Third Edition.

THE LITTLE PHILOSOPHER,

FOR SCHOOLS AND FAMILIES;

DESIGNED TO TEACH CHILDREN TO THINK AND TO REASON ABOUT COMMON THINGS; AND TO ILLUSTRATE FOR PARENTS AND TEACHERS METHODS OF INSTRUCTING AND INTERESTING CHILDREN.

WITH

A COPIOUS INTRODUCTION,

EXPLAINING FULLY THE METHOD OF USING THE BOOK.

BY JACOB ABBOTT,

PRINCIPAL OF THE MOUNT VERNON SCHOOL.

LONDON:

L. B. SEELEY AND SONS, 169 FLEET STREET.

1834.

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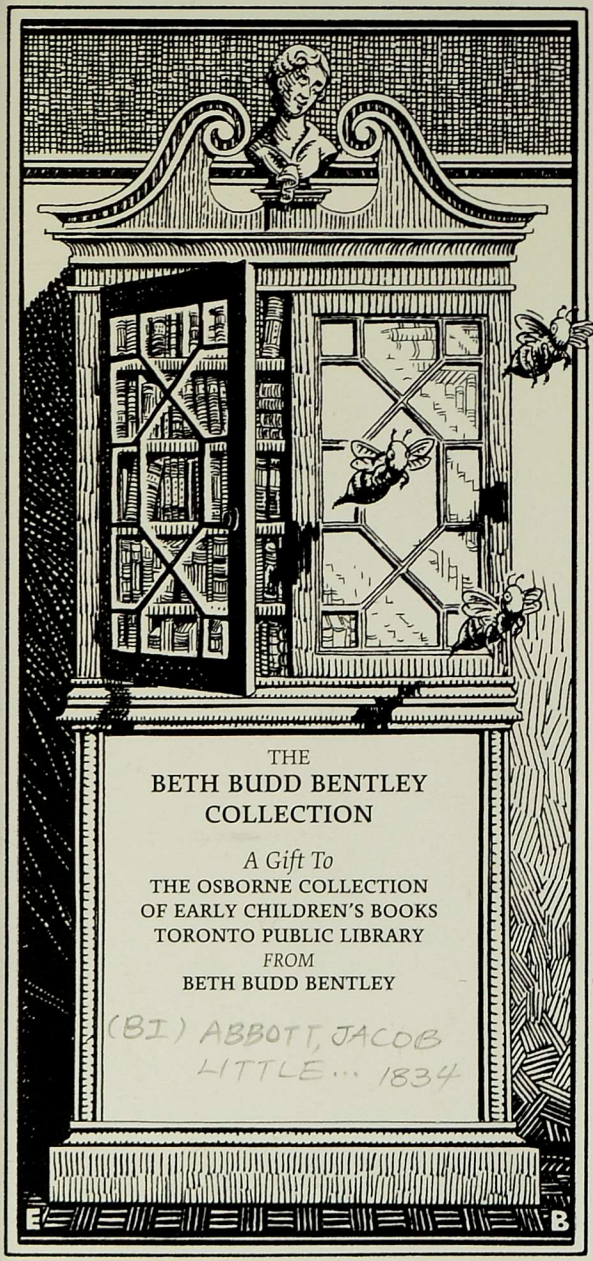

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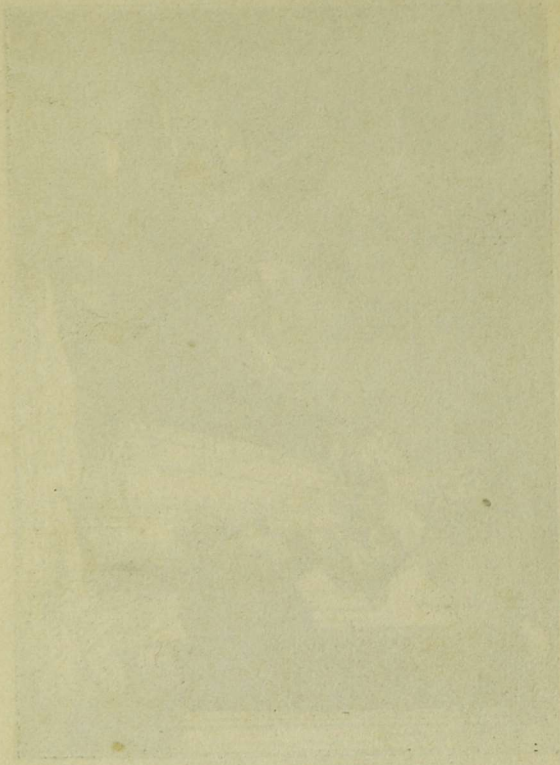

FRONTISPIECE.—*See Page* 5

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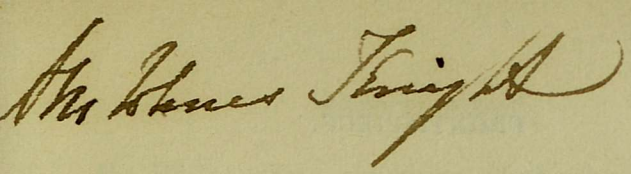

THE FRONTISPIECE.

SCENE, *a parlour; an infant is creeping about the floor playing with a newspaper. Two little children, Ann and William, are trying to make the fire burn.—Enter their Mother with a copy of "The Little Philosopher" in her hand.*

Mother. Come here, my little children; I have bought a new book, and am going to teach you *Philosophy.*

Ann. Oh, mother, a new little book; but it is too hard; we cannot learn Philosophy.

William. What is Philosophy, mother?

Mother. It is the first thing which children learn.

William. Why mother, the *first thing?* then it must be the a, b, c. Who would think that would be called by such a name?

Mother. No, William; you learned a great many things, long before you learned the a, b, c.

Ann. I am pretty sure the first thing that *I* studied, was my letters.

Mother. Look at the baby there; what is he doing?

Ann. Oh! he is tearing the newspaper all to pieces; he will spoil it.

Mother. No matter if he does: but what do you think he is doing it for?

William. I don't know, unless it is for mischief.

Mother. No, William; it is not for mischief. A piece of paper is something new and curious to him; and he likes to shake it about, to see how it will move; and to pull it to see how strong it is, and how easily it will tear. In that way, he is learning the nature of it.

Ann. See, now he has thrown it away.

Mother. Yes, he is creeping along towards the footstool. He is going to examine that. Now he slides it along the carpet. He finds it is heavier than the paper.

Ann. And harder.

William. Now it has caught in the carpet.

Mother. Yes, see he looks perplexed. He does not know why it stops; he is tipping it up;—it is almost over;—there it goes, thump on the floor.

Ann. How frightened he looks.

Mother. Yes, it is strange to him, to see any thing fall and make a noise. But the next time, he will not be so much surprised; he has learned something, by this experiment in Philosophy.

William. Why mother, is this Philosophy?

Mother. Yes, William; and every child has a great deal of Philosophy to learn, before it can walk or speak, and much more, before it can read.

Ann. But William and I have learned all

the Philosophy; we know all about paper and stools, and the table, and falling, and other things.

Mother. I believe you were trying to make the fire burn when I came in.

William. Yes, mother; but it was only for fun: it is not cold.

Mother. But what fun is there in building a fire

William. Oh, I love to see it begin to smoke, and then blaze a little; and pretty soon higher and higher, till it is a great hot fire.

Mother. But I don't think your fire burns very well; what is the matter with it?

William. No, mother, we could not make it burn.

Mother. But there is good dry wood there.

Ann. I know it, and some good coals; but we could not fix it right. What is the reason your fires burn so much better than ours?

Mother. Because I know something more about the nature of fire than you do. There is some Philosophy in that, which you have got to learn.

William. Will your new book tell us about that? Will it tell us what we blow the bellows for?

Mother. I don't know; but I suppose it will tell us things *like that.* But come, we will try it. It is full of questions which I shall read; and you must *think* of the answers.

William. Let me look in it first. Oh, here are the answers all put down.

Mother. No, only the difficult answers are given; and I must not read those until you have *tried hard* to think of them yourselves. And after I have gone over the lesson once, and told you the answers, I shall read the same questions again to-morrow; and see if you remember them.

Ann. But some of the book is printed smaller than the rest.

Mother. Yes, the questions in small print are more difficult, and they are for older children than you.

Ann. Oh, let us try to answer them. I think we can.

Mother. Well, we will try the easiest first; and then, perhaps, I shall ask you some of the others.

INTRODUCTION.

GENERAL DESIGN OF THE WORK.

The following work was originally published in numbers, and under a fictitious name. The favourable reception which, under those circumstances, it received, has induced the publisher to issue it in a form more convenient for general use.

The parent or teacher who may take up this little work, is especially desired to notice, that it is not intended to give to children a superficial, and consequently useless, acquaintance with subjects and sciences beyond their grasp; but, as its title imports, *to teach them to think and to reason about common things.* The design is not to go at all out of the appropriate field of childish observation;—but to fix the attention, and to employ the reasoning powers, upon the thousand objects around them, with which they are necessarily more or less familiar, and which are consequently the best subjects of thought and reflection for them.

METHOD OF STUDY.

Although there is no doubt that a class of children at home or at school may be very much *interested* in endeavouring to answer the questions proposed here, yet it must be remembered, that the main object of the work is *utility*, not *amusement*. It must therefore be considered as a book for *study*, not for mere *reading*. It should never be given to a child with the expectation that he will sit down and amuse himself with it. To succeed at all, he *must have a teacher and a definite lesson*. The children, we repeat, *must have a teacher*. That teacher may indeed, and perhaps most successfully, be an older brother or sister; but in order that the book may at all accomplish the object for which it is intended, it must be used as the *text book of a teacher*, not the mere reading book of a child.

The reader will observe that there are two sets of questions, one for younger, and one on the same subjects, for older pupils. These questions are distinguished by the type in which they are printed. The author is of opinion that a child of two or three years of age might be

interested in the easier questions by giving him a very short lesson, perhaps two or three questions, every day. Each question should be fully explained and repeated in various forms, until the child is perfectly familiar with the principle. In order to do this, the mother, or if in school, the teacher, must supply many questions analogous to those in the book.

For example, suppose a mother attempts to give her child the first lesson. The questions, as will be seen by reference to page 17, are as follows :—

Spread out a handkerchief upon the floor.

Touch one of the sides of the handkerchief.

Touch another side.

Is the side of the handkerchief straight or crooked ?

In teaching this lesson to a very young child, something like the following dialogue would occur.

Mother. Mary, take this handkerchief and spread it upon the floor.

Mary. Where, mother

Mother. Here, down by my side. Spread it smooth. That is right. Now touch one of the edges of the handkerchief.

The child, if very young, would perhaps not know what is meant by the edge · she very

probably has never heard the word before. The mother would, of course, explain.

Mother. This is the edge, all along here; and here is another edge, amd here is another edge, and here another. Now, Mary, touch the edge of the handkerchief.

Mary now succeeds.

Mother. That is right. Now touch another edge. That is right. Now touch another edge.

The same experiments may now be repeated with some other object, having distinct edges like the handkerchief. For if the child now thoroughly understands the lesson, she will take great pleasure *in repeating the experiment* and the answers.

Mother. Now, Mary, spread this sheet of white paper on the floor. Be very careful. That is right. Now touch one of its edges, &c.

A similar experiment might be made with a book, and then (the whole lesson having not occupied more than five minutes) the mother should say, "Well, I cannot teach you any more now; give me the handkerchief, and the book, and the paper, and run away to play."

The next day *the same exercise precisely* should be repeated. The child will, if the case is properly managed, take a great pleasure in it. The mental effort necessary to recal to

mind the information gained the day before, and to do the things required, will be just enough to be pleasant, and thus at each succeeding exercise there should be a review of the past, repeated again and again. Very young children are never tired of hearing, over and over, the same story, or playing the same game, or calling into exercise, in the same ways, their little stock of knowledge. When a principle has at last become obviously and perfectly familiar, of course the exercises upon it may be dropped, and this will evidently be done earlier with older than with younger children.

INFLUENCE OF THE BOOK UPON PARENTS AND TEACHERS.

The parent or teacher who reads this, will easily see, from what has already been said, in making the above illustration, that it is not the design of the book that the questions should be read off mechanically and rapidly, the child answering what he can, and the teacher telling him the rest. It is intended to awaken the *teacher's* powers as well as those of the child, by exercising his ingenuity to the utmost, in finding

analogous questions, and making interesting explanations, and performing little experiments. If the book is used by any parents or teachers in this way, and in this spirit, it will most materially and permanently increase their power to interest and instruct children in all other cases.

A wish has been frequently expressed, that more of the questions had been answered in the book, as many teachers find that they are unable to answer all, themselves. There are two very good reasons why the author has not inserted answers to all the questions. First, that there are some questions which he did not know how to answer himself; and secondly, because *he did not wish the teachers to be able at once to answer all.* The old idea of a teacher trying to keep up before his pupils the character of infallibility, is now exploded. All good teachers, and all wise parents, are willing freely to acknowledge their ignorance, and to engage with their pupils on the understanding, that *they are themselves learners too,* though in a somewhat more advanced stage. When a child brings to its parent or teacher any difficult or perplexing question, "*I don't know,*

but I will help you to find out," is the best answer, and the pleasantest for all parties, which can be given. They then, teacher and pupil, occupy common ground,—there is sympathy between them,—the child is encouraged by observing that his father is a learner, as well as himself, and is led on to patience and perseverance, by observing that his father patiently perseveres. It is intended, therefore, that the parent or teacher should not always, as a matter of course, immediately know the answer to every question. A great many are intended to awaken the common curiosity and interest both of parent and child, and to engage them in that most useful and delightful employment, *a united and mutual effort*, in search of knowledge. In order to obtain the information desired in some cases, it will be necessary to inquire of others; in some cases simple experiments or observations must be made, as, for example, in the questions on the motions of the heavenly bodies. But in almost all cases, the teacher, even if he is only an older child, will be able to find the means of obtaining the knowledge desired, and his class will be much better satisfied, and will enjoy the exercise much more,

and will derive far greater advantage from it, by their obtaining the knowledge required through their own successful investigation, than from having a printed answer ready to their hands.

USE OF THE BOOK IN SCHOOLS.

The greater the number of pupils in the class, the greater will be the interest taken in the questions and answers. Sometimes a teacher has used the book for his whole school, as a sort of general exercise. Of course, some of the simple questions intended for very young children, perhaps nearly all those in large type, should, in such cases, be omitted. The pupils all answer together, where the answers are short, and individuals, called on by the teacher by name, reply to those questions to which the answers are long. Or, after reading the question, the teacher may say, "How many can answer it?" Those who can may rise, or simply raise their hands, and then some individual may be called upon to give an answer. As soon as this answer is given, all those who were prepared to say the same and nothing more, drop their hands. If any

others have a different answer or any additional information, they keep up their hands and are called upon in succession, until all their various answers have been reported. The teacher should exercise much ingenuity in devising various other questions not here written; and in every doubtful case the pupils should be directed to ascertain what is the fact, by experiment or by observation, and should not be told by the teacher in cases where they have the means of discovering the truth by these methods.

The teacher may appoint, in some cases, particular boys or girls to make experiments, or to ascertain facts in the interval, between successive recitations, and to report the result. Children will take a great interest in executing such commissions, and no one need be informed how many faculties and powers will be developed and strengthened by such exercises.

It may perhaps be generally better, however, that when the book is used in schools, it should be in small classes, each pupil having a copy, and previously studying the lessons, ascertaining the facts by inquiry, or experiment, or observation. The absence of

printed answers, and the necessity which the pupil will be under of learning the facts, by that most useful of all intellectual efforts, both for young and old,—active investigation,—constitute one of the most important peculiarities of this book, as a means of exercising and developing the powers of the young. It is confidently believed that this will enable it to exert some influence in making the child who shall use it more of a thinking and reasoning being, and thus may assist the efforts of his teacher to lead him to prosecute more understandingly and successfully his other studies.

The writer hopes that those parents and teachers who may use it will find it effectual, in some degree, in awakening the curiosity and developing the thinking powers of their pupils;—and that they will themselves become so familiar with the method of instruction here presented, as to employ it extensively upon other subjects, and to carry it into other fields, without a manual to guide them.

THE

LITTLE PHILOSOPHER.

PART I.

[The questions in large type are intended for the younger children; those in small type for the older.]

I. SHAPE.

Spread out a handkerchief upon the floor.

Touch one of the sides of the handkerchief.

Touch another side.

Is the side of the handkerchief straight or crooked?

Lay a thread down upon the floor.

Is it straight or crooked?

Touch the edge of the table.

Touch another edge of the table.

Touch the place where these two edges meet.

What is this called ?

Touch another corner.

How many corners has a table ?

Shew me a corner of the handkerchief.

Find another corner of the handkerchief.

How many corners has the handkerchief ?

How many corners has a book ?

Shew me a corner of the carpet.

How many corners has the carpet ?

Shew me a corner of the room.

How many corners has the room ?

Has every thing four corners ?—No, a flat-iron has only three corners, and a dollar has none.

Cut out with scissors a piece of paper with four corners.

Another with three corners.

Another with five.

Another with no corners.

Draw a line upon the slate.

Is it a long or a short line ?

Draw a longer line.

Draw a shorter line. A straight line. A crooked line.

Make two lines with the ends together.

What is the place where they meet called? A corner.

Is it a square corner?

Make a square corner.

Make a figure with four square corners.

Has a book square corners? How many?

Has a handkerchief square corners? How many?

Is a handkerchief, then, shaped like a book? Not exactly.

Why not? The sides of the handkerchief are all equal, but two of the sides of the book are longer than the other two.

What is the shape of the handkerchief called? Square.

What is the shape of the book? Oblong.

Is the table square or oblong? The window? The door?

Make a square upon the slate. Make an oblong.

Are all squares of the same shape? Yes, they are of the same shape, but some are larger than others.

Make a large square and a small square upon the slate.

Make an oblong.

Mention several things of an oblong shape? A bed, a door, a ruler, and a board.

Are all oblongs of the same shape? No, the bed is almost square, and the ruler is very long and narrow.

What shape is a ring?

What do you mean by its being round? The distance from the middle to the outside of it is the same every where.

Is a book round?

Why not? It is farther from the middle of it to the corner than it is to the side.

What else is round like a ring? A hoop and a wheel.

Is a dollar round like a ring? Yes, only it is filled up inside.

Mention several things which are round like a ring. A plate, a half-penny, the top of a cup, and the letter O.

What shape is a roller? Round.

Is it round like a ring? No; it is long and round.

Is the leg of a chair round?

Is it round like a ring or like a roller?

Is a tumbler round?

Is it like a ring or a roller?

What else is round like a roller?

A pencil, a cane, my arm, my fingers, a log.

Think of many things round like a roller.

What shape is a ball? Round.

Is it round like a ring?

Is it round like a roller? No; it is round every way.

Is an orange round?

Is it round like a ring, or a roller, or a ball?

Is a phial round? Like what?

Is an apple round? What kind of round?

Is a pail round? Like what?

Is the sun round? Yes. It looks round like a ring; but it is round like a ball.

Cut out a piece of paper round.

Is it round like a ring, or like a ball, or like a roller?

Can you make any thing of paper, like a roller? I can roll up the paper.

Can you make any thing of paper, round like a ball?

Make a round hole in the paper. Is it round like a ring, or like a roller, or like a ball?

Make a round mark upon the slate. Is it round like a ring, or roller, or ball?

Make another ring upon the slate.

Are all rings of the same shape?

Are they all of the same size?

Make a large ring. Make a small ring.

Are all rollers of the same shape? No, a pencil is long, and not large round: but a tumbler is very large round.

Is a barrel round like a roller? Not exactly.

Why? It swells out in the middle.

Is the limb of a tree round like a roller? Not exactly. Why? It grows smaller and smaller towards the end.

Are all balls of the same shape? Yes, only some are bigger than others.

Is an egg round like a ball? Not exactly; it is longer from one end to the other than it is across.

II. COLOUR.

Is every thing of the same colour?

Mention some things of different colours.

What colour is the sky?

What colour is the grass? A wafer? Brass? Ink?

Name all the colours you can think of?

What good does it do to have things of different colours? They look prettier.

Which is the prettiest, green or blue? Red or white? Yellow or green?

When is a thing striped? When it has different colours in long lines.

Find something that is striped.

What is a spot? It is a little place upon something, of a different colour from the rest.

Find something spotted.

What colour is paper? Ink?

Why is the ink black, and the paper white? That marks made with ink, upon paper, may be seen plainly.

What colour is the slate? The pencil-mark?

Why do we make white marks upon the slate?

Suppose you were going to mark upon a white wall, would you mark with a coal or with chalk.

What colour is snow?

What colour is grass?

What colour are the fields in winter? In summer?

What advantage is there in having the fields green in summer? It is pleasanter to see.

Suppose the grass had been red, what harm would be done? The bright sun in the summer would shine upon it, so as to make it dazzle our eyes.

Does not the sun shine upon the snow in winter?

Does it dazzle our eyes?

Why then did God make the snow white? Perhaps because white snow makes it lighter in the night.

Why should not the fields be covered with something white in summer too? Perhaps because the nights are not so long, and there is not so much danger, if it is dark.

What then would be the harm if the fields were of any bright colour in summer? Our eyes would always be dazzled.

What would be the harm if the fields were of any dark colour in the winter? It would

be very dark and gloomy in the night, and persons would often be lost in the snow, and frozen.

What colour is fire? Very bright, yellow, and red.

What good does it do for fire to be of a very bright colour? It gives us light in the night.

Is it any safer to use fire because it is very bright? Yes, if any thing takes fire, it makes a great light, and people see it sooner.

What colour is water? It has no colour.

Is not water white? No. Milk is white, and milk is very different from water.

Name something else which has no colour. Glass.

III. HARDNESS AND SOFTNESS.

Is every thing hard?

Mention something which is not hard.

Mention something which is hard.

Feel the table, and tell me whether it is hard or soft.

Feel your cheek, and tell me whether it is hard or soft. Is a cushion hard or soft? Why is it made soft?

Why is the table made hard? So that it may not bend, and let the things fall off.

Is the bedstead hard or soft? The bed?

Why is the bed made of something soft, and the bedstead of something hard? The bedstead must be stiff and hard, to keep up the bed, and the bed must be soft, so as to be easy to sleep upon.

Suppose God had made every thing hard, or every thing soft, what harm would there have been? We could not have had all the things that we want.

Which is hardest, an apple or wood?

How do you know? Because I can cut the apple much easier than the wood.

Which is softest, a pillow or the back of the cat?

Suppose you strike two hard things together, what do you observe? They make a noise.

Suppose you strike two soft things together, do they make a noise? How can you try it? With two balls of yarn.

Are your fingers soft or hard? There is something hard in the middle of them, but they are soft outside.

Suppose they were hard, what harm would there be? They would rattle together when I moved them.

What parts of your body are hard? My teeth and my nails.

Why did God make your teeth hard? So that I can bite things with them.

Why did God make your nails hard? So that I can point better, and take up little things with them.

Which is hardest, the shell of a walnut, or the meat? How do you know? Because I can bite the meat, but cannot bite the shell.

Which is the hardest, the shell of a walnut or the shell of a chesnut? How do you know?

Which is the hardest, wood or stone? How

do you know? I can cut or break the wood easier than I can the stone.

What are knife blades made of? Steel.

Why are they made of steel? Because it is very hard, and will cut through a great many other things.

What do I mean when I say a thing is stiff? You mean it will not bend.

What should I say of it, if it will bend? You would say it was pliant.

Is a pole stiff or pliant? A string? The trunk of a tree? The small branches?

What part of a whip is stiff? What part is pliant?

IV. WEIGHT.

When you throw a stone up in the air, does it stay there?

What becomes of it?

Which way is down? Towards the ground.

Does every thing come down, as far as it can, towards the ground?

Suppose you drop a feather, does it come down towards the ground? Yes, slowly.

What do we mean when we say any thing is heavy? It is hard to lift it.

When any thing is not hard to be lifted, what do we say of it? It is light. Does light ever mean any thing else? What?

Which is heaviest, a stone, or a piece of wood as large as a stone?

Which is heaviest, a chair or a footstool? A chair or a table?

Suppose you put a stone in the water, what becomes of it? It sinks to the bottom.

Why does it sink to the bottom? Because it is heavier than the water, and so it presses down through it.

Suppose you put a piece of wood in the water, what becomes of it? It floats upon the top of the water. Why? Because the water is heavier than the wood, and presses down under it, and keeps it up.

Which is heaviest, ice or water? How do you know?

How can you tell whether oil or water is heaviest? By pouring oil and water together, and seeing which goes to the bottom.

Which is heaviest, tin or water?

Suppose you put a tin pail in the water, will it sink, or float upon the top?

Why will it float upon the top? Then is tin heaviest? Yes. Because it is made large and hollow, and so it is lighter than so much water would be.

Why did God make things have weight. So that they may be kept down firmly where they are put.

Suppose they had no weight, what harm would there be? Every thing would be easily moved, and blown about, as feathers are, which have but little weight.

Which is the heaviest, glass or ice?

Will an axe sink or float in water? Why will it sink? Because there is so much iron in it.

Suppose you put a board in the water, and then put a little stone on it, will it sink? Perhaps not, if the stone is small.

Suppose you put many stones upon it, will it then sink?

How soon will it sink? As soon as I have put so many as to make the stones and the board together, heavier than the water.

Which is heaviest, a bullet, or a log of wood?

Which will sink in water?

Why will not the log sink, if it is heavier than the bullet? Because it is a great deal larger, and there is more water under it, to keep it up.

What things are made heavy on purpose? A flat-iron. Why? A pestle. Why? A hammer. Why?

What is made light on purpose? A kite. Why? A basket. Why?

V. LIGHT.

Is it always light?

When is it dark?

Why is it light in the day, and dark in the night? Because the sun shines in the day.

Is it always very dark in the night? Why not?

What shines in the night besides the moon?

Who made the sun, and the moon, and the stars?

Why did He make the world so as to have it dark part of the time? Because we must sleep part of the

time, and it is easier to sleep when it is dark.

Can we always see the sun up in the sky in the day-time? No, because it is sometimes cloudy.

Why cannot we see the sun when it is cloudy? Because the clouds come between us and the sun, and hide it.

Why is it not quite dark when it is cloudy? Because a good deal of light shines through the clouds.

Is it always dark in the house when the sun or the moon does not shine?

How do you make it light? By a little bright fire made with a lamp or a candle.

How does the light get into the room in the day-time? It shines in through the windows.

Why is it dark in the closet?

Why does not the light from the lamp shine out through the windows in the night, and make it light out of doors?

Can light shine through a board ?

Can it shine through water ?

What is any thing called when the light can shine through it ? Transparent.

What else is transparent ? Glass.

Suppose God had made every thing transparent, what would have been the harm ? People could see through the sides of the house, and see every body in it.

Suppose God had made nothing transparent, what would have been the harm ? We should have had nothing to make windows of.

Could we not have left an open place for the light to come in ? Then the wind and rain would come in too.

Why is it very dark in the night when it is cloudy ? Because there is not light enough from the moon and stars to shine through the clouds.

Does any thing else give light beside the sun, moon, and stars, and fire ? Yes, sometimes it lightens

Where does the lightning shine ? In the clouds.

VI. FIRE.

When you put a piece of wood upon the fire, what becomes of it ?

What is it changed into? Some of it is changed into smoke, and goes up the chimney, and some of it is changed into coals and ashes, which stay in the fire-place.

Will every thing burn?

Will bricks burn? How do you know?

Will paper burn?

Mention some things which will burn.

Mention some things which will not burn.

Which burns fastest, paper or wood?

Which burns longest?

Which makes the greatest blaze?

Will cloth burn?

Will your clothes burn?

Will oil burn? How do you know?

Will water burn? Do we use water about the fire? What for?

Why do we have a fire?

Is it always necessary to have a fire to warm us?

When do we not have a fire In summer.

Why do we not have a fire in summer as well as in winter ?

What else does fire make besides heat ? Light.

Do we burn wood in the fire-place for the heat, or for the light ?

Do we burn lamps and candles for the heat, or for the light ?

What would have been the harm, if God had made every thing so that it would burn ? Then we could not keep the fire by itself. It would have spread from one thing to another, and every thing would be burnt up.

What keeps the fire in houses by itself, and prevents its burning the house ? The bricks of the hearth and the chimney.

Do houses ever take fire ? Yes, and blaze up very high, and burn to ashes every thing that is in them.

Is it right for children to play with fire ? Why not ?

What would have been the harm if God had made nothing so that it would burn ? Then we could have had no fire.

What becomes of the wood when it burns ?

Part of it goes up the chimney in smoke, and part of it becomes ashes.

What becomes of the smoke? It floats about in the air, and some part of it is brought down again with the rain.

What becomes of the ashes? It is thrown out at last into the ground, and some parts of it go into the roots of trees, and rise up the trunk, and help to make wood again.

What good does it do us to have oil made so that it will burn?

What good does it do us to have water made so that it will not burn?

Would it have been as well if God had made the water so that it would burn, and oil so that it would not burn? No; because we want much more to put out fires than to burn in lamps, and water is more plenty than oil.

Would it not have been as well to have had iron burn, and wood not burn? No; because we want more for building fires than for shovels, tongs, &c.; and wood is more plenty than iron.

Would it be as well to have sand, clay, and other parts of the ground burn, and wood not burn; for the ground is more plenty than wood? No; because then the ground might take fire, and we could not put it out; and the whole world would be burnt up.

VII. WATER.

Has water any colour? Taste? Smell?

Is it heavy?

Where does water come from? From wells and springs, from brooks and rivers, and from the skies when it rains.

Does it ever become hard?

What makes it become hard?

What is it called when it becomes hard?

Suppose you put some ice into a warm place, what becomes of it?

What does it turn into?

Suppose you put some water over the fire, what becomes of it? It boils and grows less and less, until it has boiled all away.

What does it turn into? Steam.

What becomes of the steam? It goes off into the air, and is spread all about. Why do we not see it? Because it is too thin.

What are the clouds? They are this water, which has gathered again in the air, so that we can see it.

Why did God make water transparent? So that we can see how deep it is, and see whether there is any thing in it when we drink it.

Why did God make it without any taste? Perhaps, because if it had any particular taste, we should soon become tired of it, and not like it.

Is water very plentiful, or not?

Mention some things that water is good for.

When is any thing said to be wet? When is any thing said to be dry?

If you hold any thing wet to the fire, what change takes place?

What becomes of the water? It goes off into the air.

Suppose you move something that is wet away from the fire; will it dry then? Will it dry as fast as it did before?

Suppose you expose it to the sun; will it dry faster, or not so fast as before?

Why cannot we see the water when it goes off into the air? Because it goes off very slowly, and in very small particles.

Can we never see it going off? Yes, when water is heated over the fire, we can see the vapour rising.

Suppose water stands in a bowl, would it go off slowly into the air?

How can you prove this? By putting a little water in a cup or saucer, and leaving it a good many days in the open air.

Does the water rise up in the same way from rivers and brooks, and the sea? Yes.

What becomes of it? It is spread through the air all around us, and over our heads.

Why does it not wet us? Because it is so thin.

Can we ever see it? Yes; it gathers into clouds, and then we can see it.

Does the water ever come down again after it has once gone up? Yes: when it rains it is this water, which has gone up, coming down again to the ground.

What becomes of the water when it reaches the ground? It runs down the sides of the hills, and forms little brooks, and a great many brooks run together and form rivers, and the rivers run into the sea.

Does all the water run into brooks and rivers? No; some of it soaks down into the ground, into the wells and springs.

Which is heaviest, ice or water? How do you know that ice is lightest? Because it floats upon the water.

What would be the harm if ice was heavier than water? Then it would sink to the bottom as fast as it froze, and almost all the water in the rivers and ponds would freeze solid.

Why has God made water so plenty? Because it is very useful to plants, and to animals, and to men.

VIII. EARTH.

What is the earth? That which is under our feet wherever we go. What is it called besides earth? Ground.

Is it covered with any thing?

What is it covered with in winter?

What is it covered with in summer?

Is it covered with any thing in the roads?

Is it smooth or rough? Is it level or uneven?

What is a hill? What is a valley?

Is the ground hard? Not very hard; we can dig into it.

If you should dig into the ground in several places, would you find it all alike? No, I should find a great many kinds of ground.

What is a rock? It is a large mass of stone.

What is the difference between a stone and a rock? A stone is small, so that men can lift or move it.

What is the difference between a stone and a pebble? A pebble is small, and smooth, and roundish.

Where do we find a great many pebbles? In the brooks, and by the shore of the sea.

What good does the ground do? Plants, and trees, and flowers grow up out of it, in the gardens and fields.

Is there ground under this house?

Where can you see it? In the cellar.

Is there ground under the brooks and rivers?

What is a mountain?

Why did God make the ground with hills and valleys and mountains? Because the country looks pleasanter, and the water will run off in brooks and rivers, and plants will grow better.

Why did God make different kinds of ground? They are good for different kinds of plants, and for different purposes.

What is clay? It is a fine kind of earth, very sticky when it is wet, and very hard when it is dry.

What is it good for? Bricks are made of it.

What are rocks good for? They are used to build houses and bridges and walls.

Why are stones better than wood? Because they never will rot.

What is sand? It is coarser than clay, and does not stick together when it is wet.

What is it made up of? Of very small particles, hard like little stones, and with sharp edges.

Can you see these little particles? Yes, if I look very carefully.

What is sand good for? It is good to scour with, and it makes drier roads, and also glass.

Where is it found? It is generally found

very deep in the ground, and in the bottoms of brooks and rivers.

What good does it do in these places? The water gets strained through it, and becomes clear in the wells, and springs, and brooks.

What is the colour of sand? Different colours; black, white, yellow, grey, and red.

What is gravel? It is a very coarse kind of earth, full of little stones and pebbles.

What is it good for? It makes very hard walks and roads.

What other things that are useful are brought up out of the ground? Iron, and salt, and marble, and lead, and coals, and water, and a great many other things.

What other things come up out of the ground? All trees, and grass, and flowers grow up out of the ground.

PART II.

IX. THE AIR.

Is there any thing in this room besides the furniture, and the things which you can see? Yes, it is full of air.

Where in the room is the air It fills the room above us, and around us every where.

How do you know that there is air in the room? When we walk fast, or run about, we can feel it against our faces.

Swing your hand about fast: can you feel it?

How does it feel?

Why do we not feel it always, when we walk about? Because it is so light and thin.

Why do we not see it?

Is there air in the other rooms of the house ?

Is there air out of doors ?

Does the air from out of doors ever come into the house ? How ?

What is air called when it is moving ?

Does the air out of doors move ?

Is it ever perfectly still ?

How can you tell that it is moving ? I can see little particles of dust moving about in it.

Does it ever move very fast ?

When it moves very slowly, is it called wind ?

Is it always windy ?

Does the wind ever blow when it rains ?

Does it always blow when it rains ?

Does it ever blow when it is pleasant ?

Does it always blow when it is pleasant ?

Does it ever blow when it is cold ? When it is warm ?

Does the wind always blow the same way?

How can you tell which way the wind blows?

When the wind blows from the North, what is it called? South? East? West?

Does the wind blow to-day? Which way?

Does the wind ever do any injury? What injury?

Does it ever do any good? What good? It carries away smoke and bad air, and it makes it cool and pleasant. It also brings clouds and showers which water the ground.

Does the wind do any good at sea? What good?

Does the wind often do any injury?

Does it generally do good?

Of what use is air? We breathe it, and it keeps us alive.

What makes your bosom swell when you

breathe? If you breathe fast, can you hear the air passing in and out?

How do you know it is necessary to breathe? If we hold our breath a few moments we feel distress.

Can persons live long under water? Why not? Can fishes live under water?

Suppose a person should be shut up in a small, tight place, where there was but little air, what would become of him?

Is the air of any other use in the house besides being breathed? Yes, it makes the fire burn.

How do you know it makes the fire burn? Because if the air is kept from the fire it will go out, and if the air is made to go to the fire fast, it burns better.

How can we make the air go to the fire fast? By blowing it with our mouths, or with the bellows.

How do you know that the bellows makes the air go to the fire?

Suppose a fire should be made out of doors, would it burn fastest in a still day or in a windy day? Why?

What good does the air do out of doors? It bears up the clouds, and the birds can fly by means of it.

How does it bear up the clouds? They float in it, just as wood does in water.

Which then is lightest, the clouds or the air?

How do birds fly by the air? They strike it with their wings, and so lift themselves up by it.

Could birds fly if there was no air?

Is there more than one kind of air? Yes, a great many kinds.

Is more than one kind very common?

Suppose the air had been made much heavier and thicker than it is, would it have been as well for us? Why not?

Suppose it had been much lighter and thinner? Then it would not have supported the birds and the clouds.

Which is heaviest, air or smoke? How do you know?

Suppose smoke had been made heaviest, where would it go when it went out of a chimney?

Which is heaviest, water or air?

Suppose air had been heavier than water? Then the water would have risen, like smoke, from all the rivers and seas, and would have gone up high above our reach.

Suppose there had been no air? Then the birds could not fly any more, the clouds would fall down to the ground, the fires would all go out, and all animals and all people would die.

X. HEAT AND COLD.

How can you tell whether any thing is hot or cold?

Is every thing hot or cold?

What is the difference betwen hot and warm?

What is the difference between cool and cold?

How do things become hot?

What things does the fire make hot?

Does the sun make any thing hot? Does it make any thing warm?

What things?

Suppose ice is put near the fire, what change takes place in it?

Suppose lead is put into the fire, what change takes place in it?

Which requires greatest heat to melt it, ice or lead?

Will wax melt by heat? Iron? Tallow?

Think of other things which will melt by heat.

Suppose water is placed where it is very cold, what change takes place?

What is freezing?

Will melted lead harden by cold? Will oil? Milk? Quicksilver? Yes, if it is very cold indeed.

Think of other things which will harden by cold.

Will every thing which is liquid harden by cold?

Will every thing which is solid melt by heat?

Think of some things which will not melt.

How can you prove that wood will not melt?

Suppose you should put iron into the fire, would it melt?

Does this prove that it cannot be melted? Why not?

Does any thing change its colour when it is warmed?

Does any thing change its colour when it is heated?

What change is there in the colour of iron? Of wood?

Suppose you put hot iron into cold water, what changes would take place? The iron would be cooled, and the water warmed.

Suppose you put cold iron into hot water, what changes would take place?

Suppose you put a piece of hot iron and a piece of cold iron together, what change would take place?

Suppose you put your hand upon a cold stone? My hand is cooled and the stone warmed.

Suppose you put your hand upon a warm stone?

Suppose you carry a piece of hot iron out of doors, is there any thing cold around it? What? Air.

What change takes place, then, in the iron? And is the air warmed?

Why is it warmed? Because the heat spreads till all around it is of an equal temperature.

When we say it is a warm day, or a cold day, what do we mean is warm or cold? The air all around us.

What makes the air and the ground warm?

Is it warmest in the day-time or at night? Why?

Is it warmest in summer or in winter? Why? Because the sun is more nearly over our heads in summer than in winter.

What makes our bodies warm? It is some part of the air contained in the blood.

How do you know that it is not our clothes only? Because our faces and hands are warm when they are not covered with clothes.

What good do our clothes do? They keep our bodies from becoming cold by the cold air.

If you were to wrap a stone in flannels and furs, would it make it warm?

Would it keep it from cooling fast if it was already warm?

Is that all which clothes do for our bodies?

Why would any thing hot cool faster without something around it? Because the air which was near it would move away, and cold air would be continually coming to it and cooling it.

Suppose a cold wind should blow upon a piece of hot iron, would it cool faster or slower? Why?

Suppose a warm wind should blow upon a

piece of ice, would it melt faster or slower? Why?

Suppose you blow upon a snow-ball, will it melt faster or slower where you blow upon it?

Do people ever keep ice all the summer? How?

When you are out in the cold, which becomes cold soonest, your arm or your hand? Your feet or your hands? Your feet or your side?

Why do your feet become cold sooner than your side? Why do your fingers become cold sooner than your wrist?

Suppose you run or walk very fast, does it make you warm or cold?

Suppose you rub your hands together some time, does it make them warm or cool?

If you rub two pieces of wood together very hard, will it make them warm or cool?

If you wet any thing, will it be warmer or cooler when it is drying? Will it be so if you wet it with warm water? How can you prove it? I can dip my finger in warm water, and then hold it in warm air, and it will feel cool while it is drying; or, I can wet my finger with my tongue, which is warm, and the spot will immediately feel cool.

XI. THE WEATHER.

How many kinds of weather can you think of?

What is meant by rainy weather? Fair weather? Cloudy? Clear? Foggy? Warm? Cold? Frosty? Chilly? Hot? Sultry?

What is the natural colour of the sky?

When there are small clouds floating about the sky, of what colour are they? Do a few small clouds prevent its being pleasant weather?

Suppose the clouds are large and thick, or fill the whole sky, of what colour are they? Dark colour.

What weather is this called?

Does it always rain in cloudy weather?

Can we see the sky then?

How does the sky look when it is rainy weather?

How does the ground look?

Where does the rain come from?

What is rain ?

What is the shape of a drop of rain ?

Are the drops always of the same size ?

Does the rain always fall straight to the ground ? Why not ? If it should fall straight to the ground, would it ever strike the windows ?

What is the difference between a shower and a storm ?

How do the clouds look just before it clears up after a storm ?

What is snow ?

Are the flakes always of the same size ?

Which falls through the air swiftest, snow or rain ? Why ?

What is the shape of a flake of snow

What is hail ? What is the difference between hail and snow ?

What is fog ? It consists of very fine particles of water floating in the air.

What is mist? It consists of coarser particles, large enough to fall towards the ground, but not so large as the drops of rain.

What good is done by rain?

What good is done by snow?

In what part of the year is the weather cold?

In what part is it warm?

What effect has the cold weather of winter on the ground?

What effect has it on the grass? The trees? The water?

Will all water freeze if it is exposed to the cold?

Do the rivers and the ponds in the winter freeze solid to the bottom, or only upon the top?

Why do they not freeze solid? Because the ice being lighter than water remains at the top, and protects the water from the cold.

How is snow formed? By vapour freezing in the air.

How is hail formed? By water freezing in the air after it is formed into large drops.

Can hail, then, ever be formed, unless the air is very cold?

Why, then, does it ever hail in the summer? Because it is sometimes very cold high

up in the air, though it is warm near the ground, and the hail is formed high up in the air where it is cold.

Why do we not sometimes have snow in the summer? Because if snow should form in the sky, it would melt before it reached the ground.

Why does not the hail melt? Because it is more solid and heavy, and falls quicker.

In what part of the year do we have thunder showers?

From what part of the sky do they generally come?

Does it begin to thunder or to rain first?

Do we always hear the thunder and see the lightning at the same time?

Are they, or not, always really together?

Why do they not seem to be together? Because they are sometimes a great way off, and the light of the lightning comes to us quicker than the sound of the thunder, so that we see the lightning first.

Then when we see a flash of lightning, shall we generally hear the thunder soon?

Suppose the cloud where the lightning is, is near us, will the thunder and lightning appear nearer together or farther apart? Why?

When a cloud is coming up in the day-time, which do we notice first, the thunder or the lightning?

Why do we not see the lightning as soon?

Because the bright light of the day prevents us.

When a cloud is coming up in the night, which do we notice first, the thunder or the lightning? Why? Because it is dark, and the lightning appears brighter than in the day-time.

Do we often see lightning in a very distant cloud in the evening, without hearing the thunder? Is there always thunder there, though we cannot hear it?

In what part of the sky do we see the rainbow? In what part of the day?

How is it produced? By the sun shining upon the drops of water in a cloud.

Where must the sun be then? Opposite the cloud. If the sun is in the east, where will be the rainbow? If the sun is in the west? Can we ever see a rainbow at noon? Why not?

XII. THE SUN.

What is the largest shining body in the sky?

What is the next largest?

What other shining bodies are there?

Is the sun *much* larger than the moon?

Is the moon much larger than a star ?

Is the sun much *brighter* than the moon ?

Is the moon much brighter than the stars ?

Which of the heavenly bodies dazzles your eyes ?

Which gives the greatest light ?

Is the sun always of the same size ?

Is the moon ?

Are all the stars of the same size ? Are all of the same brightness ?

Is the sun always round ? Is the moon ?

Is the sun always in the same place ? The moon ? The stars ?

Where does the sun rise ? At what time of the day does he rise ?

Which way does the sun seem to move after he rises ? Up into the sky ?

How long does the sun continue to rise higher and higher ?

How does the sun appear to move

in the afternoon? He seems to go down on the other side of the sky.

Where does the sun set?

Do we see any of the light of the sun before he rises?

What is this light called? The dawn.

Do we see any of the light of the sun after he sets?

What is this light called? The twilight.

Suppose God had so made the world, that there should be no dawn, would it be as well? No, the light of the sun would then burst upon us suddenly, and dazzle us.

Suppose God had made the world so that there should be no twilight, would it be as well for us? No, for then, when the sun sets we should be suddenly left in darkness.

Does the sun shine all the time?

Does he shine always in the day-time?

When it is cloudy do we see the

light of the sun at all? Yes, a great deal of light shines through the clouds.

When the sun rises in the morning in the east, does it come directly upward into the sky, or go off a little towards one side?

How can you tell? I can watch it early to-morrow morning, when it rises.

Does it go towards the north or towards the south?

What is that part of the day called when the sun is highest? What o'clock is it called?

Is the sun exactly over our heads at noon?

Why? Because I have just said he does not go directly upwards, but passes off a little towards the south.

What is that point in the sky called which is exactly over our heads? The zenith.

Which way from the zenith will the sun be at noon?

How can you prove this? By looking at the sun exactly at noon.

Upon which side of the house will the sun shine at noon?

Will he shine in at the windows? Yes, a little way.

Would he shine in at the windows if he was exactly in the zenith?

Suppose the sun should be farther from the

zenith at noon one day than on another; would he shine in at the windows farther or not so far?

Suppose the sun at noon should be higher up towards the zenith one day than another, would he shine in at the south windows farther or not so far?

How can you tell whether there is any difference in the sun's place at noon on different days? By noticing how far he shines in upon the floor on different days.

What time in the day must you observe it?

Suppose you should measure it to-day, and to-morrow, and perceive no difference, would it prove there was no difference? No, for it might be very small.

Suppose there should be a little difference every day, how could you perceive it? By measuring it to-day, and writing it down so as to remember it, and then measuring it again, after a week.

Does the sun always rise in the same place?

How can you tell? By observing it several mornings.

How can you remember where it rises, the first morning that you observe it? By noticing some tree or house opposite to which it rises.

Must you stand in the same place every morning?

Does the sun always set in the same place?

How can you tell?

How could you learn the sun's motions for a year? By observing the place of his rising and setting, and his distance from the zenith towards the south every week, for the whole year.

XIII. THE MOON.

When does the sun shine?

When does the moon shine?

Do you ever see the sun in the night?

Do you ever see the moon in the day?

Is the moon always of the same shape?

What is the shape of the moon when it is largest?

What is it called then? Full moon.

Can you see any thing on the moon when it is full?

What does it look like? Irregular spots.

Can you see the moon every night?

Why not? Sometimes it is cloudy, and sometimes the moon is not in that part of the sky which we can see.

What is the shape of the moon when it is smallest? It is of the shape of a bow.

What is it called then? New moon.

Can you see the spots on it then?

What is the moon? It is a large world.

Why does it look so small?

Do other things look small, when they are a great way off?

Which is the farthest off, the moon or the clouds?

How do you know?

What makes the moon look bright? Because the sun shines upon it.

Do we see the whole of the moon? No, only that part which the sun shines upon.

Is the moon always really of the same shape? It is.

Why does it seem to be so different? Because the sun shines upon different parts at different times.

How much of it is always bright? One half.

Which half? The half turned towards the sun.

Which is the farthest from us, the moon or the sun?

Then when the moon is in the same part of the sky as the sun, will the sun shine upon the side of the moon which is *towards* us, or the side which is *from* us?

Could we see then much of the bright part?

Will it be *new* moon then, or *full* moon, when the moon and the sun are nearly in the same part of the sky?

Suppose the moon and the sun were in opposite parts of the sky, should we see much of the bright part of the moon?

Then will it be new or full moon when they are opposite?

In what part of the sky is the sun at evening?

In what part of the sky would the new moon be at evening?

In what part would the full moon be?

In which direction would the sun be at midnight?

Where then would the moon be at midnight, if it was full?

Suppose you should look at the moon some evening, when it was new, where should you look for it? In the western part of the sky.

How would it look? It would be shaped like a bow.

Which way would it appear to move? Down towards the west, after the sun.

Could you see it very late that evening?

Where should you find it the next evening at the same time? Nearly in the same place, only higher up in the sky, and farther from the sun.

Would it be of the same shape and size that it was the evening before?

How would it be the third evening? It would be farther still from the sun, and larger and brighter.

Will it be *really* any brighter the farther it is removed from the sun? No, but we should be able to see more the part which the sun shines upon.

When the moon has moved so far from the sun, that it is nearly over our heads, at sunset, how will it look?

When it has moved so far that it is just rising when the sun sets, how will it look? Round and full.

Does the moon rise at the same time every evening?

How can you ascertain? By observing it two or three evenings, and noticing the time.

Does it rise later and later, or earlier and earlier?

How much later every evening?

How can you learn the principal motions of the moon? By noticing its place and size every night.

How could you remember the observations? I could write the place in which it appeared

every night, and draw its shape upon a piece of paper.

When would it be best to begin? When it is new moon.

How can you tell when it will be new moon? By the Almanack.

How long is the moon in going through all its changes from one new moon to another?

XIV. THE STARS.

When can we see the stars?

In what part of the sky are the stars?

Can they always be seen in the night?

Can they ever be seen in the day?

When the stars first appear in the evening, are they seen in various parts of the sky or only in one place?

Do they all begin to shine together?

Which do we see first? The brightest.

Do we see the stars before the sun goes down

Do we see the stars immediately after the sun goes down ?

Is it light at all when we first see the stars ?

Why do we not see any except the brightest first ? The light in the sky prevents us.

Do the stars which are first seen look bright or faint ?

Why do they look faint ? Does a lamp look faint in the day time ?

Do they grow brighter and brighter, or fainter and fainter ? Why ?

When the stars are all to be seen, do they all appear alike ?

Are they all equally large ?

Are they all equally bright ?

Are they placed regularly or irregularly in the sky ?

Can you count them ?

What good do they do ?

Can you see them as plainly when the moon shines ? Why not ?

Can you see them all night ?

Can you see them in the morning, just before the sun rises ?

Do they seem to fade away, and go out gradually as the sun comes up, or do they move away from the sky ?

Why do they grow faint as the sun comes up ?

Why can we not see them in the day time ?

How can you tell whether the stars move ?

Do they move ?

Which way do they move ?

When they come to the western side of the sky, where do they seem to go ?

From which side of the sky do other stars come to take their places ?

Where does the sun rise ? The moon ? The stars ?

Where does the sun set ? The moon ? The stars ?

Do all the stars rise and set ? They do not, those in the northern part of the sky pass round and round one star called the North star.

Does the North star appear to move ?

Where is the North star ?

Do the stars move among themselves, or all pass round together ?

How can you tell? By looking at two or three stars, and noticing how far they are from each other, and afterwards observing whether they are at the same distance.

Are there any stars which move about among the other stars? There are a few.

What are they called? Planets.

Do they look very different from the other stars?

Are the stars named?

Do you know the names of any of them?

Should you like to know the names of some of the brightest of them?

Are there any other bright bodies in the sky, besides the Sun, Moon, and Stars?

PART III.

THE BODY.

XV. JOINTS.

In how many places will your fore-finger bend?

In how many places will all your fingers bend?

What is the reason that your fingers are made to bend?

Hold your fingers out straight; now can you bend them most easily towards the palm of your hand, or towards the back of your hand? Why were they made so? Because it is more convenient to take hold of things.

In how many places will your thumb bend?

Is there any difference between your fingers and your thumb? What

difference in shape? In size? Does it bend in the same direction with your fingers, or in an opposite direction?

Suppose you had no thumb, could you take up things at all?

Could you take them up conveniently?

Have you any thing like fingers upon your feet? Have you any thing like a thumb upon your feet?

In how many places will *my* thumb and fingers bend?

Is there any difference between my hand and yours? What difference?

Which is softest and smoothest, the palm of your hand, or the back part of your hand? Why?

Why will your fingers bend in one place easier than in another? Because there are joints where they bend.

What is the name of the joints of your fingers? Knuckles.

Are there any other joints in your body ?

What are the names of them ? Wrist, elbow, shoulder, knee, ankle, &c.

Do these joints all bend alike ?

Hold your arm straight ; now can you move your hand up and down, keeping your arm still ? Can you move it round ?

Can you move your hand *entirely* round, while your arm is held straight, or only *partly* round ?

Hold your hand out straight ; now can you move your forefinger up and down, while your hand is still ? Can you move it round ? Then is the joint of your knuckle different from the joint at the wrist, or like it ?

Can you move your arm every way at the shoulder ?

Can you move it every way at the elbow ? Can you move your foot every way at the ankle ?

What good do your hands do you ?

What good do your feet do you ?

Could you use your hands and arms without joints ?

Could you use your feet without joints ?

Suppose a person should have no joints, in what difficulties would he be ?

XVI. EYE.

How many eyes have you ?

What are your eyes for ?

How many eyes have I ?

How many eyes has the cat ? A dog ?

Has every living thing two eyes ? No ; spiders, and flies, and some other animals, have a great many, but they are very small.

Where are your eyes ?

Why are your eyes made so near the top of your head ? Because I can see better with them than if they were placed low.

Could you not have seen with them if they had been in your side ? Not so well.

Why would it have been not so well to have had them in the back of your head ? Because I could then see only behind me, and not before me, where I want to go.

Why would it not be well to have

your eyes higher, quite upon the top of your head? Because there would be danger that things would fall into them, and besides, I could only look up into the air.

Why would it not have been as well to have had your eyes upon your hands?

Can you not think of any place where your eyes would be better than as they are?

Where are your eyebrows?

What are they?

What good do they do?

Where are your eyelids?

What are they?

What good do they do?

Has the cat eyebrows? Eyelids?

What difference can you observe between the eyes of a cat, and of a child?

Can you think of any other animals whose eyes you can examine?

Are the eyes of all children alike?

What difference is there?

How is it that you see with your eyes? The light comes in through a small place in front, which is clear like glass, and forms little pictures in the back of my eye.

Can you see this place which the light shines through in your eyes?

How does it look? Round and black.

Why does it look black? Because we can see through it into the inside, which is dark.

Is this opening, through which the light passes, always of the same size? No; when there is but little light it grows large, so as to admit as much as possible, and when there is a great deal of light, it grows smaller, so that we may not be dazzled.

Can we see the black spot in each other's eyes grow larger and smaller in this way?

How must the person be placed to make it look large? In some place nearly dark.

How must a person be placed to make it look small? He must be turned towards a strong light.

Suppose the front part of the eye should become dusty? Then the light could not pass through well, and I could not see plainly.

Why does not your eye sometimes become dusty? My eyelid moves down over it often, and wipes it.

Suppose God had not made you an eyelid for this purpose, what should you do? I

could not have found any thing to wipe my eye without hurting me very much.

What other good do your eyelids do? They shut up my eyes when I wish to sleep.

What would be the injury of having your eyes open while you sleep?

XVII. FACE.

How many noses have you?

How many noses have I? The cat? The dog?

What is your nose for?

What else is it for? To breathe through when my mouth is shut.

Suppose you had no nose, how should you breathe? I should be obliged to keep my mouth open all the time.

What is your mouth for? To eat with.

What is there in it which makes it convenient to eat with? Teeth, with which I chew my food, and a throat by which I swallow it.

Are all your teeth alike?

Which are the sharpest, the front or the back teeth?

Will your teeth be large enough for you when you grow up?

Those I have now will not, but they will become loose and be pulled out, and larger and better ones will grow in their places.

What else is your mouth for besides eating? To talk with.

What parts of your mouth do you use to talk with? My tongue and my lips.

Which do you use in saying m?

Which do you use in saying l? s? p?

Has the cat a mouth? A tongue? Lips?

Why then cannot she talk? She has not any mind; she cannot think.

Suppose God had not given you any mind? Then I could not think or talk, I could only eat, and drink, and sleep, like the cat.

Are the faces of dogs, and horses, and other animals, shaped like a man's? What difference do you observe?

What do animals do with their mouths, which men do not? They take up things, and carry them with their mouths.

Have you ever seen the cat carry things with her mouth?

Why does she do so? Because she has no hands.

Why can she not carry them in her fore paws? Because she is obliged to use all her feet to walk with.

Which has the sharpest teeth, a cat or a horse?

Why should the cat's teeth be sharpest? Because she feeds upon the flesh of animals, but the horse eats grass and hay.

Does the cat make any noise with her mouth? The dog? The horse? The cow?

Do all animals make the same noise?

Do you think it would be better if all animals made the same noise?

What advantage is there in their making different noises?

What is your chin for?
Can you move your chin?
How can you move it?
Can you move it any other way

besides up and down? Yes, I can move it a little from one side to the other.

What other name is given to the whole lower part of the face which moves?

What good does it do to have the jaw made so that it can move?

Which way do you move the jaw when you open your mouth?

Which way do you move it when you bite any thing?

Why do you ever wish to move it from side to side?

Is the lower jaw of the cat like that of a man?

What difference do you observe?

Can the cat move her jaw up and down?

Can she move it from side to side? No, she cannot.

Why is he cat's jaw made so as not to move from side to side? Because she eats flesh, which does not need that grinding motion.

Does the horse eat flesh? What does he eat? Hay and corn.

Does his food need the grinding motion of the jaw?

Should you think his jaw would move from side to side?

Have you ever noticed whether it does when he is eating?

Does the cow move her jaw from side to side, as well as up and down? Why? The sheep? The mouse? Why?

XVIII. EAR.

What are your ears for?

Suppose your ears are stopped, can you hear?

How many kinds of sound can you think of which you hear with your ears?

Suppose you had no ears, could you understand me when I talk to you?

Could you talk yourself if you had no ears? No, for if I could not hear others talk, I could not learn to talk myself.

Are there any persons who cannot hear? Yes, many.

Can they talk? They cannot unless they learned to talk before they lost their hearing.

Suppose they never could hear? Then they never could talk as long as they live.

How do they make others understand what they want? By a great many curious signs.

Do you notice any difference between the ears of different persons.

Do you notice any difference between the ears of men and those of animals? What difference?

Can you move your ears? Can the cat move her ears? The horse? The cow?

Can a bird hear? Has a bird ears?

How do we know that birds can hear? They are often frightened away by a noise.

Has a fly ears? Can you see them? How can you tell whether a fly can hear? By making a noise near it, and seeing if he notices it.

Could you try this fairly by striking something hard upon a table near a fly?

Why not? Because the fly would see it, and we could not tell certainly whether it was frightened by the sight or the noise.

How can you contrive the experiment, so as to prove whether a fly can hear?

XIX. HAIR.

What is your hair for? To cover my head and make it look better.

What colour is it?

How comes it upon your head? It grows out slowly. Is there any hair upon the back of your hand? Upon the palm of your hand?

Is the hair of different persons always of the same colour? Name some of the different colours.

Has every body the same number of fingers?

Why are every body's fingers alike and not their hair? Because it is of no consequence what the colour of the hair is, but four fingers and one thumb are better than any other number

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Does the hair of animals grow only upon their heads?

Where does it grow? All over their bodies.

Why is hair made to grow all over them? Because they would not know how to make clothes for themselves, and God clothes them with hair.

Is the hair of all cats the same colour?

Name some of the different colours?

Does the same cat ever have hair of different colours? Does the same man?

Is an animal's hair ever red? What animals? White? What animals? Black? Green?

Do you know of any reason why an animal's hair should not sometimes be green as well as red?

Is the hair of animals every where of the same length? Can you find any hairs upon the cat which are longer than the others?

Is the hair of the horse any longer in some places than in others? In what places?

Can you think of any reason for this?

Is the hair of all animals equally soft and fine?

Which is softest, the hair of the horse or of the hog? The cow or the cat? The dog or the mouse?

Which should you think would be warmest, the coarse or the fine hair?

Which should you think would have the finest hair then, large animals or small?

Why? Because small animals are more delicate, and more exposed to the cold.

Which should you think would have the finest hair, animals in warm or cold countries? Why?

What is the finest and softest hair called? Fur.

In what countries is it obtained? In cold countries.

What is wool?

How does it differ from other hair?

Have all animals hair? What animals do not?

What have birds instead of hair?

Have all animals hair or feathers? What animals have neither?

XX. FEET.

How many feet have you?

Have all persons two feet?

Have animals two feet?

What animals do you think of which have more than two feet?

How many feet has a bird? A fly? A horse?

What is the knee? It is a joint in the middle of the leg.

Of what use is it?

Have animals knees?

How many knees has the cat? The horse?

Could we walk well without knees?

Could we walk at all?

Try to walk without bending your knees.

What is an ankle? It is a joint between the leg and the foot?

Of what use is it?

Could we walk well without a joint at the ankle?

Could we walk at all?

Try to walk without bending the ankle joint.

What are your feet for?

Why could you not walk with your legs, if there were no feet at the end? Because if the part which pressed upon the ground was small, it would hurt us to walk, so we have feet which are large and flat.

What is there in the feet like the palm of the hand? The sole.

What are there upon the feet like the fingers upon the hand?

How many toes has a person? How many fingers?

Can you move your toes? Which can you move easiest, your toes or your fingers?

Can you move your toes from side to side?

Can you press them downwards?

Can you move them upwards?

What good do your toes do? They help me to stand and walk.

How can you prove this? If I stand upon one foot, I have to press down my toes frequently, in order to keep my balance.

Is that all the good your toes do, helping you to stand upon one foot? No, I use them in the same way when I stand upon both feet and when I walk, though I do not notice it very easily.

Have animals any toes?
Have they any thing like toes? What?
Have all animals claws
What animals have?
Name some which have not.
How many claws has the cat upon one foot?

How many upon all her feet?

How many fingers and toes have you?

Are the cat's claws to help her to stand and walk? What are they for?

Has the horse claws?

Why is it more necessary for the cat to have claws than the horse? Because the cat eats the flesh of animals, and needs the claws so that she may catch them, and when she is eating, that she may tear the flesh. The horse does not eat flesh.

Should you think it would be necessary for the dog to have claws? Has he claws? The cow?

What does the sheep eat? Is it necessary for the sheep to have claws?

Of what use are claws, besides for catching prey and eating flesh? For climbing.

Does the cat ever use her claws for climbing?

What does the squirrel eat? Does the squirrel need claws for his food? Does he for climbing? Why is it necessary for a squirrel to climb?

Do mice have claws? Of what use are claws to mice?

XXI. MOTION.

Can you move your head?

Can you move it upwards? Downwards? To each side? Can you turn it round?

Can you move your eyes? How many ways? What advantage is there in being able to move your eyes?

Can you move your nose? Try. Would it do any good if you could?

Can you move your ears? Your chin?

Can you move your arms? How many ways?

Hold your hands out straight? Now can you move one upwards and hold the other still?

Can you move one arm upwards, and the other downward, at the same time?

Can you move your eyes in different directions at the same time? Try.

Is it often necessary for you to

move your arms in different directions?

Is it ever necessary to move your eyes in different directions?

Hold the thumb and fingers of one hand out straight.

Can you move the thumb up and down without moving the fingers?

Can you move the forefinger without moving the rest? The middle finger? The little finger?

Why can you not move one finger without moving the others?

Which can you move most easily, your right hand or your left hand?

Can you bend your back? Can you bend it forwards? Backwards? To each side?

What advantage is there in having your back made so that it will bend?

XXII. GROWTH.

Are all persons of the same size ?

Which are largest, young persons or old persons ?

What is the reason why old persons are largest ? Because they grow from year to year.

Do children grow every year ?

Do men and women grow every year ?

How old are persons generally when they stop growing ?

How tall are men generally when they are of full growth ?

Are all men equally tall ?

Do we know any reason why some men are taller than others ?

Is it not because they are older ? Why not ?

Are all children who are of the same age, of the same size ?

How tall are women generally when they are of full growth ?

Which are generally tallest, men or women ?

Do all parts of the body grow?

Do your feet grow? How do you know? Your hands? How do you know? Your fingers? Your head? Your teeth?

Are not the teeth of men larger than those of children?

Is all the difference made by the growth of the teeth? No, the first teeth of children, which are small, come out, and larger ones come in their places.

Do your nails grow? How do you know? If I make a mark upon the nail near the bottom of it, it will move up gradually to the outer edge of the nail.

What time will it take? Several weeks.

Does your hair grow?

How is it that the body grows? By something from the food which we eat, which is conveyed by little channels all over the body, and turns into flesh, or bone, or hair, or nail, and thus makes us grow.

What is the blood? A fluid which contains the nourishment from the food and carries it around to all the body.

How do we know that it is carried to all the parts of the body? Because if we prick ourselves any where, we find the blood comes out.

Suppose a person's hair should be all cut off, would more grow in its place?

Would a new nail grow?

Would new skin grow?

Would a new hand grow?

Do animals grow?

What animals grow?

Do all horses grow to the same size? Cows? Dogs? Flies?

Which are most nearly of the same size, horses or dogs?

Do all the parts of an animal grow?

Which is the largest, the foot of a kitten or of a cat? The head?

Do the horns of cows grow? How do we know?

What advantage is there in having all men nearly of the same size? They can use conveniently the same houses and carriages and instruments.

What advantage would there be to any man to be twice as large as others? He would be twice as strong, and could do twice as much.

What disadvantage? His clothes and his food would cost twice as much, so that he would not gain any thing.

Would it not be better if all men were larger or smaller than at present? No, they would find many inconveniences unless all animals and plants were larger or smaller in the same proportion, and then it would make no difference.

XXIII. PAIN AND SICKNESS.

Suppose you tear the skin upon your hand, do you feel it?

How does it feel?

Does it hurt you if you cut your hand?

In what other ways can you hurt your hand? By striking it against any thing hard, by burning it, or making it very cold.

Do you think it would be better for you if these things did not hurt your hand?

What advantages would there be in having your body made so that it could not feel pain?

Does it hurt children to tear their clothes?

Does it hurt them to pinch, or burn, or freeze their clothes?

Which are children generally most careful not to injure in this way, their clothes or their flesh?

Why are they more careful not to tear their hands than their clothes?

What disadvantage, then, would there be in having our bodies made so as not to feel pain? We should probably tear and spoil our faces and hands as carelessly as we now do our clothes. But now the pain which they feel when injured makes us take better care of them.

Why is it less important to take care of clothes than of our bodies? Because when clothes are torn we can have them mended, or put on others.

Suppose one of your hands should be torn so as to be spoiled, could you get a new one?

Suppose it should be torn a little, could any body mend it?

Would it always remain torn? No, it would slowly heal of itself.

How would it feel while it was getting well? Sore.

Can you think of any advantage in having it feel sore until it is well? It makes me take care of it, keep it wrapped up, and not knock it against any thing, and thus it gets well sooner.

Does the pain go away as soon as it is entirely well?

Do all parts of your body feel pain?

Think of some parts which do not feel pain.

Why is it better that the hair should not feel pain? Because it is so slender and so much exposed, that it would be always getting hurt.

Is it as necessary to avoid burning or cutting the hair as the hand? No, because it grows out again immediately.

Why is it better that the nails should not feel pain?

Do animals feel pain?

How do we know ?
Is it right or wrong to put animals to pain unnecessarily ?

When is a person sick ? When some part of the body is disordered.

Is every thing which is within the body of some important use ?

Will there, then, always be some injury done, if any part is disordered ?

Do we feel pleasantly or unpleasantly when we are sick ?

What advantage is there, then, in feeling unpleasantly when we are sick ? We are more willing to take care of ourselves, to avoid getting cold, and to take medicine so as to get well.

There is another advantage of feeling unpleasantly when sick ; can you think what it is ?

Is it ever our own fault that we are sick ?

In what ways may we bring sickness upon us by our own fault ?

Does the unpleasantness of sickness cause us to be more careful not to make ourselves sick ?

What, then, are the two advantages of having sickness painful ?

Is sickness always our own fault ?

Would it not be better if we were so made as never to be sick ? No, for sickness makes us feel our dependence upon God, and reminds us that we must die.

PART IV.

ANIMALS.

XXIV. KINDS OF ANIMALS.

Name some of the kinds of animals. Beasts, birds, fishes, reptiles, insects.

What is the difference between a beast and a bird? Birds live in the air, and beasts on the ground.

What is the difference between birds and fishes? Fishes and insects? Insects and birds? Insects are much smaller, and have no feathers.

What is the difference between beasts and reptiles?

Is a horse a beast, or a reptile? A snake?

Is a butterfly a bird or an insect? Why? A swallow? A fly?

What is a whale? An elephant? A lobster?

Name all the animals you can think of, and say to which class each belongs.

Which animals are prettiest, birds or fishes?

Can you think of any reason why birds are made more beautiful than fishes?

Which do we see oftenest?

XXV. CLOTHING OF ANIMALS.

Have all animals the same clothing?

What is the clothing of birds? Of Fishes? Scales. Of insects? A very fine down, which looks like dust. Of beasts? Hair, and sometimes wool.

Which should you think would be warmest, hair or feathers?

Why should birds have warmer clothing than beasts? Because they are smaller and more delicate; besides they have to fly swiftly through the cold air.

Do you see many birds flying about in the winter? No, they fly away into warmer countries before it becomes very cold, and come back in the spring.

Is it not strange that they should find the way?

Are all feathers alike? Did you ever see white feathers? Upon what bird? Red feathers? Black? Green?

What birds have feathers of many colours? Hens and peacocks.

Is the clothing of beasts always hair? No, it is sometimes wool and fur.

What is the difference between hair and wool? Between hair and fur?

Which have the warmest hair or fur, small animals, or large?

Which are clothed warmest, those which live in cold countries, or warm?

Do hair and feathers do any other good besides keeping animals warm? Yes, they cause the rain to run off and keep the skin dry.

Which does this best, hair or feathers ?

Do not animals like to be wet ? How do you know ?

What is the clothing of fishes ?

What are scales ? Of what shape are they ? Are they hard or soft ?

Are they to keep the fishes warm ? No, fishes are not warm ; they are always as cold as the water they swim in.

Do they not suffer when the water is cold ? No, they are made so as not to feel cold.

Are the scales, then, like the feathers of birds, to keep the fishes from being wet ? What then are they for ? They keep the fishes from being injured by rubbing against the rocks, under the water, and sometimes from being hurt by other fishes.

Are the scales of all fishes of the same colour ?

Have reptiles any need of warm clothing ? No, for they do not generally feel the cold.

Have they in general any clothing ? Yes, scales like fishes.

Have all reptiles clothing ?

Have toads and frogs any clothing ?

Have insects need of any warm clothing ?

Why not? Because they only live in summer, when it is warm enough for them.

Have they clothing for any purpose? What?

Of what use is the downy clothing? It causes the wet to run off easily.

How can we prove this? By dropping a little water upon a butterfly's wing, and seeing it roll off without wetting him.

Can you think of any other kind of clothing, besides those which have been mentioned? Yes, some animals have a hard shell.

What animals? Lobsters, and turtles, and snails, and many others.

Of what use is this kind of clothing?

Do men make any use of the clothing of animals?

Do men make any use of the hair of animals? What use? Do they make any use of fur? What use? What animals are there whose hair and fur is of use?

Do men make any use of feathers? What use? What birds are those whose feathers are most used?

Why are the feathers of geese used more than those of other birds? Because they are larger than those

of most other birds. Why are the feathers larger? Because the geese themselves are larger.

Are there no other birds as large as geese?

What birds?

Why do we not use their feathers? Because it is much more difficult to tame and keep these birds.

Do men ever make use of the scales of fishes?

Do men ever make use of the shells of shell-fish? What use?

XXVI. FOOD OF ANIMALS.

Have all animals the same food?

What food do birds use? They generally live upon the seeds of plants.

Where do they find them? Growing in the fields.

How can they pick up the little seeds? They have a long slender

bill given them, which is on purpose for this.

Do all birds live on seeds? No, some live on the flesh of other animals. Are their bills different from those of the birds which live on seeds? Yes, they are very strong and hooked, so that they can pull the flesh to pieces easily.

Is any other part of their bodies different? Yes, they have strong and sharp claws.

What are such birds called? Birds of prey.

Is the robin a bird of prey? Do you know of any bird of prey? Can you find a picture of one in any little book?

Is an eagle a bird of prey? A humming-bird?

What is the food of horses? Of sheep? Of cows?

What part of the body of these animals is made on purpose to enable them to take their food? They have

large flat teeth, to crop the grass and to chew it.

Would it be well for horses and cows if they had long slender bills like the birds ? Why not ?

Would it be as well for birds if they had mouths like those of horses and cows ? Why not ?

What is the food of squirrels ?

Do all beasts live on fruits of plants ? No, some kill and eat other animals.

What are such beasts called ? Beasts of prey. Is a cat a beast of prey ? Why ? A horse ? Why not ? A lion ?

Name other beasts which are not beasts of prey. Name any which are.

Are beasts of prey made differently from other beasts ? Yes, they have long sharp teeth and claws.

Why are their claws and teeth made long and sharp ?

Would it not be as well for the

cat if her feet had hoofs like the horse's? Why not?

What does the hog like best to eat? Roots.

Is any part of his body made on purpose to dig roots? What part?

Could the hog dig roots with a mouth like that of the horse? Could he with a bill like a bird's?

What is the food of insects? Generally the juices of plants and flowers.

How do they obtain these juices? They have a long hollow pipe coming out from their mouths, and they suck up the juice through this.

What is it called? A proboscis.

What do they do with this when they are not using it? They roll it up, or fold it up.

Can you see this proboscis upon any insects? Yes, in the fly, and the butterfly, and the miller. Why must this proboscis be long? So as to reach down into the flowers.

Can you tell now why bees, and butterflies, and millers, fly about from flower to flower, in the fields, on a summer's day?

XXVII. HABITATIONS OF ANIMALS.

What are the habitations of men?

What are the habitations of birds?

What do you mean by a habitation?

Who makes the habitations of men?

Who makes those of birds?

Where do birds build their nests? What do they build them of? How can they carry straw and clay about?

Have you ever seen a bird's nest?

Are all nests alike? Mention some which are different from each other.

What do birds keep in their nests?

Which is smoothest and softest, the inside or the outside of a bird's nest? Why?

Do all birds build their nests upon a tree? No; some build in the grass.

Can you think of any reason why some birds should build upon the ground, and some upon the trees?

Can you think of any other animals which make themselves habitations?

Does the horse? The sheep? The ant? The bee? The fly? The mouse?

Has the horse any dwelling? What is it? Who makes it for him?

What is the habitation of the ant?

How do the ants make their nests?

They dig into the ground, by bringing up one grain of sand at a time. How do they bring it up? In their mouths. Where do they put the sand?

Have you ever seen ants making their nests?

What do they keep in their nests? Food for the winter, and their young.

Do birds lay up food for the winter in their nests? Why not?

What do birds do in the winter?

What is the habitation of mice? How do they make their holes? What do they keep in their holes?

Do their holes do them any other

good? Yes; they run into them when there is any danger.

What is the danger which mice avoid by running into their holes?

What is the habitation of the spider?

Who makes the spider's web?

How does she make it? She spins the long threads from her body.

How does she fasten the ends? With her feet.

Did you ever see the spider spinning her thread?

How can you contrive to see her? By placing a spider upon a stick, and seeing her fasten her thread at the end of it, and then let herself down by it.

Is the thread strong enough to bear the whole weight of the spider? Is it coarse or fine?

Of what use is the web to the spider? It catches flies and other insects.

Why does the spider wish to catch flies?

How does the web catch them? They fly into it, and become entangled.

Does the spider ever become entangled in her own net? Why not? It must be because the feet and legs of the spider are made differently from those of the fly.

Do you know what this difference is?

Can you not tell by examining very closely?

Why not? Because the legs of both are so small, that I cannot see them distinctly.

What is the habitation of the bee? The hive.

Who makes the hive for the bee?

Suppose no men should make hives for the bees, what would they do? They would find some hollow log, or hole in the rocks.

What do bees make in their habitations?

What is the comb made of?

What is it for?

Why do bees make honey?

What is the shape of the cells in which they place it?

What is the habitation of the beaver?

Did you ever read an account of the beaver in any book?

What book?

What can you remember in regard to it?

Do all animals make their own habitations?

What animals do?

What do not?

Do men make the habitations of any animals?

Of what animals?

Why do men make habitations for horses, and bees, and hens, rather than for any other animals?

Do any animals go without habitations?

What animals?

XXVIII. MOTION OF ANIMALS.

Do all animals move from place to place?

What limbs do horses use in moving from place to place?

What do birds use?

Have horses more than one way of moving from place to place?

Have birds?

How do birds move through the air?

How do they move upon the ground?

In which way can they move fastest; by their legs, or by their wings?

Which can move fastest, a horse, or a bird?

Can fishes move from place to place?

What limbs do they use?

What is a fin?

Why is it made broad and thin?

Do fishes move swiftly or slowly through the water? Very swiftly.

How do worms and snakes move from place to place ?

Do they use any limbs in crawling ?

Do you understand how they can crawl ?

Do they crawl swiftly or slowly ?

How many ways have flies of moving from place to place ?

In which way can they move fastest?

Can flies go up the side of a wall ? Why do they not fall off ?

Can any other animals walk up in this way ? What animals ?

Are the wings of flies like those of birds ?

What difference do you observe ?

How does a frog move from place to place ?

Has a frog more than one way of moving ? Yes ; he can hop upon the land, and swim in the water.

In which way can he move fastest ?

How does a grasshopper move ?

What limbs has he to enable him to do this ?

Are the legs of the grasshopper different from those of other animals? How are they different?

How do birds and insects fly? They strike the air with their wings, and thus raise themselves up.

How are the wings of butterflies formed? They are very broad, and flat, and thin.

Why are they made so? They are broad and flat, so as to strike the air more perfectly; and they are made thin, so as to be light.

Why is it necessary that they should be light?

Are the wings of a fly broad and thin?

Are they shaped exactly like those of the butterfly?

What difference do you observe?

Are the wings of birds formed in the same way? No; they are formed of large, strong feathers, which lie over each other.

Why should the bird's wing be different from that of an insect? Because the bird is much larger, and heavier, and requires a stronger wing.

What are the strong feathers, which form the wing, called?

Of what use are quills to men?

Would they be of any use to men if the stems were not hollow?

Why are they made hollow? So as to be strong, but light.

To what bird do common quills belong?

Are these quills in the wings of robins? of swallows? Might we use them for writing? Why not?

Can a goose or a duck fly? Can they walk? Can they swim?

What limbs do they use in walking? in flying? in swimming?

Is the foot formed differently from others, to enable it to swim? How?

What is this called? Webfooted.

Are all birds webfooted?

Is the hen?

Should you think, then, that the hen was designed to swim?

Did you ever see a hen swimming?

Are any animals webfooted besides the goose? Yes; a great many, which live upon ponds and marshes, and upon the shores of the sea.

Which has the longest neck, a goose or a hen?

Can you think of any reason? So that the goose can reach down to the bottom of the water.

Have webfooted animals generally long necks?

Do you know of any books which contain pictures of birds?

Can you find any such pictures? Can you tell by looking at them, whether the birds are designed to live in water or not? How?

XXIX. PROTECTION OF ANIMALS.

Are animals ever in danger?

What animals? The mouse, the fly, the bee.

In what danger is the mouse? The fly? The bee?

In what way can the mouse avoid danger?

Can all animals escape into holes when they are in danger?

What animals cannot?

Can any animals escape by running or flying away, without going into holes? What animals? The fly, birds, and the cat.

Can the cow escape easily by running or flying away?

Why not? Because she cannot run fast.

Has she any way of defending herself? What way?

Have you ever seen a cow attacked by any animal? What animal? A dog.

Did she run away, or turn round and try to defend herself with her horns?

Do cows ever live wild in the woods? Yes, in some countries.

Should you think they would be often attacked there?

Do horses ever live wild in the woods?

In what countries? Do dogs?

Have dogs any means of defending themselves when attacked? What means? Claws and teeth.

Have they the power to run away too?

Have horses the means of defending themselves?

Have they power to run away?

Name several other animals, and say whether they would defend themselves, or run away when attacked.

Can the bee fly also when she is in danger?

Has she always any means of defending herself?

What means?

What is a sting? It is slender and sharp, like a needle.

Why is it necessary that the bee should have a sting, rather than the fly? Because the bee

has honey to take care of, and if she should fly away, it would all be taken.

Do you think the honey would be more likely to be taken from hives, if there were only flies to take care of it?

Has a lobster any means of defending himself when attacked?

Can he escape by running away?

Can he defend himself? His hard shell protects him.

Can you think of any other animals which are defended by a hard shell? The tortoise, the snail, the oyster?

Do you know how the porcupine is defended?

Are animals perfectly defended from danger in these ways?

Are they always defended from other animals?

What animals are there which sometimes fall a prey to other animals, notwithstanding their defence?

Are animals defended from men in these ways?

What animals are not defended from men?

Were horses at first with men, or wild in the woods?

Which can run fastest, men or horses?

How, then, could men ever catch horses to bridle them, and make them work?

How could men take cows when they were wild in the woods, notwithstanding their horns?

Do they ever take them now? Where?

Do men ever take lions and tigers, notwithstanding their teeth and claws?

How do they take them? Can you find accounts of this in any books?

How do men take elephants?

How do they obtain the honey from the bees without being stung?

PLANTS.

XXX. ROOT.

Can you think of the names of any plants?

What difference do you observe between plants and animals?

Can animals move from place to place?

Can plants move from place to place?

How are plants fastened to the ground?

What are the roots?

Have all plants roots?

Can you think of several kinds of plants which you are sure have roots?

Can you think of any plants which have not roots?

Have any animals roots ?

Could animals move from place to place, if they had roots ?

Has a beet a root ? What is its shape ?

Can you think of any other plants whose root is like that of the beet ? Yes ; the carrot and the parsnip.

Has the onion a root ? Is it like that of the beet ?

Can you think of any other plant which has a root like that of the onion?

What are such roots called ? Bulbous roots.

Is there any difference between the root of the onion and of the potato ? What difference ?

Is the root of the potato called a bulbous root ? It is not.

Has the onion any little roots besides the large bud ? Where are they ?

Has the potato plant any roots besides the potato plant itself ?

Are they like those of the onion ?

Has a tree roots ?

Can you see them easily ?

Why do you think that a tree has roots?

Are the roots of a tree like those of the beet, or of the tulip?

How are they formed?

Has grass roots? What sort of roots?

Would plants stand steadily in their places without roots?

Are roots of any use to men?

What roots can you think of which are of use to men?

Of what use are they? Some for food, and some for medicine.

Are roots of any use to the plant, besides keeping it in its place? Yes; they draw out the juices from the ground, which go up through the roots into the tree.

Of what use is it, that these juices should go up into the tree? They nourish it, and make it grow.

Suppose the ground becomes dry, so that no juices can go up to the tree through the roots, will the tree be injured? How do you know?

Can you prevent the ground becoming dry around the roots of a plant? How?

Suppose you dig down around a plant, and

cut off the roots, would it injure the plant? How can you prove this by experiment?

Suppose you set out a plant which has no roots, will it live?

Are there any plants which will live, if planted without roots? What plants?

Will they live long without roots?

Will it kill a tree, or a small plant, to cut off a few of its roots? How do you know?

XXXI. STEM.

What is that part of the plant called, which is immediately above the root? The stem, in small plants, but in trees, the trunk.

Can you show me the stem of any plant?

Of what colour is it? What shape?

Is it hollow or solid?

Are all stems of that colour?

Can you find one of a different colour?

Are all stems hollow? Are all solid?

Are the stems of small plants hard or soft?

Are the trunks of trees hard or soft?

Are the trunks of trees hollow or solid?

Why should the trunks of trees be harder and stronger than those of small plants? Because they have a large weight of heavy branches and many leaves to support.

What is there around stems and trunks upon the outside?

What colour is bark? Is all bark of the same colour? Is it smooth or rough?

Is it moist or dry outside?

Is it moist or dry inside?

Of what use are the stems and trunks? They support the plant or the tree in the air.

Are they of any other use? They are full of very small channels, through which the juices go up the tree to nourish it, and make it grow.

What makes the juices go up? It is not known.

What is a branch?

Have trees branches?
Have all plants branches?
Show me some plant which has no branches.

Do all plants stand upright in the air? No, there are many creeping plants which run along upon the ground, or climb upon trees.

Have these creeping plants as large stems as other plants? Why not?

Can you think of any creeping plants? What?

Is the grape-vine a creeping plant? Is corn? The cucumber? The apple-tree? The pea?

How are creeping plants fastened to what they climb upon? By little curls, called tendrils, which grow out of their stems, and wind round the branches of trees, or any thing they touch.

What is wood?

Are the stems of all plants composed of wood?

Is the wood of all trees equally hard?

What trees have very soft wood?

What trees have very hard wood?

Of what use is wood?

Is wood of any other use besides for making fires?

Of what uses?

Is all wood equally hard?

What kinds of wood are hardest? What kinds are softest?

Is mahogany a hard or soft wood? Pine? Oak? Cork?

Which is most easily sawed and planed, oak or pine? Which is most commonly used? Why?

Is all wood of the same colour? Name some of the different colours.

Will wood split more easily in one direction than in another? What direction? Up and down the tree.

What is a knot? It is a place in the wood, from which the branch grew out in the tree.

If you look at the end of a log of wood, does it appear perfectly even? No, it is arranged in layers or grains.

What are these layers? Each one is as much as grows in a single year.

Can you tell, then, how old the tree was, by counting the layers?

What things in this room are made of wood? Of what kind of wood are they made?

Are the stems of small plants of any use?

What plants? Straw, and hemp, and flax.

Are the juices of the stems of plants of any use to men?

What common articles are there made from the juices of plants? Sugar, India rubber, pitch, &c.

Where do these plants grow?

Do you know of any use to which bark is put? What barks are most useful?

XXXII. LEAVES.

Is there any thing belonging to plants besides the root and the stem?

Are all leaves of the same shape?

Of what shape are the leaves of grass?

Can you think of any other leaves of the same shape?

How many kinds of leaves can you think of which are differently shaped?

Are all leaves of the same size?

What plants have very large leaves?

What plants have very small leaves?

What plants have leaves of the common size?

Are the leaves of trees all of the same size?

Are they all of the same shape?

Mention and describe some of the different sizes and shapes.

What trees have leaves of very peculiar shape? Firs, and laurels, and pines.

What is the shape of those leaves?

How are leaves fastened to the branches of the tree? By little stems.

What is the general colour of leaves?

Are they always green? No, in the fall they turn yellow and brown, and then fall off.

During what part of the year are the branches of the trees without leaves?

Do all trees lose their leaves in the winter?

What trees do not? The pine, and the laurel, and the fir, and many other similar trees.

What are such trees called? Evergreens.

Why are they called so?

In what country are evergreens most abundant?

In cold countries, where the win-

ters are long, and the fields would look dreary if the trees were bare.

Do we know of any reason why the leaves of some should drop off, while those of others remain green, and continue upon the tree? We do not.

What becomes of the leaves which drop off from the trees in the fall? They are driven about by the winds until they decay and mix with the ground.

Where do the new leaves come from in the spring of the year? They grow out from the little branches.

How do they appear at first? Little buds.

Do these buds contain the new leaves?

At what time in the year can these buds be seen? In the winter.

What change takes place in them in the spring? They first begin to grow and swell, and soon after they open, and the leaf grows out.

In what month do the leaves generally grow out?

Do the leaves of all trees grow out at the same time?

What trees or plants put forth their leaves early? What put them forth late?

Of what use are the leaves to the plant? They spread themselves out to the air, and draw from it some nourishment, which goes down the stem into the plant, and makes it grow.

How can we prove that leaves are useful to plants? If we pick them off, the plant will die.

Are leaves of any use to men?

Does the country look more pleasantly in the summer on account of the leaves on the trees?

Are the leaves of any plants of any other use? Some leaves are.

What leaf is there, which is very commonly used by almost all families?

Does the tea plant grow in this country?

In what country does it grow?

How are the leaves brought over to this country?

Are there any plants in the garden which are cultivated principally for the leaves?

Is the upper and under side of a leaf of the same appearance?

What difference is there?

Can you find any leaves which are rough? Any which are smooth and glossy? Any which are of a very dark colour? Any which are of a very light colour?

Collect as many leaves as you can, and see how many kinds you can find.

How can you best preserve your leaves? By pressing them between the leaves of a book.

XXXIII. FLOWERS.

What else is there belonging to plants, besides roots, stems, and leaves? Flowers.

What is there remarkable about flowers?

Are all flowers of the same colour? How many colours can you recollect to have seen in flowers?

Are all flowers of the same shape?

Think of two or three flowers which are very different in shape.

Are all flowers of the same size?

What flowers are very large?

What flowers are very small?

Do flowers have a stem for themselves, or grow upon the same stem with the leaves?

Does more than one flower grow upon a stem?

What flowers are there which grow more than one upon a stem?

What flowers are there which grow only one upon a stem?

What are some of the most important parts of a flower? The calyx, the petals, the stamens, and the pistil.

What is the calyx? It is the little case of thick leaves in which the bud is enclosed.

In what part of the flower is this to be seen? At the bottom of it, where the flower is joined to the stem.

What is the colour of the calyx?

Can you find the calyx upon any plants?

Can you find any flower without a calyx?

Examine the ladies' delight, the rose, the tulip.

Of how many leaves is the calyx composed?

Is it the same with every calyx?

Has the rose a calyx? Yes, they are the outside leaves of the rose-bud.

What is the use of the calyx? It defends the tender bud from injury.

What are the petals? They are the beautiful coloured leaves of the flower.

Are the petals always of the same colour?

Of what colour are they in the common rose?

Are they of any other colour in any other roses?

What roses?

Of what colour are they in the blossom of the apple-tree? The peach-tree? In the lily?

How many colours can you find in the petals of flowers?

Are they all equally beautiful?

Are there any flowers whose petals are partly of one colour and partly of another?

Have all flowers the same number of petals?

How many petals has the lily? The dandelion? The daisy? The rose?

Which are the most delicate, the petals or the calyx of a flower? Why is the calyx coarser and stronger?

What are the stamens? They are the little fibres which are seen in the middle of the flower in the inside.

Are all these called stamens? All except the middle, which is called the pistil.

Is the pistil different in shape from the stamens? Yes, sometimes very different.

Is there the same number of stamens in all flowers?

How many are there in the tulip? The rose? The lily?

Examine as many flowers as you can find, and count the petals and the stamens.

Are flowers of any advantage to men?

Are they of any advantage to the plant? Yes; they assist in some way in producing the seed.

Does the fruit, or the seed of a plant, grow with the flower? In what part of the flower?

How can we prove that flowers are of advantage to the plant? By picking off the flowers from a plant as soon as they have blown.

What will be the effect? The plant will produce no fruit or seed.

Do flowers come off from buds like leaves?

Are flower buds exactly like leaf buds?

Can you tell, upon a rose bush, what buds will become roses, and what only leaves?

What is the difference in the appearance?

Do all plants produce flowers?

Do any trees have flowers? What trees

Do all trees flower? Which do not?

XXXIV. FRUIT.

Do all plants bear fruit?

What plants and trees produce useful fruit?

How does the apple look when it first begins to grow in the spring? It

is a very small bunch in the middle of the blossom, not bigger than the head of a pin.

How does it grow? The juices, which are proper for making the apple, come up from the roots, through the tree, and down from the leaves, and pass through the stem into the little apple, which swells and grows slowly, until it is of full size.

Does all of the apple, then, pass through the little stem?

Is the apple good to eat while it is growing?

How does it taste? Hard and sour.

When it is full grown and become fit to eat, what is it said to be? Ripe.

Why is an unripe apple sour and unpleasant? Because fruits which are unripe make persons ill, and if the apple is sour, it will not be so likely to be eaten.

Would it not be better if green fruit did not make people ill? No;

for if fruit was pleasant and wholesome while it was small, it would be eaten before it had time to grow.

Is all fruit unpleasant and unwholesome while it is growing?

Is any fruit protected from being eaten in any other way, while it is growing, than by being sour and hard? Yes; chesnuts are protected by a shell, and by prickly burrs.

What becomes of this burr when the nut is ripe and ready to be eaten? It cracks open, and the nut falls out.

How is the walnut protected? The cocoa nut? The peach?

What is upon the outside of the apple? The skin.

What is the skin for? It is a hard and tight covering, and keeps the inside of the apple from being wet or dirtied, or injured in any way.

Where do the particles, out of which the skin is formed, come from? They must come up the tree, and through the stem, into the apple.

Is all the apple, except the skin and the stem, good to eat?

What is there in the centre?

How is the core formed, and what is it for? It consists of four or five little bags, placed in the middle, to hold the seeds.

Has the orange any skin? Is it like that of the apple? What difference do you observe? In colour? In thickness? In hardness?

Have all fruits the same coverings?

What fruits have very hard coverings?

Has the fruit of the peach a hard or a soft covering?

Has the seed a hard or a soft covering?

Are all fruits of the same taste?

What fruits are bitter? What sour? What sweet?

Are fruits of any use to men? What use?

Are they of any use to animals?

Do all animals like the same kind of fruits?

What animals like to eat apples?

What animals like to eat acorns? Walnuts?

What is there peculiar in the peach? It is a soft, juicy fruit, enclosing a hard stone, which is the seed.

Are there any other similar fruits? Yes; plums of various kinds.

What difference is there between a peach and a plum?

What use is made of the apple besides eating it?

How is cider made?

Is the juice of any other plant used for drink?

Of what is wine made?

In what countries does the grape grow?

Are grapes used for any other purpose? Yes; raisins are made of them. How?

What is the difference between a berry and a nut? What are some of the kinds of nuts?

What are some of the kinds of berries?

Do all fruits grow in this country?

What fruits do not?

Do any fruits grow in this country, which do not grow in other countries? What?

Are all the apples and oranges which grow, gathered and eaten? No; immense numbers fall upon the ground and decay.

Do these do any good? Yes; they help to nourish the seed, when it sprouts and grows the next spring.

Do all fruits grow upon the branches of trees and plants high in the air?

What plants produce fruit upon the ground?

What plants produce fruits under ground?

XXXV. SEEDS.

What is in the middle of an apple?

Of what use are seeds? They can be planted, and they will grow up into new trees.

How do the seeds grow in the apple? The juices come through the pores of the stem, and are formed into seeds afterwards.

What is the appearance of the outside of an apple-seed before it is ripe? After it is ripe?

What is the appearance of the inside?

Is it the outside or inside, which sprouts and grows when it is planted?

How does it begin to grow? A small sprout shoots out, part of which runs down into the ground and becomes a root, and part springs up and grows into a tree.

What other seeds grow in this way?

How does the sprout of the walnut get through the shell? The shell cracks open by the frost.

Are the seeds of all plants enclosed in the fruit?

In what are the seeds of the pea enclosed?

Are beans enclosed in a pod, or in fruit?

Are the seeds of the currant in a pod, or in fruit? Can you find the little seeds in currants?

Are there any seeds in raspberries? In strawberries? In oranges? In figs?

Do you know of any flowers whose seeds are enclosed in a pod?

How are the seeds of a poppy enclosed? Those of mustard? Those of corn?

Has the rose any seeds?

Is there the same number of seeds in every plant?

About how many are there in an apple?

How many in a peach? What is the seed of the peach?

How many in an orange? How many in a chesnut burr?

Are there any plants whose seeds are not enclosed at all? Suppose seeds are not enclosed at all, what would be the injury? They would be in danger of being spoiled by being exposed to the cold and wet.

Do seeds sprout and grow into new plants the same year that they grow themselves?

Do they always drop down under the tree or plant upon which they grow, and sprout up there? No; sometimes they are carried away by animals, and drop in distant places, and sometimes they are scattered about by the winds.

How can the winds blow about any seeds? Some seeds have a sort of feather growing to them, by which they are blown about

What seeds are of this kind? The thistle and the dandelion.

Are seeds of any use to animals? Yes; many animals live upon them.

What animals live upon them? Many birds live upon grain, such as wheat, corn, and millet; many animals, too, eat nuts and acorns.

Can they obtain nuts and acorns in all parts of the year?

At what part of the year can they obtain them?

What do they do for food during the winter and spring? They treasure up nuts in holes in the ground, and in hollow logs, and thus always have some to eat.

Are seeds of any use to men?

What seeds are useful to men?

Are the seeds of plums useful? Of corn? Of the oak? Of flax?

What seeds are most useful to men? The different kinds of grain.

What is made from grain?

How is it made?

XXXVI. SITUATION OF PLANTS.

Where do plants grow?

Do they grow equally well in all kinds of ground?

Do they grow well in sandy soil?

Do they grow well in rocky soil?

Do they grow well in very wet land? Yes; some plants grow very well where it is very wet.

Will plants grow well when it is very dry?

Suppose the ground should become perfectly dry, what would happen to the plants?

Do all plants grow well where it is wet?

Does the ground ever become perfectly dry?

Does not the sun dry it continually, in the summer?

Why, then, does it not become perfectly dry? The showers of rain water it.

Does the ground ever become so dry as to injure the plants? How do they appear, when injured for want of water? They wither and fade, and turn brown.

Are plants watered in any other way besides by rain? Yes; by dew, which gathers upon them in the night.

Is there any other way by which plants are watered, besides by rain and dew?

Do plants grow at all times of the year?

In what part of the year do they grow?

What becomes of plants in the winter? Most of them cease to grow, and the leaves and fruit drop off.

Do such plants die, or only cease to grow through the winter, and bud again in the spring? Some die, and some continue alive until spring.

Does an apple-tree die in the winter, or live from year to year? The poppy? The pink? The dahlia?

How many plants can you think of which live from year to year?

How many plants can you think of which die in the winter?

If these plants all die in the winter, where do others come from the next year? From the seed.

Are all plants equally injured by cold?

Do all plants require the same soil and climate? No.; some grow in very cold, snowy regions, and some in the hot countries far at the south, under a burning sun.

Do cold or warm countries produce the greatest variety of plants?

Do all plants require the same situation? No; some grow in open fields, some in forests, others in marshes, or in stagnant ponds: some love rocky precipices or the summits of lofty mountains, and others, which will not live upon land, grow and thrive in the sea.

XXXVII. USES OF PLANTS.

Are any plants useful to men?

Are all plants useful to men?

Can you think of any which are?

Can you think of any which are not?

What are some of the most useful plants which you can recollect?

What part of the plant is useful to men; the root, the stem, the leaves, the flower, the fruit, or the seed? Sometimes one, and sometimes another.

What plants can you think of whose roots are useful?

In what plants is the stem useful? The fruit? The seed?

Which is useful in the potato? In corn? In the apple-tree? The oak? The carrot? The beet? The rose? The peach? Grass? Hemp?

What plants are useful for food?

What for clothing?

What for building?

What for medicine?

Could men live if there were no plants?

What could we eat? We might, perhaps, eat meat and milk.

What is meat? It is the flesh of animals.

Could these animals live without plants to eat?

If there were no plants, then, would there be any animals?

And if there were no animals or plants, could there be any food for men?

Could we have any clothing if there were no plants?

Is all our clothing made from plants? No; some of it is from animals.

Could we have clothing made from animals, without plants? Why not?

How would the fields look, if there were no plants? They would be barren and desolate; all would be bare and rugged rocks, or sterile plains of sand.

PART V.

ART.

XXXVIII. CHAIR.

What are some of the most useful things in this room ?

What is a chair for ?

What is the table for ?

Is the chair used for more than one person ? Is the table ?

What is the mantel-piece for ? The looking-glass ? The floor ?

What is the chair made of ? The table ? The carpet ?

How many legs has the chair ?

What do these legs support ?

What is the back of the chair for ?

Are the backs of all chairs made alike ? How do they differ ?

Are the seats of all chairs made alike ? How do they differ ? Some-

times they are made of wood, sometimes of rushes, and sometimes they are stuffed like cushions.

Which are the longest, the legs of a table or those of a chair?

Why are the legs of the table the longest?

What is the use of the cross pieces which go from one leg to another of the chair? To strengthen them and keep them steady?

Why are there not cross pieces to go from one leg of a table to the other? Because they would be in the way of our feet in sitting at the table, and therefore the legs of the table are made large and strong of themselves.

Why cannot the legs of the chair be made large and strong enough of themselves? Because a chair must be moved frequently, and it must therefore be light.

Is a chair made of one piece of wood?

How many separate pieces of wood are there in a chair?

How are these pieces fastened together?

What is the colour of the chair?

Is all wood of this colour? Is there any wood in this room of a different colour? What wood?

Was the chair, when it was first made, of its present colour? How was this colour given to it? It was painted.

Is there any thing else in this room, which is painted?

XXXIX. TABLE.

How many tables are there in this room?

Are there any other tables in the house?

Are all these tables made of the same size? Are they all of the same shape? What are the largest used for? What is the smallest used for?

Are all these tables made of the same kind of wood? Of what wood are they made?

Which is the handsomest wood for a table?

Are all tables of the same height?

Which is the highest, the top of the table, or the top of the back of a chair?

Which are most necessary, tables or chairs? Why?

What is the leaf of the table for? It is made so that the table may be made small when it is put away, and large when it is out in the room in use.

How is the leaf fastened to the body of the table? By hinges.

What are the hinges made of? How many hinges are there? Why are there so many?

What keeps the leaf of the table up, when it is in use? What is done with this support when the leaf is to be put down?

What is the difference between a table and a light stand? Why is the light stand made small?

What is a drawer? Why is it made so as to slide in and out? So that things can be put in, out of the way.

Are there any drawers in any of the tables in this house? Are there any drawers in any other furniture?

What keeps a table drawer from falling down to the floor when it is shut?

Who makes tables? The Cabinet-maker. What else does the Cabinet-maker make?

XL. FIRE SET.

What is the fire-place for?
What are the sides of it called?

Why is it in one side of the room? So that the smoke may go up the chimney.

What are the fire-place and the chimney made of?

Why are they made of bricks?

How far does the chimney go up?

Why is it built higher than the roof of the house?

What is the hearth for? What is it made of?

Why may it not be made of wood?

Why is it made to extend so far into the room?

Why do the sides of the fire-place slant outwards? So that the heat may come out from the fire into the room more readily.

What are the tongs for? What is the use of the round, flat pieces, at the end of the legs? What is the joint for at the upper end of the legs?

Why is the shovel made large and flat at the lower end?

Is this part of the shovel perfectly

flat? No; it is bent up at the sides. Why?

Why is the handle of the shovel made so long? So that our hands may not be so near the fire as to get burnt when we are using it.

What are the shovel and tongs made of?

Why could they not be made of wood?

What is the brush for?

What is it made of?

What good do the bristles do?

From what animal did the bristles come?

Would the hair of any other animal answer as well?

Why not? It would not be stiff enough.

Did you ever see a hog?

Did you notice how rough and shaggy his stiff bristles make him?

Which has the handsomest hair, the hog, or the cat?

Which is the most useful?

What is the handle of the brush for ?

Why is it so slender ? So that it may be light, and easily moved.

What is the use of the large wooden part between the handle and the bristles ? The bristles are fastened into it ; they could not be fastened into the end of the handle ?

Why could they not be fastened into the end of the handle ? Because it is not large enough.

How are the bristles fastened in ? They are done up in little bundles and glued in ?

Is the brush painted ?

What are the bellows for ?

How do they make the fire burn ? By making the fresh air go to it faster.

What is the hole in the wooden side of the bellows for ?

Are the bellows made wholly of wood ?

How many pieces of wood are there ?

How are these connected together ?

Why is this part made of leather ? So that

the top and bottom can be pulled apart to draw in the air.

What are the handles for?

What makes the air go out through the nose towards the fire? We press the top and bottom together again, and the air is forced out.

Why does it not go out at the hole in the side where it came in? There is a little clapper there which shuts down and stops up the hole.

Why do the sides of the bellows slope off towards the nose? So as to guide the air to it.

Why is the nose made so long and straight? So as to guide the air well towards the fire.

Why is it made of iron or brass? Because this part comes very near the fire, and iron or brass will not burn.

How are the leather sides fastened to the top and bottom of the bellows?

Why are the nails so thick? So that air may not escape.

Turn the bellows upside down, and try to blow the fire with it.

Can you blow? Why not? The clapper hangs down so as not to stop up the hole in the bottom, and all the air comes up through it, instead of going through the nose to the fire.

XLI. WINDOWS AND DOORS.

What are windows for ?
Point to a pane of glass.
Is the whole window made of

Point to the part which is not made of glass. What is this part made of ?

What is this part called ? The sash.

What is the sash for ? The panes of glass are fastened to it.

How are they fastened to it ? By a sticky substance called putty, which is placed upon the outside.

Why was not the window made of one large piece of glass, instead of so many smaller pieces ? Because it is very difficult for the glass makers to make such large pieces.

Is there any other reason ? Yes ; if the window was one large piece. and any thing should be thrown against it, it would break the whole

window, but now it breaks only one pane.

How do we open the window? We slide up the lower sash into the upper part of the window.

How many sashes are there in a window?

Which is placed farthest back, the upper, or the lower one? Why? So that the lower one may slide by in opening the window.

Why is glass used in the window? Because it is clear, and will let in the light.

The light would come in if there was only an open place: why is it necessary to have glass? Because, if it was open, the rain and wind would come in.

What is the door for?

What is it made of?

Why does it come down so much lower than the window? Because we wish to walk out.

Why might not the window be made to

come down as low as the door? Because it would be more liable to be broken.

Is the door fastened to the wall on both sides?

Is it fastened on either side?

What is it fastened with? Can you see the hinges?

What is the use of the hinges? The door can swing by means of them, so as to open and shut.

Why is not the window made to open and shut on hinges, so as to swing out into the room like the door? Because when it was open it would be in the way.

Why is not a door made to slide up like a window, so as to be out of the way? It is so high that there would not be room for it to slide up so that a person could walk under it; and besides, it is so large and heavy, it would not be easy to raise it.

XLII. BUILDING.

What is the floor made of?

Is the floor ever covered? With what? Are floors always covered with carpets? Think of any floor

which is. Think of any which is not.

Why are floors covered with carpets?

Are the sides of rooms made of wood?

Is any part made of wood? Which part, the lower or upper? Why is the lower part made of wood?

What is that part of the sides of the room made of which is above the wood? It is plastering.

How is the plastering fastened? It sticks to the boards, or to the bricks which the house is built of.

How was it put on? It was put on when it was wet and soft, and it has dried and hardened since.

What is the plastering for? To make the walls smooth and tight, so as to keep out the cold air.

Is the plastering of a room ever covered with any thing? Yes, with paper.

Is this room papered?

Show me the paper.

Are all rooms papered?

Does a room look better for being papered?

Is all the paper upon the sides of rooms alike?

Is the side of the house made of one brick, or of many bricks put together?

How many bricks can you count there?

What is there between these bricks? Mortar, like the plastering upon the walls of the room.

What is it placed between the bricks for? To make them stick together.

Are whole houses ever built of brick?

Are the bricks fastened together with mortar?

Is the floor made of one board, or of many boards?

How are these boards fastened down? By nails.

What are the boards fastened to? To large bars of wood, which run across the room below the floor.

What are these bars of wood called? Joists.

What keeps them up? The ends are fastened into the walls.

Why might not the floor be made of plastering, as well as the sides of the room?

What is there below the floor of a house?

How was the cellar made? By digging a large square hole in the ground, and then building the house over it.

What are the sides of the cellar made of? Of bricks or stones.

Why are the sides walled up with bricks or stones? So as to keep the ground from falling in.

Is the cellar a pleasant or unpleasant place?

What is the use of such a dark, damp place?

What things are kept in it in summer?

What things are kept in it in winter?

Is it ever very hot in the cellar? Is it ever very cold?

Why is it that the cellar does not become very hot or very cold? Because it is so low in the ground that the heat and cold do not get to it.

Are there any rooms in the house over our heads? What are they called? Chambers.

Are the chambers like the lower rooms?

What difference do you observe?

How do we get up to the chambers?

Why are stairs made, rather than a regular slope? If there was a slope we could not go up, and if we were at the top, we should slide down to the bottom.

In going up a hill in the road, do we ascend by steps, or by a slope?

Why might we not ascend by a slope in the house, as well as in the road? Because it would be very much more steep than any road.

What are the bannisters for?

How many rooms are there in the house?

Which is the largest? Which is the smallest?

Are they used for the same purpose, or for different purposes?

What are some of the different purposes?

Are all houses alike on the outside?

What differences do you observe?

Can you see any house now by looking out at the window?

What colour is it?

Is it built of wood or brick?

Are houses always built of wood

or brick? No, they are sometimes built of stone.

How many chimneys are there in the house which you just now saw?

What are these chimneys built of? Are chimneys ever built of wood? Why not?

Do not chimneys which are built of brick ever take fire? They are sometimes said to take fire, but it is only the soot which has collected inside of them which burns.

How many windows are there in the house which you can see?

How can you tell how many stories high it is? By counting the rows of windows.

Suppose there should be three rows of windows, one above the other, how many sets of rooms would there be? Is this what is meant by stories? Has stories any other meaning? What?

What is the shape of the roof of a house? It slopes both ways.

Why are roofs made to slope?

Do the roofs of all buildings slope both ways?

Can you find one which does not?

Is it a large or small building? Can you find any large building whose roof slopes only one way?

Are the roofs of the houses in any countries flat? In what countries? How did you learn this?

Why can the roofs of the houses in those countries be made flat without injury? Because there is but little rain there.

What are roofs of houses in this country generally covered with? Tiles.

Are they always covered with tiles? No, they are sometimes covered with slates.

What is the use of the slates or tiles? To make the water run off better.

How do they do this? They are arranged in rows, and those in one row lie over those in the next, and thus the water runs from one to the other.

Why might not the roof be covered over with boards only? The water would run through the cracks between the boards down into the house.

Why does not the water run between the slates? It does; but it comes upon the middle of a slate in the next row, and then runs off.

What is the name of that part of the house which is immediately under the roof?

Is the garret as convenient for rooms as other parts of the house? Why not?

Why do the walls of the garret slope?

XLIII. LANGUAGE.

Have all the things in this room names?

Do you know the names of all?

What are some of the things whose names you do know?

Are all the chairs in the room of the same kind?

Do you know the names of the different kinds?

Are all the books in the room of the same size? Do you know the names of the different sizes, and the different kinds of binding? Have they all names?

Do you know the names of all the plants which grow about the house?

What is the name of the large piece of wood which is in the centre of the wheel of a waggon or chaise?

What is the name of the bar which passes across from one wheel to another? Do you know the names of all the other parts of a chaise?

Do you think you have many names yet to learn?

Are there any other words in language besides names of things? Can you think of any?

When any word is *spoken*, by what part of the body do we understand it? The ear.

When any thing is written, by what part of the body do we understand it? The eye.

How are words expressed on paper? By letters.

Are all the letters in a book of the same size? Show me some of different sizes.

Does the letter *a* make a perfect sound of itself?

Does the letter *b*? Why not? It sounds as if it had an *e* written after it; as *be*.

Does the letter *m* make a perfect sound of

itself? Why not? It is sounded as if an *e* was written before it; as *em*.

What are those letters called which can be sounded alone? Vowels.

What are those letters called which cannot be sounded alone, but must have some vowel with them? Consonants.

Is the letter *i* sounded alone, or with some other letter? Is it, then, a vowel or a consonant?

Is the letter *f* sounded alone, or with some other letter? What letter? Is it before it or after it?

With what letter is *p* sounded? Is it before it or after it? *l? r? j? q? s?*

Is *a* sounded alone, or with another letter? Is it, then, a vowel or a consonant?

Is *b* a vowel or a consonant? Why? *c? d? e? f? g? h? i? j? k? l? m? n? o? p? q? r? s? t? u? v? w? x? y? z?*

How many vowels, then, are there?

How many consonants?

How many letters in all?

XLIV. SYLLABLES.

How many parts are there in the word *pencil*, which are pronounced

separately? Two; *pen* and *cil.* How many in the word *winter?* What are they?

How many such parts are there in the word *Atlantic?* What are they?

What are these parts called? Syllables.

How many syllables are there in the word *baker?* What are they? In *penknife? pen? slate? marble? lemonade? river? dollar? half-penny? inkstand? general? Massachusetts? real? tea? idea? consonant? Charles? Henry? Louisa? Mary? Marianne?*

How many syllables are in the word *engineer.*

Are all these syllables sounded with equal distinctness? Which is sounded most distinctly? The last; thus, *en-gi-neer.*

Which syllable is sounded most distinctly in the word *paper?* The first. In the word *consent?* In *Atlantic?* The second.

What is the syllable called which is sounded more distinctly than the others? The accented syllable.

What is the accented syllable in the word *finger? continue? company? Henry? William? Maria? Samuel? steamboat? Jerusalem? mathematics? reference? referee? Potomac? Connecticut?*

XLV. WORDS.

Are all words of the same kind? No, there are many different kinds.

In what way can children learn what are the various kinds of words? By studying grammar.

Does grammar teach any thing else besides the kinds of words? Yes, it teaches how they are put together in sentences.

Is it of any use to children to study grammar? Yes, they learn to understand language better, and to speak more properly.

Do not children understand language pretty well? No; for if they try to read in common books, they will find that there are but few which

they can understand, excepting those which are made easy on purpose for them.

In what book can you learn the meanings of words?

What two small words is *steamboat* made from? *Teakettle? Penknife?*

What are such words called? Compound words.

Can you think of any other compound words?

Is *appletree* a compound word? Is *table? hammer? coachman? horseman? flowerpot? orchard?*

Which is the easiest mode of showing what we mean, talking or writing?

Why do people, then, ever write to one another? Because they are sometimes at a distance from one another, and cannot talk.

What do they write upon? What do they write with? Is it important for all children to learn to write?

Do men use writing for any thing else besides sending to each other when at a distance? Yes; sometimes

when they wish to remember any thing exactly, they write it, and keep the paper carefully.

Can animals talk? Can they make any sounds?

What animals can make sounds?

Do these animals mean any thing by their sounds?

What does the dog mean when he barks?

What does he mean when he whines?

What does he mean when he growls?

Is there any other way of showing what we mean, besides speaking and writing?

Can I show you that I am pleased in any other way than by saying so? Yes; by looks.

Can I show that I am displeased in any other way than by language?

If you ask me a question, can I show that I mean yes, without speaking? How?

Can I show that I mean no, without speaking? How?

Can you think of any other signs?

What do children mean when they pout?

Is it right for children to pout?

Can you make signs for any person to come towards you?

Can you make signs for a person to go away?

Are there a great many other signs which might be made? Yes; some persons cannot speak, and can only tell what they mean by signs, and they have a great many.

Can animals understand language?

Can they understand all language?

Can they understand any language?

What do men say to horses, when they bid them to stop? Can the horses understand?

What do they say to horses and oxen when they wish them to go towards the right? What do they say when they wish them to go towards the left?

Can the cat understand any words? What words?

Do men ever speak to dogs?

What do they say? Can the dogs understand them?

Do they ever speak to the cow? To the hens?

Do men use the same words in speaking to these various animals?

Who gave you the power to speak?

Does He hear and notice all you say?

Are there any words which it is wrong to say?

Do children ever say wrong words?

Does God hear them when they do?

Is he pleased or displeased?

When you speak kindly to others, does it give them pain or pleasure?

Is it right to speak unkindly and give pain?

Do children ever do this?

Can children do wrong in speaking in any other ways besides saying wicked words, and speaking unkindly? Yes; by telling falsehoods.

Do children ever do this?

Do they ever deceive other childrer. by this ?

Do they ever deceive their parents ?

Do they ever deceive God ?

XLVI. MISCELLANEOUS EXPERIMENTS AND QUESTIONS.

[It is not expected, that the queries and the difficulties brought to view in the following experiments can be solved, in all cases, by children. The design of them is, to lead them to *notice*, and to *consider* peculiar appearances, even in cases where they cannot explain them.]

Place a lamp at some distance from a looking-glass, and a little upon one side; then look at the image in the glass. Can you see more than one image of the same lamp? Is it of the same size with the lamp? Can you see an image of a lamp in a watch-glass? Is it larger or smaller? Why?

Drop a large stone, and a very small stone, from a high place, and see which falls quickest to the ground. Should you expect the large stone would fall first, and if so, why?

Ring a little bell; and while it is sounding, touch it with your finger. Does it stop the sound? Why?

Fill a tumbler with water, and place it upon a table; now if you turn it round, so as to move that part of the tumbler which was towards

you, away from you, shall you turn the *water* round too, or only the glass ?

You can tell by putting something into the water, a little leaf, for example, and if the water turns, the leaf will turn too. Try the experiment, and explain it.

Fill a wine glass with water, as full as possible. Lay upon the top a piece of smooth white paper, large enough to cover it. Press down the paper by laying a book flat upon it. Turn the wine glass bottom upwards, holding the book firmly against it. Then take away the book. Will the water fall? Why not?

Try to make a penny stand up upon its edge, upon the floor. Then roll it along upon the floor. Will it stand up longest while still or while rolling? Why?

Fill a small pail nearly full of water. Tie a string to the handle. Take hold of the string at the other end, and twist it. Then lift the pail by the other end. Will it untwist and cause the pail to turn round? Why?

While the pail is turning round rapidly, will the water remain level? Where will it rise? Why?

In a warm day in the summer fill a tumbler

half full of cold water, and place it upon the table. Will the outside of the tumbler become wet? Will it become wet above the surface of the water in the tumbler? Where does the water come from?

If you think it comes through the glass, try the experiment with warm water.

What is frost upon the windows? In what part of the day does it appear? Does any thing like it appear out of doors? What appears in summer upon the ground in the mornings, corresponding to frost in winter? Where does it come from?

When the room is warm and the weather cold, open a little, some door leading into a cold entry, and place a lamp upon the threshold. Does the flame rise directly upwards, or is it bent in or out? Now hold the lamp about in the middle, between the top and bottom of the door, and observe the appearance. Then hold it up, as high as you can reach towards the top of the door, and see which way the flame moves. Explain these appearances.

Take two strips of newspaper about as long as this book, and cut them of exactly the same length with each other. Now wet one of them

thoroughly, and then lay them down side by side. Are they still of equal length, or, if one is the longest, which is it, the wet or the dry one? Why? Are the strips of the same colour? Why?

Roll a ball gently upon the floor. Then slide a block of wood in the same way. Which will go farthest, the ball or the block? Why will either go on at all, after leaving your hand? Why do they stop after going a little way? Why does the block stop first?

Unwind a ball a little way, and then put in a pin so as to prevent its unwinding farther. Then, taking hold of the end of the string whirl the ball gently round and round, over your head. When the ball is exactly over your head, why does it not fall directly down, instead of going round in a circle?

Suppose a little bucket half filled with water were whirled round in the same way, would the water fall down when it was over your head?

Suppose the ball were whirled very fast, would there be any danger that the string would break, and the ball fly off? Why?

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