its feet together with her web, and sometimes wraps it up in it entirely, carries it into her nest, and devours it at her leisure.

It may appear to you strange, and perhaps cruel, that insects should be thus directed by

their instinct to destroy each other; but this is one of the laws by which the Creator has been pleased to govern the world that he has made, and we cannot doubt that it is benevolent and wise. We see it in action throughout the whole creation. The larger animals serve as food for man; and, throughout the world, beasts, birds, fishes, and insects live upon each other. It is absolutely necessary that this should be the case. Insects, particularly, increase so rapidly that, if they were not thus destroyed, they would eat up all our vegetables, fill our houses, and render our existence extremely uncomfortable. Providence has therefore taken this means to keep them within proper bounds. If animals did not thus live upon each other, there would not be a sufficient supply of food for them, and many of them would die of starvation.

A species of garden spider, which weaves a large, beautiful, wheel-shaped web, commences by spinning a long thread, which she lets float in the air. Having a little stickiness about it, it soon adheres to some neighboring bush or fence; and when the spider finds, by touching it with her feet, (which, for this purpose, have

been made extremely sensitive,) that it is thus attached, it spins another thread, and fastens it to the first; then another, and another, and so on, until a rope is formed strong enough to bear the net. But, in trying its strength, she is not satisfied with merely pulling at it with her feet, but lowers herself by it, swinging and bobbing about with the whole weight of her body. After making several more ropes in the same manner, for a frame work, she commences weaving the net, beginning with the straight lines, which may be called the spokes of the wheel. After attaching these firmly to the supporting cords, and stretching them so as to make them as tight as possible, she pulls each one with her claw to ascertain its strength, breaking any one that may prove defective, and replacing it by another. When this is done, she moves rapidly round and round the net, spinning threads at equal distances apart, and attaching them to the spokes. The spider usually places herself in the centre, and there watches for any fly or other insect that may happen to fall into the net. Sometimes she makes a nest under a leaf, or some other shelter, into which she retreats on

the approach of danger, and in unfavorable weather.

The largest and most beautiful spider of this kind I ever saw, made her web in our garden some years ago. Her body was as large as a small nutmeg, and beautifully marked with yellow and black; and her legs were so long, that when standing, they covered a space of three inches in diameter.

The web was unusually large, and very beautifully and regularly formed. As the spider sat in the centre, watching for her prey, my brothers occasionally threw a grasshopper into the net, which she eagerly seized, and holding it firmly with her forefeet, threw out a web, which, as it issued from her body, looked like a silken band about an eighth of an inch in width; with this she quickly stopped the struggles of her prisoner, wrapping him up in it entirely.

Our spider was considered so great a curiosity that she had many visitors, some of whom put her disposition to a severe trial by poking at her with a stick; when she would make a sudden spring towards them, and manifest her displeasure by the violent shaking of her web.

She remained with us about six weeks, when she suddenly disappeared; but after an absence of ten or twelve days returned, and stayed several weeks longer, when she again departed. Whether the poor creature was killed in her rambles, or whether she had become tired of her old home, and went to seek a more desirable situation for a new one, I cannot tell, but we never saw her afterward.

A friend of mine, anxious to try the ingenuity of the spider, stood a wine glass in a basin filled with water, and placed a spider on the top of the glass. It immediately ran down the side of it, but finding water at the bottom, was obliged to return to the top. It then ran round the glass, and went down on the other side; still there was nothing but a watery ditch. In this way it tried every side, and finding it impossible to escape, paused a moment on the top, as if deliberating what it should do next. Suddenly a bright thought seemed to strike it: it turned round and threw out a long thread, which, after floating a moment in the air, settled on the edge of the basin. The spider touched it in its usual way to satisfy itself that it was securely

fastened, and finding that it was so, attached the other end to the edge of the glass, and starting off very carefully on this slender bridge of its own construction, it reached the edge of the basin in safety.

It is said that when spiders become very old, and the fluid of which their web is composed is entirely dried up, so that they cannot spin, they will go to the habitation of some young spider, take possession of its web, and drive it off to weave another.

Harriet. I wonder whether the young spider is so respectful as to give up its web to the old one without fighting for it.

Aunt M. It is said they seldom quarrel in such cases; but whether this submission on the part of the young spider arises from respect or from fear, it would be difficult to say; though I rather suspect it is a little afraid of the sharp claws and pincers of its venerable friend. But perhaps I am doing it injustice. It is too late for us to talk longer now; but I want to tell you something more about spiders, and if you are not tired of the "disagreeable creatures," as

Harriet calls them, we will continue the subject to-morrow evening.

Harriet. They are not so very disagreeable for all, and I am not at all tired of hearing of them.

Aunt M. Very well, we will talk a little more about them to-morrow.

EVENING NINETEENTH.

SPIDERS.

Aunt M. I am inclined to look upon spiders as an abused race. They spread their nets before our eyes, so that we have constant opportunities of seeing them destroy their prey, and it is probably on this account that we have been accustomed to consider them particularly bloodthirsty and cruel. But we should remember that they are induced to destroy the harmless fly that becomes entangled in their snare, not from feelings of cruelty nor revenge, but from a natural desire to satisfy the cravings of their appetite.

There is a bright side to their character, too; for in them, also, the Creator has implanted that

strong maternal attachment which would incline them to make almost any sacrifice to secure the safety and welfare of their young.

There is a spider, usually found under clods of earth, which may readily be distinguished by a white silken bag, about the size of a pea, attached to the extremity of her body, which contains her eggs. Although it appears a considerable weight to her, she carries it with her every where. If you take it from her, she makes the strongest efforts for its recovery, and no personal danger can force her to quit the precious load. If she cannot succeed in recovering her bag, she appears almost frantic with distress; and if she again obtain possession of it, she evinces great delight, eagerly seizing it, and, with the utmost rapidity, running with it to a place of safety.

Bonnet, a distinguished entomologist, anxious to prove the strength of this spider's affection, threw one of them, with her bag, into the cavern of an Ant Lion, a very ferocious insect, which conceals itself in the bottom of a hole made in the sand, for the purpose of catching any insect which may happen to fall into it. The spider endeavored to run away, but was

not sufficiently active to prevent the ant lion from seizing her bag of eggs, which it attempted to pull under the sand. She made the most violent efforts to drag herself away, struggling with all her might. The glutinous substance, however, which fastened the bag to her body, at length gave way, and it was separated from her; but she instantly caught it with her jaws, and increased her efforts to drag it from her enemy. It was in vain,—the ant-lion was the stronger of the two; and, in spite of all her efforts to retain it, dragged the precious load under the sand. Had the unfortunate mother been willing to leave her bag behind her, she might readily have made her own escape from the pit. But this was not to be thought of for a moment, and she even preferred being buried alive to parting with her precious treasure. It was only by force that Bonnet at length drew her out of the pit, but the bag of eggs remained with the ant-lion; and although he pushed her repeatedly with a twig, she still persisted in continuing on the spot, seeming as though she had nothing left to live nor care for.

Harriet. What a pity the gentleman could

not get the bag of eggs from the ant-lion ! I do not see how people can bear to try such experiments. The poor spider !

Mary. If I had been there I would have killed the wicked ant-lion.

Aunt M. That would have been wrong. The ant-lion was only taking its natural food, just as a spider would catch a fly, or a man kill an ox.

The attachment of this affectionate mother is not confined to her eggs. After the young spiders are hatched, they make their way out of the bag, by an opening which she is careful to make for them, and attach themselves in clusters to her back, head, and legs; and in this situation, where they present a very singular appearance, she carries them about with her, and feeds them until they are old enough to provide for themselves.

If you touch the mother, thus covered by hundreds of her young ones, it is most amusing to see them leap from her, and run away in every direction.

Many spiders live in the water, and feed upon the insects which frequent it. One of these makes

a silken cell, about half the size of a pigeon's egg, the lower end being open. This it attaches with its web ropes to the surrounding plants, and hangs in it ready to dart upon its prey.

Another floats out, like a little sailor, upon a ball of weeds, and when it succeeds in catching an insect, it lifts it up upon its raft and devours it as it floats along.

There is a curious spider found in the south of France, and some other places, which is sometimes called the trap-door spider. It hollows out a den in the earth, generally about an inch in width, and from one to two feet in depth. The inside of this it first covers with a kind of mortar, and then, as if it meant to paper its walls, hangs all over them a beautiful silken web, which is said to be smooth as satin, and of dazzling whiteness. But the most curious part of it is a trap door over the entrance, which it perfectly covers. This door is made of different layers of web and earth, and covered with dried leaves closely matted together, and is so hung at the upper part as to admit of being raised when the animal passes in or out, after which it immediately falls into its place. The edges are

curiously fringed with a net-work, which conceals the opening, and renders it less liable to be discovered. Along the edge of this door, on the inside, are a number of little holes, which are used by the animal for holding it down with its claws when it is attacked by an enemy.

The spiders of our country are generally small and harmless, but some of those which are found in warmer climates are large enough to cover a man's hand, having legs as thick as a wheat straw, and their bite is considered dangerous. The largest of these enormous spiders, or *Tarantulas*, as they are called, are found in South America. They are covered with soft brown hair; their feet are furnished with claws; and they have two black teeth, which are so hard, glossy, and sharp that they are sometimes set in gold and silver cases, and used as tooth-picks. These spiders are in the habit of destroying small birds, darting upon them as a cat would spring upon a mouse.

My brother, who, you know, spent two months in Chili, kept two of these enormous creatures for pets. Odd pets, you will think, but you know he makes pets of every thing,

even of snakes and lizards, and has a way of handling them so tenderly that he soon tames them, and they even appear attached to him. He kept the spiders some weeks, tied by the leg with a string attached to a nail driven in the wall of his chamber. At first they were exceedingly fierce, spreading out their arms, as their two fore legs are generally called, and showing their terrific teeth whenever he approached them. In a few days, however, they became so tame as to crawl over his hand without manifesting any symptoms of anger, and to eat freely and without fear such food as he provided for them. He frequently gave them pieces of raw beef, which they devoured with great relish. One day a humming bird was carried into the room, and being brought within leaping distance of the spiders, they both sprang upon it instantly, took it by force from the hands of the person who held it, swung back with it to the wall, and darted their deadly fangs into its beautiful throat. In five or six minutes it was dead, and in a few hours nothing of the poor humming bird remained but its bones and feathers. All the soft parts were consumed.

The Chilians have a great horror of this spider, and for some time after my brother's pets were taken into his chamber, not a native could be prevailed upon to enter it, and he was obliged to do his own chamber work.

They were at length killed by a new Spanish servant, who went into his room during his absence to clean and put it in order. Seeing the venomous creatures resting on the wall, and naturally supposing them to be intruders, he put an end to them with his sweeping brush.

Reneé. I wish I could see one of these monstrous spiders.

Aunt M. I can show you a picture of one which has been kindly drawn for me by a friend of my brother's from a spider now in his possession. It must be a small one, however; as some of them are said to be three inches in length, one inch and a half in breadth, and eleven inches with the legs extended.

Reneé. Where is the picture, Aunt Mary?

Aunt M. I think we shall find it in this drawer. Here it is.

Mary. Eh! it makes me shudder to look at it.

Reneé. Why I think it is very pretty; I only wish I could see a living one. Are these the teeth on the top of its head?

Aunt M. Yes; and here is one separately drawn to show its form.

Anna. It has ten legs.

Aunt M. The two front ones, as I have told you, serve the purpose of arms. They are used by the animal for seizing its prey, and holding it while it devours it. If you are satisfied with looking at the picture, we will now lay it aside.

An interesting anecdote is related in history of Robert Bruce, who afterwards became one of the most powerful kings of Scotland.

He was at the head of an army, fighting against the English, and had been six times completely conquered in battle; he had become almost discouraged, when one night, as he lay on a rough bed in a little cottage where he had taken shelter, he saw a spider trying to throw its web from one beam to another. Six different times it threw out its slender thread, and every time it failed to become attached to the beam. Still the patient spider was not discouraged; it tried the seventh time, and succeeded.

Well, thought the warrior, "I have received a useful lesson from the spider; perseverance will overcome difficulties. I will try again." He did so, gained the victory, and became king of Scotland.

Let us too learn a lesson from the spider, but let us apply it to a far different purpose. We do not wish to destroy our fellow creatures to promote our gratification, but I trust we are all desirous to be able to *persevere* in every good word and work.

And now, my dear little girls, I think we shall have to bring our evening meetings to a close. They have been pleasant and, I hope, profitable to us all.

Anna. Oh, Aunt Mary, not yet.

Aunt M. You know I told you the other evening it was nearly time, and I intended this should be the last. The evenings are so short now, and it is getting warm.

Reneé. To-morrow evening will be the last of the week, and the last of the month; it would be so nice to finish then. Just let us come to-morrow evening.

Aunt M. Do you think you will be more willing to stop then?

Harriet. I am sure we shall; and I have thought of a plan. We will each bring some insect with us, and Aunt Mary will tell us about it.

Mary. Oh, yes, that will be very nice; I will bring——

Reneé. Wait a little while, Mary. We do not know yet whether Aunt Mary will let us come.

Aunt M. Yes, you may come; and I have no objection to your plan if you will do exactly as I tell you. Do not kill an insect for the sake of bringing it; and if you bring living ones, be very careful that you do not hurt them; catch them as tenderly as possible, and put them into a box with a few pin holes in it. I should be very sorry that the poor little creatures should have to suffer for our gratification. Do not catch them until it is nearly time for you to come. We will have tea early, and meet at seven o'clock.

Mary. We will do just so. What will you bring, Anna?

Reneé. Do not let us tell each other what we will bring. We will keep it all a secret until we get here and open our boxes.

Mary. So we will; there will be a great deal more fun in that.

Aunt M. Very well, keep your secrets, and mind what I have told you. Good night!

EVENING TWENTIETH.

KATY-DID, HOUSE-FLY, APHIDES, FIRE-FLIES, GLOW-WORM, &c.

Aunt M. Well, my dear little girls, I am glad to see your happy faces. Have you brought anything with you?

Anna. Yes, indeed we have; but neither of us knows what the others have brought. Harriet and I were in the garden together just before tea, and she called out to me that she had found something, but she would not tell me what.

Aunt M. I suppose she will tell us now. What is it, Harriet?

Harriet. It is a Katy-did; I found it on the honeysuckle. It hopped away from me two or

three times, but I caught it at last, and it is now safe enough in this box.

Anna. Oh, a Katy-did! I wish I had found a Katy-did. I could not get any thing in the garden, so I went into the house, and caught a fly.

Aunt M. I am glad you have brought us a fly. It is so common an insect that I should like you to know something about it, and it is very curious too, besides having its own little share of beauty. What has our little Mary got?

Mary. Something very pretty indeed; but I am afraid it will fly away if I open the box. There, you can look in at that little crack. Do you see?

Anna. Oh, yes; it is a Lightning-bug.

Harriet. Say Fire-fly; that is a prettier name.

Mary. I was very much afraid that I squeezed it too hard when I caught it, but I believe I did not hurt it, for it seems very lively now.

Reneé. I was not satisfied with one insect; I believe I have something like a hundred.

Mary. A hundred! where did you get a hundred? Do let us see them.

Harriet. Oh, they are only Aphides, all sticking together on a branch; it is very easy to get a hundred of them.

Reneé. Indeed, I think it is a great matter to get a hundred cows into one little box. You know these are the ants' cows.

Harriet. So they are; I forgot that.

Aunt M. I think you have all done extremely well, and we shall have plenty of subjects for our evening's conversation. We will examine our prisoners now, and release them as soon as we can. I think poor Katy seems rather the most uneasy in its confinement; suppose we look at it first, and let it go. I will hold it gently in my hand a few minutes, while we observe it more closely. Is it not beautiful?

Harriet. Yes; see its long antennæ, and little pink eyes, and its wings too, they look like delicate green leaves.

Aunt M. These are only the wing-cases; and you see that they completely enclose the body, meeting above and below.

Anna. Hark! it is singing. I heard it say Katy.

Aunt M. That was because I pressed upon the wing-cases. The musical organs are situated underneath these. They consist of transparent membranes, tightly stretched within two frames like tamborines, and whenever the wing-cases are opened and closed, they rub together, and produce the sound. When they sing Ka-ty-did, they open and shut them three times; thus making three distinct sounds.

It is only the male which sings; the female is always a silent listener. They conceal themselves during the day among grass or leaves, but as soon as it becomes dark, they come out fearlessly, and take their station upon some convenient tree or bush, when the male commences the clear joyous song, which he sometimes continues through the whole night. When all else is perfectly quiet, this sound may be heard at the distance of a quarter of a mile.

Reneé. I suppose this is a male then. What long, slender legs it has.

Aunt M. The legs are formed for leaping; you see the hind ones are the longest. I want

you to take particular notice of its jaws. Put one of your fingers to its mouth; it may snap a little, but it will not hurt you.

Reneé. Why it really bites, and its teeth ar as hard as bone.

Aunt M. Yes, and you see they are black and glossy; but instead of being placed horizontally, or across the mouth, as our's are, they are placed perpendicularly at each side of it, and close, like a pair of forceps.

I think you might put Katy out of the window now.

Anna. Here, let me take it. It is glad enough to get out of my hand. There, fly away, my pretty little dear; but see, it is just hopping about on the window sill, and listen how it chirps now. It seems to say, "Katy-did—Katy did'nt—so she did."

Harriet. It is thanking us for letting it go.

Mary. Or bidding us good-bye.

Aunt M. We will leave it to fly away when it pleases, and while it sings its farewell song, we will look at Anna's fly. I want you to observe the colors upon its wings.

Reneé. I did not know that the wings of the fly were colored.

Aunt M. Look at them, and see if they are not.

Reneé. Yes, they are beautifully colored. There is violet and green, and a tinge of yellow.

Harriet. How strange that we should never have noticed it before.

Aunt M. It is indeed strange that any of their beauties should pass unobserved, when they are so constantly around us. There, the fly is gone—but it is no matter; we will take the liberty of talking about him in his absence. If you had examined the proboscis of the fly, you would have found it as smooth and as beautifully polished as the sting of the bee, which I showed you some evenings since.

You know the proboscis is hollow, and that the fly takes its food through it; it resorts to an ingenious expedient when it meets with a grain of sugar which is too large and hard to pass through this slender tube. It lets a drop of fluid fall upon it, or, in other words, spits upon

it, and having thus dissolved the desirable morsel, sucks it up without difficulty.

Many insects, you know, can walk upon glass and other smooth surfaces with perfect ease and security, even with their backs downwards. The house-fly is enabled to do this by means of an apparatus in the feet, which I will endeavor to describe to you.

No doubt you have sometimes amused yourselves with making a thimble cling to your arm or lip by sucking the air from it; you were aware that this effect would be produced, although you may not have understood the cause. The inside of the thimble being deprived of air, that which was without pressed upon it with such force as to cause it to remain in its position, and adhere to the flesh. It is precisely upon this principle that the house-fly walks upon glass, or upon the ceiling, without danger of slipping or falling.

Each of the feet is furnished with two claws, and at the base of these are two suckers or membranes, connected with the feet by a funnel-shaped neck, which is capable of being moved in every direction. These suckers can

be contracted and expanded at pleasure, and when the fly lifts its foot, it folds them up between the claws, and thus excludes the air, and when it puts it down, it expands them, and as there is no air within, the pressure upon them from without keeps them in their places. Every time the fly raises and puts down its foot it performs this curious operation.

Anna. It must be very troublesome for it to walk.

Aunt M. No, the motion is perfectly natural, and made with as little effort as we require to raise a hand or a foot.

But we must pay some attention to these little Aphides, for they seem inclined to walk away from us. What trim looking little creatures they are! Look at the light green color of their bodies, and their delicate wings; they are tinged with green and violet, like those of the fly.

Harriet. So they are; but many of them have no wings at all. Please hand me the microscope, Anna. How beautiful the eyes are, and the long antennæ!—and there is the proboscis too.

Aunt M. Is the proboscis very long?

Harriet. Not very.

Aunt M. No, I see that it is not more than one-third the length of its body. This is most common; but in some species, it is so long that when the insect walks, it is folded under the body, and extends even beyond the tail.

Although the Aphides appear motionless when thus clustered together on a branch, they are far from idle. Each little proboscis is thrust into the stem, and each little Aphis is busily employed in sucking the juices it contains. Sometimes, however, they are so piled upon each other that they cannot all get a chance at once, and some of them are obliged to wait, or betake themselves to another part of the plant.

Aphides exist in countless multitudes, and there are numerous varieties of them. They may be found upon almost every tree and plant; the stems, the leaves, and even the roots, are often covered with them. Some are green, some brown, some black, others red; and indeed they are of almost every color.

The eggs are as various in color as the insects themselves. In one respect they differ material-

ly from ordinary eggs; the insects being alive within them when they are laid, and the shell merely serving as a covering to protect them through the winter. At some seasons of the year, they are born without the shell, but many of them are then enveloped in a white substance, which is produced from the body of the mother.

This substance, which is known by the name of white, or American blight, is common on apple and some other orchard trees. In the spring the leaves and stems are often so completely covered with it, that they look as if flour had been strewn over them, or there had been a slight frost. Towards the latter part of summer, this substance becomes thicker and more cottony, so that the insects are effectually protected from the cold. Enveloped in this downy covering, they feed upon the juices of the tree, and frequently cause its death.

Some species of Aphides produce excrescences or knobs upon the leaves of plants, which are called *galls*. These galls vary from the size of a pea to that of a man's fist. The Aphis occasions a disease of the leaf, by puncturing it with her proboscis. The gall forms, round

and hollow, and she immediately takes possession of it as a dwelling. Here she lays her eggs, and when the young are hatched they puncture the inner walls of this little chamber in order to extract the juice. This causes the gall to grow, and thus their dwelling is enlarged. When one of these is broken open, it is found completely filled with Aphides.

If Reneé will now take her hundred cows, or as many of them as she can collect, into the garden, we will look at Mary's fire-fly.

I think we may venture to take it out of the box; we will not let it escape us yet. I was speaking a while ago of the wing-cases, which serve as a protection for the delicate wings underneath. We have here an excellent example of them; they are common to the whole beetle tribe.

Mary. Is the fire-fly a beetle?

Aunt M. Yes, it is a small beetle. I will raise one of the wing-cases a little, and let you see the transparent wing.

Mary. Yes, I see it.

Aunt M. When the insect is at rest, they are so closely folded to its body, and so com-

pletely covered by these hard cases, that you would not suspect their existence.

The most interesting thing about the fire-fly is the beautiful greenish-yellow light which you see it at this moment emitting, and which proceeds from a quantity of yellow matter contained in the lower part of the body. It has the power of kindling and extinguishing this light at pleasure; now it is gone—now it brightens up again. It is particularly brilliant after slight showers of rain.

Naturalists have had various conjectures as to the design of this curious light, but have not been able to come to any satisfactory conclusion respecting it. It is doubtless of some use to the insect; and I think it is not unreasonable to suppose that He, who has made all things so beautiful, has lighted up these little lamps to increase the cheerfulness of Nature when other beauties are hidden by the darkness. They add greatly to the enjoyment of an evening walk in the country, and even our city gardens are brightened by their presence. While flowers pour out their delicious fragrance, and Katydids and Crickets sing their evening song, these

little creatures perform their part, by twinkling like so many minute stars in the grass and bushes around us. All testify of the goodness of the Creator. Each seems to say, in its own peculiar language,—"Our God is love!"

Harriet. I have always been worried when I have seen children tear fire-flies to pieces, to get the light. I think it is very cruel.

Aunt M. It is indeed very wrong, and I think there are few children who would be willing to indulge in such cruelty if they could be made sensible of the pain they inflict. But they do not feel it themselves, and the little insect struggles feebly in their hands, and makes no noise; it cannot tell its sufferings. They do not seem to remember that they are thus depriving one happy little being of the life to which it has an equal right with themselves.

Mary. If they knew more about insects, they would not be so cruel to them.

Aunt M. Perhaps not. But we must not be guilty of cruelty ourselves by keeping our prisoner longer than necessary. You may now let it go and enjoy itself among its companions.

The fire-flies of tropical countries are much

larger and more brilliant than ours. They are more than half an inch in length. The light proceeds from two spots about the size of a pin's head, situated near the eyes, and also from the under surface of the body. One of the early historians of Central America gives an interesting and curious account of these fire-flies. He says: "They have two stars close by their eyes, and two more under their wings, which give so great a light that by it you can spin, weave, write, and paint; and the Spaniards go by night to hunt the Utios, or little rabbits, of that country, and a-fishing—carrying these animals tied to their great toes or thumbs, and they call them Locuyos, being also of use to save them from the gnats, which are there very troublesome. They take them in the night with firebrands, because they make to the light, and they are so unwieldly that when they fall, they cannot rise again; and the men stroaking their faces and hands with a sort of moisture which is in those stars, seem to be afire as long as it lasts."

We are told that many years ago, when a number of Europeans landed in the West Indies at night, they were greatly alarmed at seeing

the distant woods lighted up by innumerable fire-flies. They supposed them to be Spaniards advancing upon them by torch-light, with the intention of destroying them, and immediately retreated to their ships.

Some of the early Spanish missionaries to South America, having neither candles nor lamps, were in the habit of reading and writing by the light of fire-flies confined in bottles, and when travelling over some parts of the country at night, their guides fastened them in their hats to enable them to follow them through the darkness.

Stephens, the well known American traveller, says that when in Central America, he read, by the light of a single fire-fly, the finely printed pages of a newspaper.

The fire-fly is not common in England, but its place is partially supplied by the glow-worm. The female, which is far more brilliant than the male, is a small wingless insect, somewhat of the form of the wood-louse, and is commonly found under bushes and hedges. The male has wings, but emits only a faint light.

There are other luminous insects besides those

I have mentioned. One of these is the Lantern-fly, which emits a brilliant light from a sort of horn projecting from its head; and another is the Electric Centipede, which leaves a track of light behind it wherever it moves.

Even the ocean contains a vast number of luminous animals; and it is supposed to be partly owing to these that the waters, particularly within the tropics, are frequently observed to have the appearance of liquid fire.

And now, my dear little girls, we have had a long talk, and you remember that this evening is to close our conversations upon insects for the present; but I hope it will be only the *beginning* of your knowledge of them.

I have introduced you to a few, a very few, in comparison with what you might meet with in a single day spent in the country; but I want you to cultivate their acquaintance. I am sure you will find them interesting friends. Your knowledge of these may be the means of introducing you to more, and you will find that there is always something new to learn, something interesting to discover. You cannot fail to meet with the objects of your study, for they

are to be found every where; in the air, the earth, and the water, and upon the trees, the bushes, and the grass.

I am sure it will give you pleasure to recognize the little friends with whom I have made you acquainted; to see the caterpillar casting its skin, or weaving its cocoon, and the butterfly bursting its cell and mounting into the air, as if rejoicing in its freedom; the spider spinning its curious web; the winged ants taking their first flight in the air, and then dropping their wings upon the ground, and the patient little laborers clearing out the earth from their under-ground galleries, or laying in their stores of provision; the hive-bee loading itself with pollen; the upholsterer clipping out the pieces of leaf with which to form the cells of her under-ground nest, and the laborious little carpenter cutting her way into the wood; the wasp collecting her bundle of sticks; the aphides sucking the juices of the plant, or living securely in their curious little dwellings upon the leaves; and even the musqueto in its dangerous passage to land;—all will seem to you like familiar acquaintances, and will have a claim upon your kindly notice.

And when locusts, katy-dids, and crickets sing their song of welcome, you will feel that you know *them* too; that they are your friends, and you are theirs. And I want you to be *truly* the friends of all these; never see them persecuted without defending them. Treat them with kindness, for they are innocent and helpless; treat them with respect, for they are the work of God. Remember that he has formed them all to answer some good purpose; that he has provided for their safety and enjoyment, as well as for yours; that his care and kindness extend over his whole creation; that he is their Father, and your Father, and that he is love.