ELEMENTARY SCIENCE READERS

PAYNE · BARROWS · SCHMERBER

FIRST BOOK

BENJ. H. SANBORN & CO.

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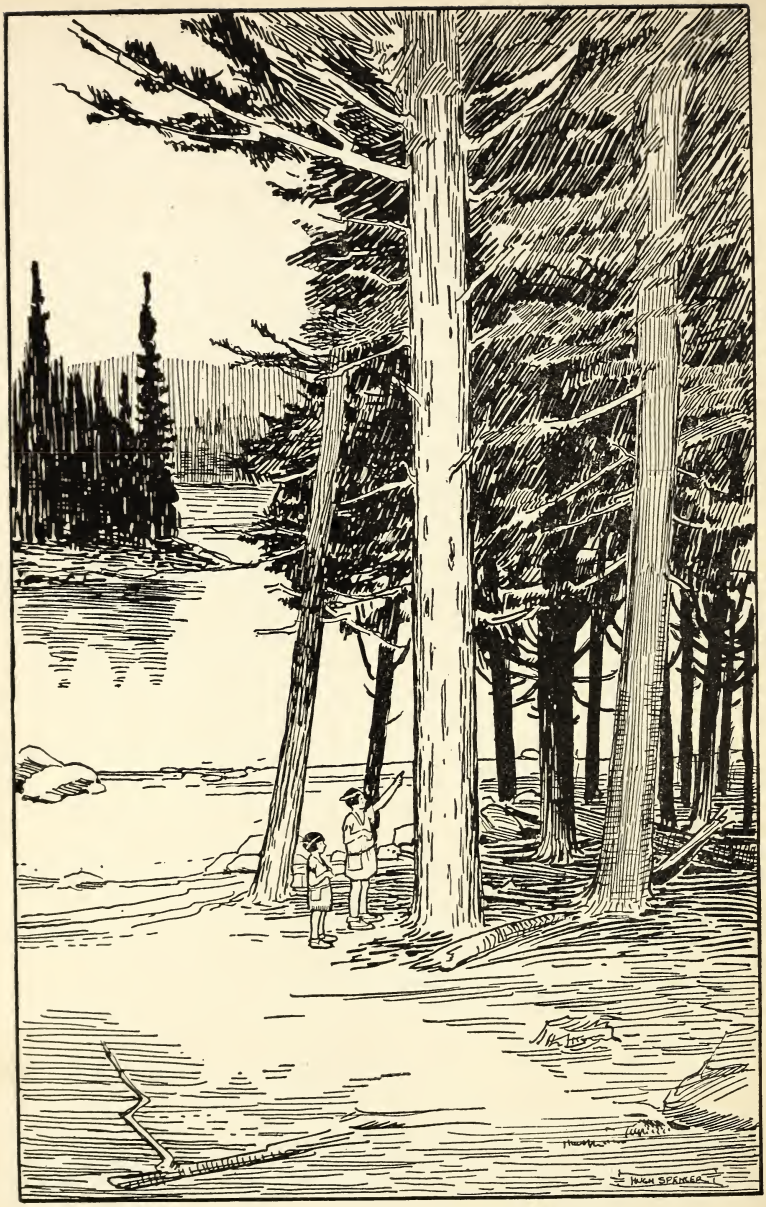
HUGH SPARKES

ELEMENTARY SCIENCE READERS

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FIRST BOOK

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PREFACE

The First Book in this series of Elementary Science Readers deals with plants, insects, birds, and higher animals. It is intended both to give the essential facts of science that children of the third and fourth grades should know and to serve as a school reader. It is then a content reader, furnishing additional reading material for increasing skill in reading and giving information that will be useful in the lives of the children not only now, but in later years.

The need of additional content material for reading in the grades has been keenly felt by every teacher, principal, and superintendent. Numerous books with content material have appeared in recent years, but nothing of an adequate nature in the field of science.

The source material available has not been written from the viewpoint of children. These books therefore are not made up of selections, but were specially written by the authors, who selected, organized, and presented their material with the interest, the ability, and the needs of children in mind. They have chosen a literary form that will arouse the curiosity of children and lead them to further reading and observation.

Since one of the most important aims of silent reading is the mastery of subject matter, there has been added to each chapter a list of suggested questions to aid the teacher in the effective use of the texts. The technique of silent reading is so well known by the teaching profession that further suggestions or a discussion of principles would be out of place.

The illustrations are not merely to make the books attractive. They are intended to arouse the interest of children and to give definiteness and reality to the subject matter. Here again the use to be made of pictures in silent reading is so well understood that no further suggestions are called for.

The authors have undertaken their task not merely to add another

series of silent readers, but to make a series for which there is an imperative demand. They feel that they are making a contribution that has not hitherto been made and that they are pioneers in a field in which there is much to be done.

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Elementary Science Readers

FIRST BOOK

THE FLIGHT OF BIRDS

Mohawk, the little Indian boy, did not know what to make of it. For the first time his robins had disappointed him. Every day for several weeks he had come to the same clearing in the wood with his offering of wild berries. Never before had the robins failed to greet him. But today, although he had called many times, not one had answered. "Can it be that they have forgotten to come," he wondered. The little boy waited a long time, anxiously looking in all directions. At length, discouraged and sad at heart, he returned to his wigwam.

The next day and the next the same thing happened. Finally he gave up going to the fields at all. As the weeks passed, Mohawk noticed that most of the other birds were disappearing too. He had heard that terrible things sometimes happen to people who go into the woods. He wondered if anything could have happened to his birds. Could it be that some savage enemy had

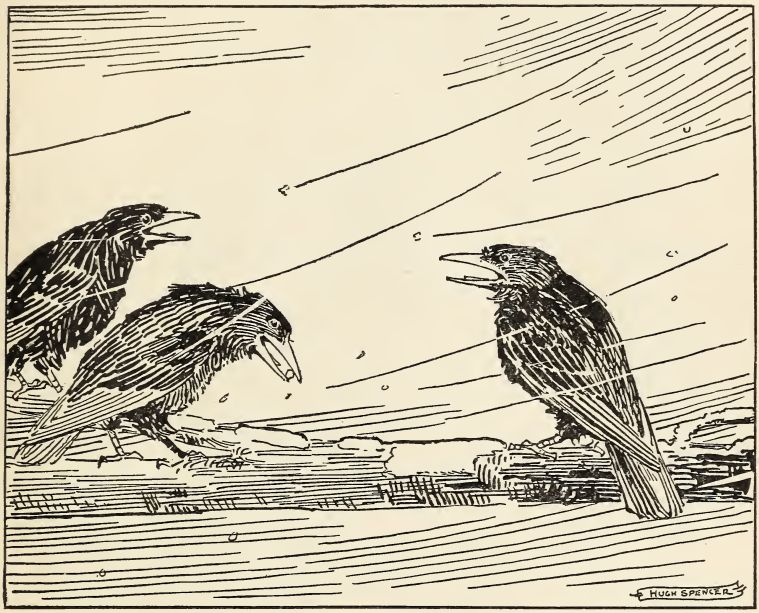
killed them all? The problem was too difficult for him to solve, so he almost gave up trying.

Mohawk wondered and wondered. He finally asked his father, Big Chief, what had become of the birds.

His father answered, "Your little friends have gone to a warmer climate for the winter. Most of the birds that live in this part of the world travel southward in the fall. Something tells them when winter is close at hand. They know that food will soon be scarce, and that they had better be on the wing."

"What happens to the birds that do not go south for the winter?" asked Mohawk.

Big Chief replied, "There are some kinds, like the crow and the owl, that manage to live through the sever-



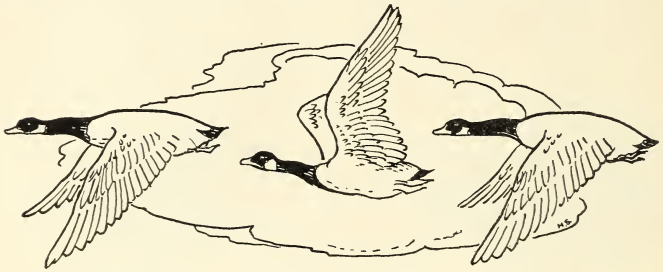
est weather. They find shelter in thick bushes and similar places. Since only a few birds remain, there is enough food for them."

Thus Mohawk was made happy, and anxiously awaited the return of his feathered friends.

I wonder if you know that when the birds go south

they usually gather in great flocks? Sometimes they fly near the ground, and sometimes high in the air. Some flocks travel slowly, while others speed faster than most trains.

It often happens that thousands of low-flying birds strike against buildings and monuments. When this



occurs, many are killed. Telegraph wires, because they cannot be easily seen, cause the death of many.

Nobody has ever been able to find out how the birds know in what direction the warm countries lie, what route to take, and when to start on their journey. It may be that the leader of each flock learns these things from other birds that have done them before. This, however, is only a guess.

If you will watch the sky in the fall, you will see some of these south-bound travelers. Perhaps you will

see ducks flying south. Ducks always arrange themselves in single file. Geese take the form of the letter V when they fly south. Sometimes the flocks form in irregular shapes, but a leader is always ahead and the rest are following.

After having spent the winter months where the air is warm and the food is plentiful, the wanderers come home. All except those that suffer accidents return to their summer homes after their winter in the south. They always summer in the same place. Mohawk learned all this from his father just as you have learned it at home and in school.

You will not be surprised to hear that one April morning Mohawk heard familiar voices in the trees. Hurrying to the accustomed spot he found, to his joy, his friends waiting for him.

Each year that followed Mohawk saw the same thing happen. It was not long before he was able to tell just about when to say good-by to his friends and when to be ready for them in the spring.

The flight of birds is one of the means by which the Indians used to tell the approach of the seasons of the year. They planted their seeds when certain birds ar-

rived in the spring, and prepared for winter when others left in the fall.

Nature will tell us many things, if we are wise enough to understand her language.

QUESTIONS

1. Why were the birds disappearing?
2. Where had the birds gone?
3. Name some birds that do not leave in winter.
4. Can you guess how birds know when to go south?
5. Why do the birds return in the spring?
6. How did a knowledge of bird habits help the Indians?

Mohawk was very lonesome without the robins. But before long he found a new friend, Bushy-tail, a little red squirrel, that lived in a walnut tree. He and Bushy-tail soon became very well acquainted. His new friend learned to crawl upon Mohawk's shoulder and to eat nuts out of his hand. Every day during the late fall, Mohawk visited his companion, just as he had visited the robins.

All of a sudden the weather turned cold and a blizzard came. Mohawk had to stay in his wigwam for several days. When at last the storm was over, he plodded on his snowshoes through the deep drifts to Bushy-tail's tree.

But Bushy-tail was nowhere to be found. Then Mohawk knew that the birds are not the only animals that disappear when the cold days come. But where could he have gone? Squirrels have no wings, therefore Bushy-tail could not have flown south.

When he returned home, Mohawk said to his father, Big Chief, "Where has my little friend Bushy-tail gone for the winter?"

"My son," said Big Chief, "Bushy-tail, like all other squirrels, has a winter home. It is not in some far off country like that of the robin. It is in a hole in the very

tree in which he lives during the warm months. Long before the cold weather came he began carrying nuts to his nest. By the time the snow fell he had a goodly supply on hand."

"My, I did not know that Bushy-tail was so wise," exclaimed Mohawk.

Big Chief continued, "When the blizzard came, Bushy-tail scampered into his nest and curled up like a ball and went to sleep. He did not get up the next morning, but slept for days and days."

"Will he sleep all winter?" asked Mohawk.

His father continued, "Once in a while he will become wide enough awake to eat some of the nuts in his

hoard. But he will go back to sleep again. At last when the bitter cold is over he will come out and his winter sleep will be ended."

"Do all animals have winter homes?" asked Mohawk of his father.

"The woodchuck," answered Big Chief, "is another animal that knows how to get away from the cold. When he thinks that the fall is over, he stores a little hay in his tunnel. Then he creeps in and closes up the end with weeds and dirt. He lies down at the far end and begins his winter nap. He does not need as large a stock of food

as the squirrel does, because in the summer and fall he stores up great layers of fat in his body."

"But what does he live on?" asked Mohawk.

Big Chief replied, "His fat and a little hay that he eats when he awakens keep him alive. You may think that this is not enough nourishment for an animal to live on for such a long time. It would not be, if he were awake and active, but the body requires very little food when it is at perfect rest. I did not tell you that the

squirrel also has his store of fat which he uses. But he depends more upon his supply of nuts. Once in a while Chucky, as the woodchuck is called, awakes and comes out of doors, but if it is still cold, he goes back to bed. At last when spring has come, he puts an end to sleeping."

Do you know that there are many people in the world today who believe that if the woodchuck, or groundhog, as he is also called, sees his shadow on the second of February, he will return to his burrow and stay there for another six weeks? From this action of the woodchuck they think that the winter will be hard and long. We know that this is not true. We call such a belief a "superstition."

The bear, the bat, and many other wild animals lead the same kind of winter life that the woodchuck does. They do not all dig tunnels in the ground, but they find homes where they can be safe and warm. Favorite places are caves and hollow logs.

Quite different are the winter quarters of the frog. Long before the ground is frozen he digs into the mud and begins his long rest. He collects no food beforehand. Unlike the squirrel and the woodchuck, he does

not awaken until spring. About the only breathing he does is through his skin. His body becomes chilled through and through. Since he is cold-blooded this does him no harm. The warming of the earth by the spring sun tells him that it is time for him to get up and hunt food.

Thus you see that nature provides for her children. She does not treat them all alike, but gives to each one that which is best for him.

QUESTIONS

1. Where do squirrels live?
2. Where do the squirrels go in winter?
3. How does the squirrel prepare for its winter food?
4. Can you tell how the woodchuck spends the winter?
5. What other animals spend the winter like the woodchuck?
6. How does the winter quarters of the frog differ from the others?

THE DEER

One cold day in December, Big Chief said to Mohawk, "We will go fishing through the ice."

"Goody!" exclaimed Mohawk. He was overjoyed. Never before had his father taken him fishing. He had always been told that he was too young to go fishing. He now felt very much grown up.

They lost no time starting out. When they reached the river they chopped holes through the ice. They were soon fishing through these holes with hooks and lines. Suddenly Mohawk saw the bushes at the edge of the river move. "What is it?" he asked.

"Hush, don't move," whispered Big Chief. "It is a deer or an elk."

The branches parted. Then a large animal with spreading horns stood before them.

"An elk," said Big Chief under his breath.

There is not a nobler-looking animal than an elk with full-grown horns. The horns of an elk are called antlers. The proud animal stood motionless with head erect. He was listening and looking with all his might.

Suddenly he saw Mohawk and his father. Then with a toss of his head he turned and was gone.

"Why did he run away?" asked the little boy.

Big Chief replied, "An elk is always on his guard. He has many enemies. Man is one of his worst foes, because he kills the elk for food and fur. The elk you saw was afraid we might harm him."

Then Mohawk knew that there were animals still in the woods.

"Please tell me something about the elk's antlers," pleaded Mohawk.

Big Chief said, "The elk, the deer, the reindeer, and many other animals belong to the deer family. All the men folk of this family have antlers. The lady reindeer have them too. No other kinds of lady deer have them. Antlers are used for fighting."

"Whom do the deer fight?" asked Mohawk.

"Their enemies," replied Big Chief. "Their worst enemies are the wolves. Often great packs of wolves attack a deer. Sometimes a deer kills many of the wolves with his antlers. Then he gets away. More often the wolves tire the deer out, and kill him."

It made Mohawk sad to think that beautiful deer should be killed by cruel wolves. After a moment he asked, "Do deer ever fight with one another?"

His father answered, "They sometimes fight with each other in the fall when their antlers are full grown."

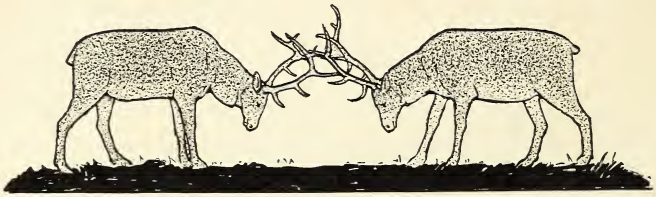
"Don't deer have antlers all the time?" questioned Mohawk.

Big Chief explained, "Every spring their antlers fall off. It takes all summer for new ones to grow. During the summer they have to keep away from their enemies.

At that time of the year their only weapons are their hoofs. Hoofs are not much help against strong enemies."

"Do they have very bad fights with each other?" asked the little boy.

"They do not very often do each other much harm," replied his father. "One or the other soon stops fight-



ing. But once in a while their antlers become locked together. If they cannot separate them, both deer starve to death."

"Starve to death!" exclaimed Mohawk.

"Yes," said his father, "since their heads are held together by their antlers neither can reach food."

"It is too bad," said the little boy. "They have so many dangers to guard against."

That same day Mohawk saw another member of the deer family. It was much like the elk, but a great deal smaller.

"That is a white-tailed deer," Big Chief said. "It is not as strong as the elk. It is a good fighter too."

On the way home, Big Chief told Mohawk about other members of the deer family. Mohawk was espe-

cially interested in the moose. "The moose is a large, heavy deer," his father said. "His horns are wide at the ends. He is a terrible fighter. Men have lost their lives, because they have gone too close to an angry moose."

Big Chief told about other kinds of animals that

roam the fields and woods in the winter. He told about some that are gentle, like the rabbit. He described others that are savage, like the wolf.

By the time Mohawk and his father reached home, the little boy felt that he had learned a great deal about animals. He made up his mind to get acquainted with as many as he possibly could.

QUESTIONS

1. How do Indians get fish in winter?
2. What does an elk look like?
3. How does the deer protect itself from wolves?
4. Name several animals that belong to the deer family.
5. What wild animals do you know that are timid?
6. Name a savage wild animal.

MOHAWK FINDS A NEW PLANT

Mohawk always wanted to go with his father when he went trapping, hunting, or fishing. He had made little traps of his own, and had played trapping games with the other Indian children. He was sure that he could be a real help if only his father would allow him to go. But when he asked his father to take him on the next trip, he was told that an Indian boy must know many things before going trapping with men.

"Where can I learn," said little Mohawk to his mother as she sat grinding corn. "I want to get ready for the next trip."

"All about us are many things that you should learn," said his mother. "Watch very carefully and Nature will show you many secrets."

No little boy ever studied harder than did Mohawk. Any day you might have found him roaming the fields around his wigwam. How carefully he watched the life in the fields! The plants that he had run past so many times were very interesting to him now.

Mohawk found that there were plants that trap their food. How wonderful it seemed to him! How many

things he would have to tell his father when he returned.

One plant in particular he watched and watched. His playmates had told him that it caught flies. He saw

many flies buzz about it, but none stepped inside while he watched.

But Mohawk had learned to be patient. One day he was rewarded for his patience. A little fly circled around and finally alighted. When he tried to step farther, he found that his legs were held fast by sticky

hairs that bent down over him. Soon the whole body of the fly was covered by the sticky hairs. He was firmly caught in the sticky cage with no hope of escape. Mohawk was very glad that he had waited so patiently.

"Perhaps I could make a trap like that," thought Mohawk. He tried to do so by making a paste of milkweed sap. It caught flies easily, but was not good for stronger insects.

He felt very sure that his father would take him now. But before his father returned he had many days in which to watch the other plants and trees. Each day he was learning something new about plants.

And so it happened that one day, as he returned from the fields, Mohawk saw that his father was at home. How many things he had learned! How much he wanted to tell his father! Running with all his speed, he soon came to the wigwam.

While his father was resting from his long trip, Mohawk told him about his studies of plant life. His father did not say much, but a few days afterwards Mohawk saw his mother preparing food for another trip, and there was enough for two.

"Am I going?" Mohawk cried. His father nodded

his head. With a whoop Mohawk ran to tell his playmates of his good fortune. Perhaps Big Chief thought his boy had learned to be watchful and careful. Do you think Mohawk learned to be a good trapper?

QUESTIONS

1. What do we mean by Nature's secrets?
2. How did the plant hold the insect?
3. What plant has sticky sap?
4. In what other ways do plants trap insects and animals?
5. Why do some plants have sweet odors?
6. How must we observe Nature to learn her secrets?

HOW TREES TRIM THEIR BRANCHES

Mohawk and his father traveled many days. At last they came to the shore of a large lake. Beautiful

pine trees grew in thick clumps almost to the water's edge.

"We will stop here," said Mohawk's father. "We will need a canoe, so we must make one."

They searched and searched for a tree that was tall

and straight. They were looking for one that had no branches for many feet from the ground.

At last they cut a tree from the center of a very dense clump. It was surrounded by many short bushy pine trees and Mohawk wondered why one tree should be so tall while the others were so short. The tree they had cut did not branch until near the top, while the others had branches almost to the ground.

"What makes them grow so differently?" Mohawk asked his father.

"You will notice," said Big Chief, "that there are scars all along the trunk of this pine. They are the places where the branches have been cut off."

"But who cut them?" said Mohawk.

"The tree itself," said his father. He then told Mohawk how a tree cuts its own branches.

"This pine which we have cut down had branches almost to the ground when it was young. It was like the others that you see pressing around so closely. But it became crowded as the other trees grew larger. It needed more room. Each day the branches rubbed against each other more and more.

"As the branches grew thicker and thicker, the

upper ones shaded those that were lower. A tree needs light and air in order to live, so it thrusts its branches higher and higher to get more light and air. But the leaves underneath became sickly and died, because they could not get enough light and air.

"Do you suppose the tree would send its sap to leaves that were no longer useful? The sap passed these branches by and they too became sickly and died.

"But the tree had no use for dead branches, so it started to cut them off. You know that a tree adds a new layer of wood each year. When this tree added each new layer, it built the new wood around the place where the dead branch joined the trunk. Each new layer pressed tighter and tighter until the dead branch seemed to be sticking out of a little hole.

"Each year also the new layer squeezed tighter and tighter until the dead branch was pinched off. The little hole was then covered with new bark and soon there was nothing to tell that a branch had been there, except perhaps a scar.

"That is the reason this tree has a smooth trunk for many feet. Now you know how a tree cuts its own branches."

"Nature does many wonderful things," remarked little Mohawk, as he scraped the bark from the trunk. "It would have taken a great deal of time to cut off all those branches."

"Yes," said his father, "that is true. It took Nature many years to cut them off. Nature does that with millions of trees. Man would hardly have time to do all that."

QUESTIONS

1. What were Mohawk and his father searching for?
2. Why did the tree trunk have scars?
3. What does a tree need in order to live?
4. How did the pine tree get more light and air?
5. Can you tell why the sap passes dead branches?
6. How are dead branches pinched off?

THE LITTLE WANDERERS

"Just look at Rover's coat," said Mother as we started home from a picnic in the country. "I am afraid that we cannot get them all off."

"My, all our clothing is just the same," said Father, looking us over from head to foot.

"But why do the burrs stick so fast?" asked Sister as we climbed into the auto.

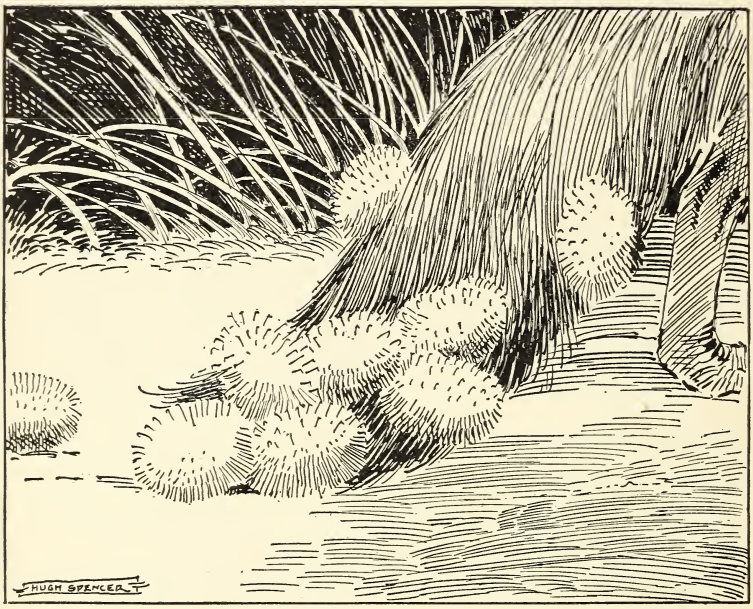
"Well," said Father, "when we are at home I will tell you the story of the little wanderers."

Later Father told us this story.

"There are many more children in a plant family than we find in families like ours. If all the plant children stayed at home, there would not be enough food for them to eat and water to drink. Therefore, many of the seed children must be taken from their homes to new places in the world, where they may have a better chance to grow healthy and strong. I am sure that you will want to know how they get away, and how they travel.

"Plant families, like other families, are not all the same. Different kinds of seed children behave differ-

ently. Of course we all know what a tramp is, for we have met many on the roads. But did you know that we have tramps in plant life that are always ready to take a ride away from home?

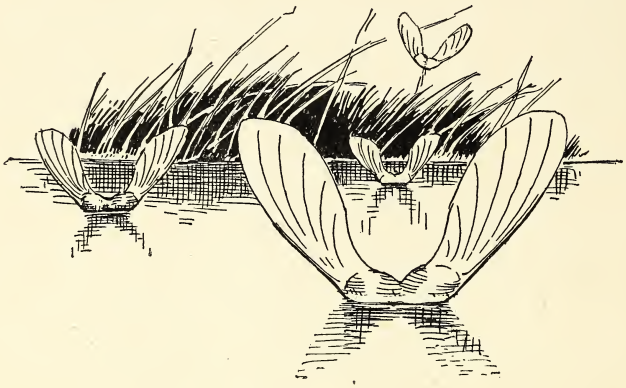


"They fasten on people and animals with little hooks. They ride for miles and miles. At last they are picked off or brushed off. Their tramping is then over, and the little seed children find themselves in a new part of the world.

"Now, children, save some of the little tramps that are sticking to your clothing. At school your teacher will tell you what family each belongs to and how you should treat them.

"There are families of plants, just as there are families of people," said Father. "There are families of plants that sail like balloons. When we go out in the car, watch the white, fuzzy, silky things that float lazily in the air. Have you ever wondered where they come from and where they are going?

"If we were to catch some and look at them carefully, we would find that the seed children were out for a ride. They sail above the ground, carried by the wind. Where do you think the wind will take them? It will take many of them to new parts of the land. They may drop where living will be easy.



"Here these little seed children will start new plants. What kind of a place do you think it will be? The dandelion and milkweed seeds travel this way best.

"But not all the little seed children will float away like toy balloons in the air. There are many families whose seed children cannot help themselves. They stay at home a long time with the mother plant. At last the mother plant pushes them outside. You will find

that these seed children never get as far away from home as the others I have told you about. Can you tell me why?

"Of all the little wanderers, the little sailor seeds go farthest from the mother plant. They sail on brooks, rivers, lakes, and even on the big ocean itself. I wonder what they are likely to find in the new home. Perhaps some day they will land on a strange shore, and start a new family of plants in a far-away land. Plants are carried into foreign countries in this way. Would you like to know them better?"

"Yes, indeed," the children replied, and so Father promised to tell another story of the plants soon.

QUESTIONS

1. Why do not all the little seed children stay at home?
2. How do little tramp seeds get away from home?
3. How does the wind help to scatter seeds?
4. What seeds can you name that are carried by the wind?
5. Why do some seeds never get far away from the mother plant?
6. Can you explain how some seeds get to foreign lands?

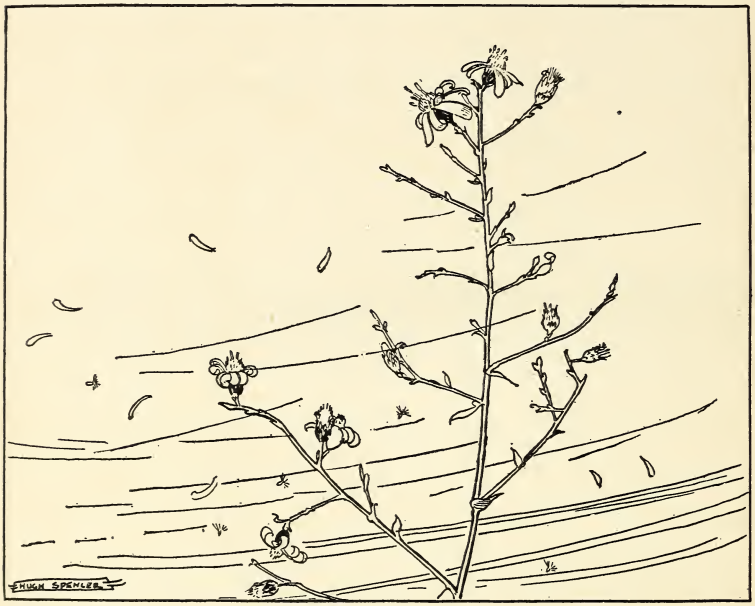
TWO WINTER BLANKETS

It was time for the flowers to pay their yearly visit. The May flowers and violets came in the spring and stayed but a little while. The buttercups and daisies paid a longer visit and made the fields and meadows beautiful with their yellow and white dresses.

By and by, other different flowers came. They looked as if their colored petals were fastened to the stems with bright yellow buttons. These were asters and they arrived rather late, to be sure, but that is the way with asters. What a fine time they had, dancing and swaying in the wind, which, by the time they arrived, was getting colder and colder.

Day by day the asters dropped their petals, and their yellow buttons turned into seeds. At last, one strong little flower was left alone in the field. All her brothers and sisters had gone.

She did not like to drop her pretty purple petals. Perhaps she wanted to stay and play alone. She stood straight and tall as the wind blew stronger and colder. But winter was coming and Nature wanted the little seed



babies taken care of. Do you know why? No flowers could come next year, if the seed babies did not fall on the ground to be covered.

It was necessary that the little seed babies should be protected from freezing. With a big puff, the wind

loosened the petals of the little purple aster. With another puff, he blew them off, and slowly the little purple aster dropped her seed babies.

How cold it was on the ground. The seeds blew

into every little hole. Perhaps the big tree nearby would be helpful to the seed children. The leaves which had been red and yellow were now getting withered and brown. The big tree was getting ready to drop its leaves also. One leaf fell to the ground. Another and another

fell. They rustled and slid closer together as they slowly covered the seeds. The seeds pressed closer to the ground as the leaves piled on top of them. What a warm blanket it was! Mother Nature had not forgotten.

But the days and nights grew colder, and winter drew nearer each day. Do you think one blanket would be enough for the long winter? Does Mother Nature have more than one blanket?

Something soft and white fell from the sky. The second blanket was falling gently over the seeds. Do you know what it was made of? Yes, it was made of snow. Would you like to sleep under a blanket made of snow? Would you put your baby brother or sister under a snow coverlet?

No, indeed. I'm sure they would not like it at all. But the seed babies needed it. Down, down they snuggled into the earth. How warm they were! How soundly they slept! Perhaps they had been waiting for just this thing to happen, for they lay as still as could be until Nature's call should waken them to life and growth. Do you know when that call comes to most of the seed babies?

QUESTIONS

1. What are some of the early spring flowers?
2. What flowers arrive later?
3. Can you tell about what becomes of the little seed babies?
4. Do you know what would happen if the seed babies were not covered?
5. How are the little seed babies covered?
6. Why do they sometimes need two covers?

THE BIRTH OF A SEED CHILD

Spring was here. I knew it, because Father was planting the garden. The sun was much warmer also. I wanted to go without hat or coat, but Mother would not allow it.

One morning I asked Father to give me some seeds. He gave me several peas from the kitchen closet. I never knew that they were seeds before. They were all wrinkled and dried.

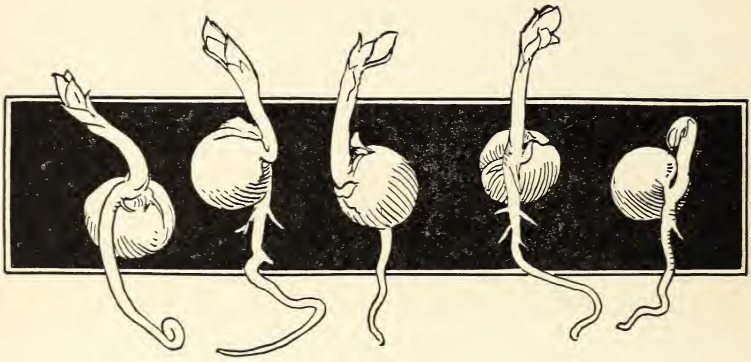
"Let us put them in water overnight," said my brother Jack. "I have heard Father say that all seeds need moisture for growth.

"We will watch them every day," said Jack, as he filled a dish with water, "and write down all that happens in a notebook." So we did as he suggested.

I looked at the peas the following morning. Something was surely happening, for they were all swollen. I wondered what was inside of them, so I broke one open. There was not much to see—only a soft white mass.

When I showed it to Jack, he said that the soft mass was food for the live part of the seed.

Jack said that the seeds would sprout if they were put in a dark place that was fairly warm, and left alone for about four days. So I placed the swollen peas in wet sawdust in a dish. Then I put the dish on a shelf where it was warm.



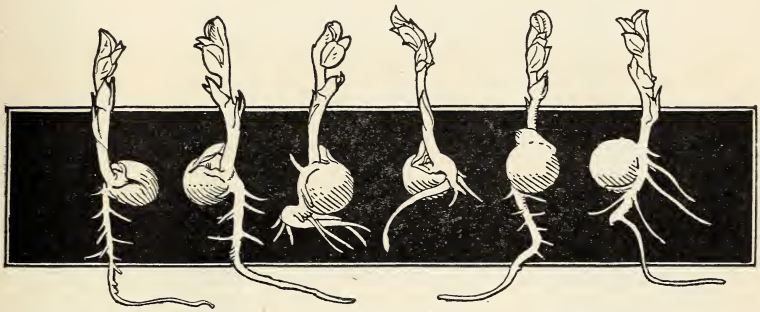
It seemed a long while to wait but we did not touch them. I counted the days. Four days had passed since we had placed the seeds in the wet sawdust.

Some were bursting open. Jack pointed out the stems, with a funny little knob on each. "That knob will open into leaves," he said.

It happened just as Jack told me. Each stem began to straighten out. "Perhaps it is trying to get the leaves above the sawdust," I suggested.

I noticed that the fleshy white part which was the food was getting smaller and smaller. I was sure it was going into the stem and leaves, for they were getting larger and larger.

Many little string-like hairs were hanging down. I guessed that they were roots. I hoped that they would



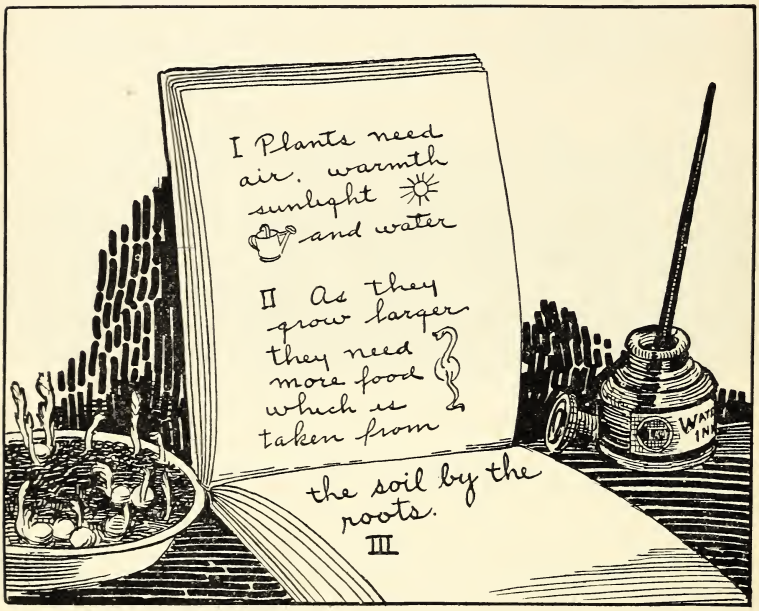
grow large enough before all the food in the old shell was gone.

Three more days passed and there was nothing left but a stem with two leaves and some roots. The old shell had fallen off. The little leaves were getting paler and paler. I wondered if they needed more food.

Father told us that I was right. "You must plant them in the ground now," he said. "City water does not give them enough food to live on."

We planned to plant them the next morning, but when morning came, the little plants were dead.

We are going to try again. In my notebook I have written:



I. Plants need air, warmth, sunlight, and water.

II. As they grow larger they need more food, which is taken from the soil by the roots.

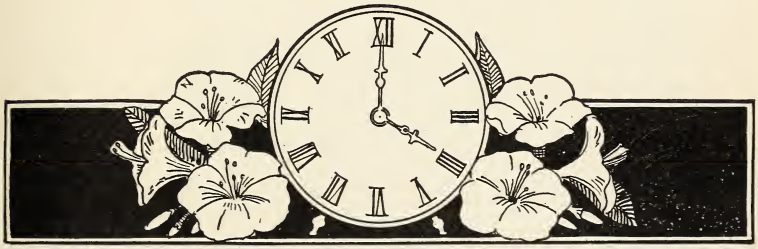
Perhaps our next plants will live longer. Do you think so?

QUESTIONS

1. What are some of the signs of spring?
2. Can you describe the seeds of the pea plant?
3. Why did the children place the dish in a dark place?
4. What is the soft white mass inside of the seed used for?
5. Why does the main stem grow upward?
6. What are the roots for?
7. What does a plant need for life and growth?

WHAT SOME PLANTS DO

Our garden is full of the most wonderful things. I am beginning to understand their language. My playmate had to go home at four o'clock today, but I did not have to ask Mother the time. My little garden told me. Do you know the little time-keeper of the garden? The

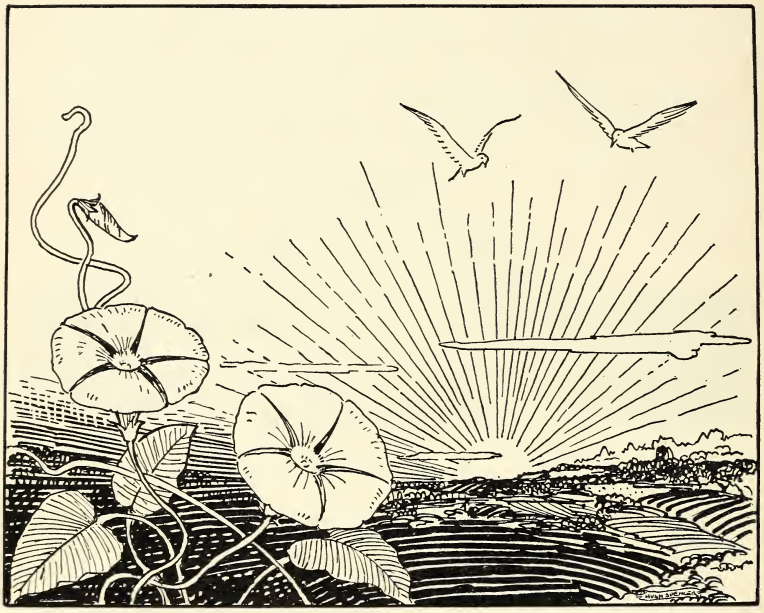


four o'clock closes its petals as the sun's warmth begins to dwindle. Perhaps you too have noticed them.

The morning glory opens her petals at sunrise and closes about midday. The little yellow primrose opens her door shortly after noon. I have watched them in my garden. The sun-flower seems to love the scorching sun more than does any other plant. You will see him droop his head also as the sun goes down. Maybe he misses the sun's warmth.

But it is not only on sunny days that my garden tells

its story. On rainy days there are many things to see and learn. If you will look closely you will find some of the flowers turning toward the ground. They look



very much like umbrellas. I know that the rain can slide off more easily that way.

Some of the others that seem to need more water turn directly upward. These flowers look like cups, and hold the water long after the rain is over. Find them after the next rain if you do not know them already.

Father says the plants are very much like children. Some are stronger than others.

I know one spot where none of the flowering plants would grow. Father planted ivy there. Now the place is just covered like a wonderful network of dark green leaves. Ivy will grow on rocks, walls, and many other places where other plants will not grow.

But the spot I love best of all is just behind the house. The sun does not shine there most of the day because it is shaded. The ferns and violets have their home there. It is moist with lots of shade, and near this bed I have placed my swing.

QUESTIONS

1. What is one of the little time-keepers of the garden?
2. Why do some flowers close their petals in the late afternoon?
3. Can you name some flowers that love strong sunlight?
4. Why do some flowers turn toward the ground when it rains?
5. Can you tell about other flowers that act differently in the rain?
6. Where do the fern and violet grow? Why?

PLANTS THAT FEED ON ANIMALS

"It is a wonder that there are any insects at all," said Hannah's mother. "They have so many foes to fight. Besides their animal enemies, they have to be on guard against many different kinds of plants. Certain plants are waiting to catch and kill them."

"Can plants catch and kill insects?" asked the little girl, in surprise.

"Yes," replied her mother. "Many plants are very skillful in catching insects. There are certain plants that have traps shaped like pitchers. These traps catch any insect that enters them."

"How do they catch the insects?" asked Hannah.

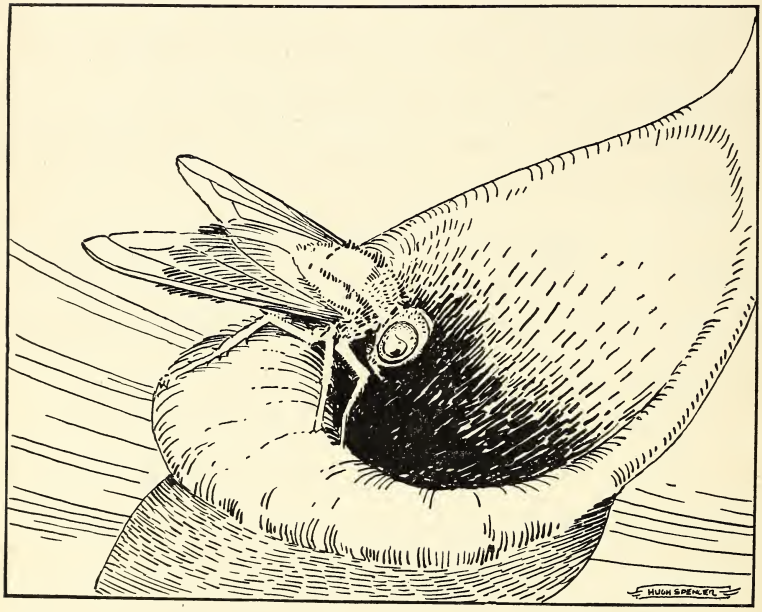
"Along the inside of the pitchers are little hairs. These hairs point toward the bottom of the pitchers. There is a kind of sweet syrup on the hairs.

"Now suppose that a fly walks into the neck of this pitcher to get the syrup. He has no trouble going in, but he cannot go out."

"Why can't he get out?" asked Hannah.

"Because the ends of the hairs stick into him," continued her mother. "Just imagine what would happen

if the hairs on your kitty were as stiff as wire. You could stroke her only one way. If you tried to stroke her the other way the stiff hairs would stick into your hand.



"The fly cannot go back, so he keeps going forward. At last he falls into the bottom of the pitcher. There he is drowned in the fluid that is there."

"I don't see why the plant wants to kill a fly," said Hannah.

"Because the plant wants it for food," was the reply. "Some plants get part of their food from insects instead of from the ground."

"Are there any other kinds of plants that kill insects and other things?" asked the little girl.

"Oh, yes," said her mother. "One of the strangest of all is the Venus flytrap.

"This plant has real traps. Each trap has two parts side by side. Along the edges of each part are long teeth."

"What are the teeth for?" asked Hannah.

"When an insect touches the hairs that are inside of the trap, the two halves snap together. The trap shuts up just as a book closes. The insect is caught between the two parts. The teeth hold it fast."

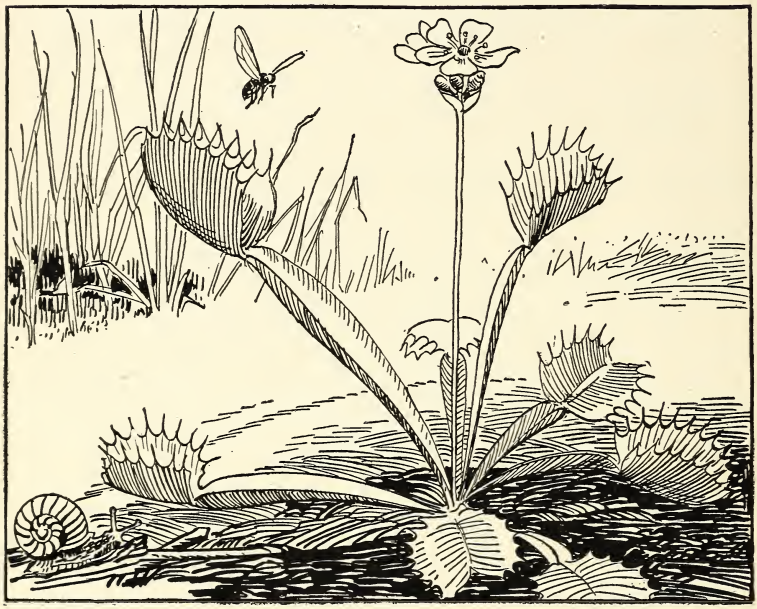
"Can't the insect get out?" asked Hannah.

"No," said her mother. "The insect is killed and used as food.

"There is another plant that uses insects as food. This is called the devil's snare. It has long arms. On these arms are claws. If any small animal touches this plant it is caught by the claws."

"Can't the animal get away?" asked Hannah.

"No," replied her mother. "The more the animal struggles, the more claws it touches and the tighter it is held. It is not long before he is dead. Then he becomes food for the plant."



"I did not suppose that plants could be so cruel," said Hannah.

"Another plant that catches animals is the bladderwort. This plant has small bladders. Tiny water animals, when they are frightened, sometimes run into

these bladders. They think they will be safe there."

"What happens to them in there?" asked Hannah.

"They cannot get out because the lid is closed," was the reply. "The animals soon die and become food for the plant.

"There is another plant called the sundew. It catches insects in a different way. There is a sticky substance on certain hairs of the plant. The insects touch these hairs and are held fast. The insect dies and it is used by the plant as food."

"Do many other plants do such awful things?" asked the little girl.

"There are many others that get their food in similar ways," her mother replied.

"Most plants get the same things from the ground that these plants get from the animals. Our common plants get these things from the ground."

QUESTIONS

1. How does the pitcher plant catch flies?
2. Why do plants catch insects?
3. What other plants catch insects?
4. Can you describe some plant traps for insects?
5. Where does the bladder-wort live?
6. How does it catch its food?
7. Why do you think insects go near plant traps?

WHAT THE PLANTS DO FOR MAN

"What do the plants do for us?" asked Hannah of her mother.

"They help us in many important ways," was the reply. "I have told you that there would be no animals if there were no plants. There would not be any human beings either, because they would starve too.

"I am going to tell you now how the plants help keep the world in order. First of all, I am going to ask you a question. Why do you suppose that the soil on the side of hills is not washed to the bottom by the rain?"

After thinking a minute, Hannah told her mother that she could not guess.

Her mother continued, "It would all be washed down, if it were not for the plants. All the grasses, bushes, and trees have roots. The roots of these plants hold the soil together. Some of these plants, like the grasses, make a thick covering over the ground.

"Most of the rain that falls is taken up by the plants. Some of it, though, flows down hill. It does not carry much of the soil with it, because the soil is held in place by the roots."

"I understand," said Hannah, "if it were not for the plants the soil would be washed down hill."

"Yes," continued her mother. "The plants keep the soil on the hills. Also in very dry weather, if there were

no plants, the soil would dry up. Then it would crumble into dust and the wind would blow the dust away."

"If there were no plants, the soil would either be washed down hill when it rained or it would be blown away in dry weather," said Hannah. "Am I right, Mother?"

"Yes, that is correct," was the reply. "I said a moment ago that the plants hold water. Where there are plenty of plants there is a moist cushion over the earth. Some of this moisture is always going downward."

"Where does it go?" asked Hannah.

"It forms springs and little brooks. Many of these little brooks and springs flow together and make the rivers."

"Would not the water flow down into the little brooks, even if there were no plants?" asked Hannah.

"Part of it would flow down, but a great deal of it would go up into the air. The sun can draw water that is not held by the plants up into the air. The water that did flow down would go down all at once. When there was a heavy rain there would be a sudden rush of water into the rivers."

"It would all go down, if there were no plants to hold it," observed Hannah.

"That is correct," said her mother. "There would be no water left. So between rains, there would be no water in the streams. The rivers would all be dry.

"In the spring the melting snow is held by the plants.

In countries where the trees have all been cut down there are terrible floods each spring."

"What else do the plants do to help us?" asked Hannah.

"They keep the air sweet and pure," said her mother. "You see they use up the things in the air that animals breathe out. They also give the animals things that they need, as I told you a little while ago. That is one reason why parks are good things to have in cities. The

trees are very large and can do a great deal to purify the air.

"The plants and trees furnish birds and animals with places to live in. They also help cool the air in the hot summer. In winter they prevent the air from getting as cold as it is in the treeless places. They also give protection by breaking heavy winds.

"I have not mentioned the different kinds of food that the plants give us. Almost all that we eat, except the food that we get from animals, comes from plants."

"We make lots of things from plants too," added Hannah.

"A great deal of our clothing and many of the things that we use every day come from some kind of plant," said her mother. "We must not forget that plants make the world beautiful. Anything that gives us beauty does a great deal of good."

QUESTIONS

1. How is the soil on hillsides kept from sliding?
2. What happens to the rain that falls on the ground?
3. How do plants help to hold moisture?
4. What does our story say about parks?
5. What would happen to brooks in summer if there were no plants?
6. How many uses of plants can you name?

"If there were no plants, there would be no animals in the world. You see, there would be nothing for the animals to eat."

"But, Mother," said Hannah, " all animals do not eat plants. The tiger and the lion do not."

Her mother replied, "That is true, but the tiger and the lion eat other animals that do live on plants. The antelope is one of them. If there were no plants, all the animals that the tiger eats would starve to death."

"I see," said Hannah. "Then the tiger would have nothing to eat."

"Yes," said her mother. "The same thing would be true of all the animals in the world. So you see animals cannot live without plants."

"What do the plants live on?" asked the little girl.

"The plants get their food from the air and from the ground," said her mother.

"But there is nothing to eat in the air," said Hannah.

"Oh, yes, there is," said her mother. "But you can't see the things that make up the air. You will study about them later.

"The plant takes these things that it gets out of the air and puts them together. The plant makes its own food, just as we make bread. To make bread we take flour, water, and other things, and mix them together. Then we bake them. We can't make bread without heat. Most plants cannot make their food without sunlight."

"Does the sunlight bake the food for the plants?" asked Hannah.

"No," replied her mother. "It helps in a different way. The sunlight helps the plants get some of the things out of the air that they need. Then there are little tiny plant-like things in the ground. They help the big plants get some of their food from the ground."

"How do the tiny little plant-like things that live in the ground get their food? You just said plants have to have sunlight," said Hannah.

"There are a few plants that get their food without sunlight. Bread mold and mushrooms and the little plant-like things are examples. But they have to have part of their food ready-made. They get it from plants and animals that once were alive."

"Can't any animals make their own food?"

"None of the real animals is able to make his own food. There are some tiny creatures, though, that are able to make it. They are almost like plants. They are so small that one can hardly see them. They are so small and so few that they do not count."

"I see," said Hannah. "Animals have to have their food ready-made."

"Yes," replied her mother. "They either eat the plants that have made their own food, or they eat the animals that have eaten the plants. So you see, if it were not for the plants there would be no animals in the world.

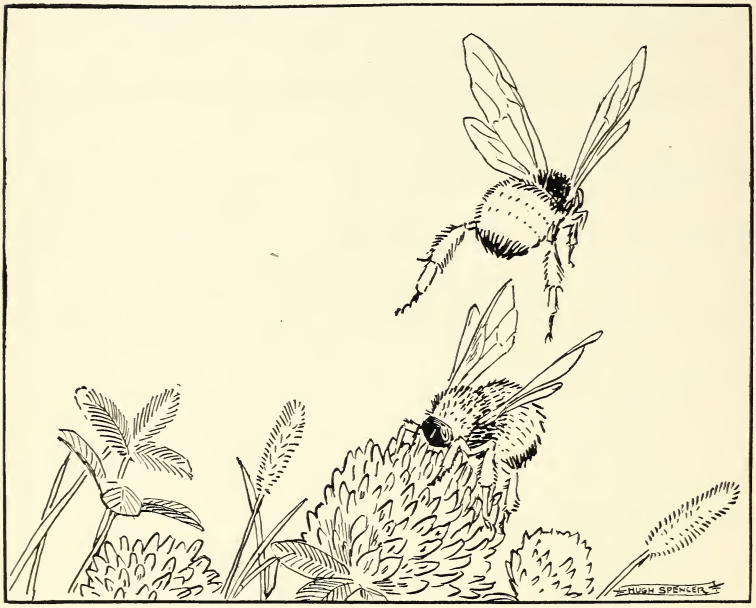
"Plants have another way of helping the animals. They breathe out certain things into the air that the animals have to breathe in."

"Don't the animals do anything to help the plants?" asked the little girl.

"Certainly," was the reply. "The animals breathe out certain things into the air that the plants have to use for making food.

"Animals help the plants in another way. They carry a kind of dust called pollen, from one plant to another. If it were not for some of the animals, many of

the plants' eggs could not get any of this pollen from other plants. Then these eggs would not grow. There are some other things that the plants get from animals."



"It seems to me," said Hannah, "that the plants help animals and that the animals help the plants."

"You are right. They do help each other," replied her mother. "But the plants are the more necessary of the two. They could live without the animals, but the animals could not live without the plants."

QUESTIONS

1. How are plants useful to animals?
2. Where do the plants get their food?
3. Can you tell how animals are useful to plants?
4. What is pollen?
5. How does pollen get from one plant to another?
6. Why do you think plants are more necessary than animals?

HOW PLANTS PROTECT THEMSELVES

"Plants are protected in many ways from their enemies. Many of them have special structures to guard them. The cactus plant is one that has to fight many foes."

"What are its foes?" asked Hannah of her mother, for her curiosity was aroused.

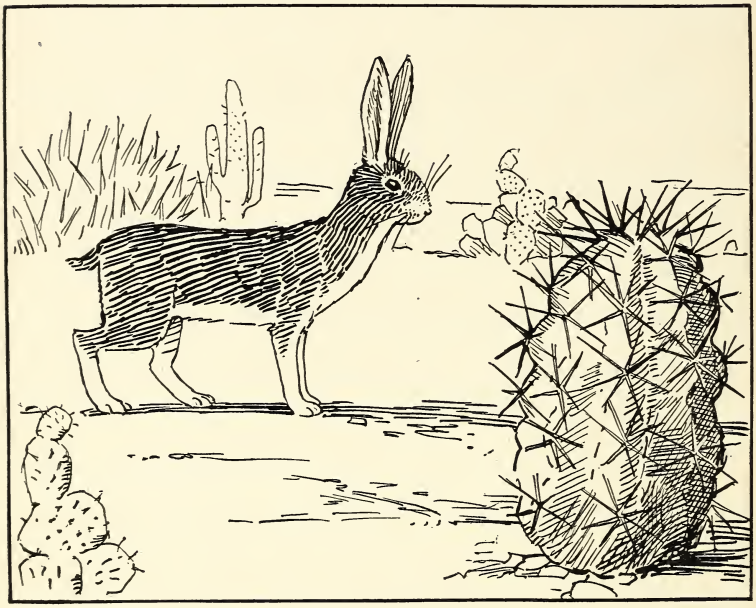
"The worst foe of the cactus is dryness," replied her mother. "The cactus lives where it does not rain for weeks at a time. So this plant has to be ready for the dry weather, otherwise it would die."

"How can a plant be protected from a thing like dryness?" asked the little girl.

Her mother answered, "The cactus has great spaces in its body that are filled with a spongy substance. When there is plenty of rain the plant stores up a large supply of water in these sponges. The plant stores up the water by means of its roots. The roots run for long distances underground, and carry moisture to the sponges."

"What other danger does the cactus have to watch out for?" asked Hannah.

"The water that the cactus stores up brings another danger to it. Animals that live in a country where everything is hot and dry would kill the cactus. They want to drink the water that the cactus has stored up."



"Then why don't they do it?" asked Hannah.

"Because," said her mother, "the cactus is protected from the animals by very sharp spikes that stick out all over it. Any animal that tried to eat a cactus would be badly cut or pricked.

"Many other plants are protected from animals that

would like to eat them. Some have thorns and others have spikes or hooks."

"Oh, yes, I know, the thistles," said Hannah. "They are pretty safe from cows."

"Yes, and there are a great many plants that are similar to the thistles," said her mother. "Some grasses have very sharp edges that can make bad cuts. Animals leave them alone too."

"Do all insects hurt plants?" asked Hannah.

"Oh, no," replied her mother. "Most of the flying insects carry pollen from one flower to another. Few of these insects injure the plants. Insects like the ant and the caterpillars do the greatest damage."

"Can plants protect themselves from ants?" asked Hannah.

" Some can. Many have smooth stems. The ants cannot climb up them. Other plant stems are covered with a sticky gum. If an insect gets caught in this gum, he cannot get away."

"Is it on account of the insects that the stem of the pussy willow is so slippery?" asked Hannah.

"Yes," said her mother. "The little pussy willow is pretty safe from crawling things."

"What keeps the caterpillars away?" asked Hannah.

"Thorns that are on some stems prevent caterpillars from climbing up. The thorns point downward. A cat-

erpillar that tries to climb up runs into the thorns. He has to stop, because they would stick into him."

"Are there any other ways that a plant is guarded from its foes?" asked Hannah.

"Many different kinds of plants close up their flowers in the daytime, while their enemies are around

and active. These flowers open up at night, when their foes are sleeping."

"What plants do that?" asked the little girl.

"The night-blooming cereus is one of them," said her mother.

"Then there are plants that have such bad odors that many animals will not go near them. The skunk cabbage is an example."

"My, but there are lots of ways in which a plant protects itself," remarked Hannah.

"I have not told you about another kind that has a special supply of syrup below the flowers. Ants and other insects that climb up the stem eat this syrup until they have all they want."

"I see," said Hannah. "They don't go to the flowers at all. It is a good way to keep the insects from the flowers."

"There are still other methods that plants have of keeping their enemies away, but I will save them until another time. Good-night."

QUESTIONS

1. Name a plant that lives in a dry climate.
2. How does this plant protect itself from dryness?
3. What means does this plant use to protect itself from animals?
4. Name some other plants that protect themselves.
5. Can you tell how some of these plants get protection?
6. Why do some plants want to keep insects away?

PLANT GIFTS

Father had just returned from the moving pictures and was telling Jack about what he had seen. It was the story of rubber. When he had completed the story of how rubber is gathered he explained how it is manufactured into tires, bands, and thousands of other things.

Jack said, "I never knew that rubber came from trees."

"Oh, yes, the rubber tree is only one of many whose sap is useful," said Father. "Turpentine is made from the sap of the pine tree, and maple syrup is made from the sap of the sugar maple. Other trees produce sap that is made into things that we use every day."

"I know that there are many things which we wear that come from plants or trees," said Jack. "This is true of cotton, for I have read about it in school. Cotton is raised in our own country and many people are working every day to change it into cloth."

"The plants that are useful to man are very many indeed," said Father. "I am sure that you could not enjoy any game more than finding out about them."

"But we know many of them already," said Jack.

"There are hundreds that you do not know about," Father replied as he took a book from the shelf. "But as it is late we will have time for only two or three.

"I wonder if you know," he continued, "that the cover on our table is made from a plant. This little plant is called flax. It grows in many countries. When your grandfather was a boy, it was grown by all the families in the neighborhood. In those days it was used to make dresses and clothing. If you will look in our

storeroom tomorrow, you will find an old weaving frame and a spinning wheel. Perhaps you will discover how they were used after you have seen them. But cotton has taken the place of flax in making clothing, because it is easier to use. Perhaps someone may discover a plant that can be used more easily than cotton for making cloth."

"That is a very useful plant," said Jack. "But I believe that some of the trees are more useful. They are the source of our lumber. Building would not be so easy without them. Some trees are much softer than others and are quite easy to cut. They help make houses for millions of people."

"But that is only one of the ways that man uses the trees," said Father. "Did you know that paper is made from trees?"

Jack was very much surprised.

"You can read for yourself about the making of paper," said Father as he handed the book to Jack.

"Still more wonderful things can be made from crushed wood," said Father as he rose to bid Jack goodnight. "Do you know that artificial silk is made from wood? Many things made of it are worn by man.

Stockings, ties, dresses, and other garments that feel and look like real silk are made of wood."

For a moment Jack thought his Father was joking.

"That is true," said Father. "Tomorrow I will tell you more wonderful ways in which plants serve man."

QUESTIONS

1. Can you name some trees whose sap is useful?
2. What are some things made from the sap of trees?
3. What is flax and why is it grown?
4. Why is the pine useful for building?
5. Can you name several things made from wood pulp?
6. What is artificial silk and how is it used?

FRIENDLY WORMS

A big, fat caterpillar crawled along Little Sister's silk dress, as she walked through the garden. When it touched her hand, she screamed as little girls sometimes do when they feel fuzzy caterpillars. Jack, her big brother, ran to her as fast as he could. He laughed and laughed when he saw that it was only a caterpillar.

"Take him away," said Little Sister. "I do not like them and I wish there were no caterpillars in the whole world."

"I will take him away, but I will not harm him," said Jack. "If there were no caterpillars in the world, there would be no silk dresses for you nor silk ties for me."

"Can caterpillars make silk dresses for me?" asked Little Sister.

"This one cannot," answered her brother, "but I will tell you about some that can."

Little Sister sat down on the garden bench, while her brother let the fuzzy caterpillar take a walk up his coat sleeve, as he told her the story of the silkworm.

"The Chinese and Japanese people raise millions of

caterpillars or silkworms. The boys and girls help feed them the tender leaves of the mulberry trees. The silkworms are kept on trays, in a light, clean room, and must be fed very often. Sometimes they are fed five or six times a day.

"When the caterpillars are full-grown, they become restless, and will not eat any more. It is time for them to spin their cocoons of fine, silk thread. They spin the silk thread and wind it around their bodies, until each caterpillar is a prisoner. The prison is called a cocoon. It takes about three days for the caterpillar to spin his cocoon.

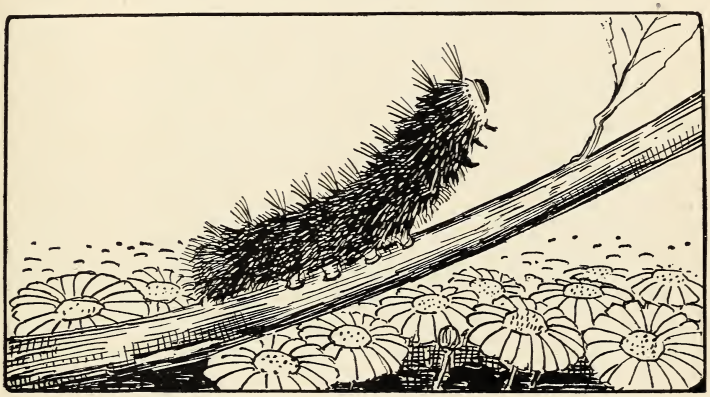
"The silkworm in the cocoon changes into a moth. The moth breaks the thread at one end of the cocoon and comes out into the light and air. Soon it lays its tiny eggs and dies. New silkworms are hatched from these eggs.

"The thread from one cocoon is very fine. It is, therefore, twisted with the threads from other cocoons. This makes a strong silk thread which can be woven into silk cloth. Perhaps you have seen these threads come loose from the edge of a piece of silk."

"What a wonderful story!" sighed Little Sister. She

touched the fuzzy caterpillar with her finger. "What a wonderful story!" she said. "I like my silk dress so much better now that I know a little creature like you helped to make it."

The caterpillar twisted and squirmed, until he reached a green leaf, where he stayed quietly as long as



Little Sister and her brother watched him. Perhaps he was getting ready to wind himself into a cocoon. Do you think so?

"I am glad that you told me the story of the friendly worm," said Little Sister. "It will be a good story to tell in school. I am sure that many of my classmates will be happy to know that some worms are very useful. Perhaps our teacher will tell us of others."

QUESTIONS

1. Why did Jack not wish to hurt the caterpillar?
2. What do silkworms feed upon?
3. In what way are cocoons made?
4. How does the moth get out of the cocoon?
5. How are silkworms hatched?

HOW BUTTERFLIES GROW

"Let's go and visit the hermit," said Molly to her brother, Bob.

"Hermit?" he asked. " What is a hermit?"

Molly answered, " A hermit is a man who lives by himself in some lonely place. This one has a cabin in the wood. His name is Tom."

"Why does he live in the wood?" inquired Bob.

"I guess," replied Molly, "because he loves birds and animals and flowers."

Molly and Bob soon reached the hermit's cabin. They found him watching a pair of black and brown butterflies that were resting on some milkweed blossoms.

The hermit greeted them warmly. Then he said, "Did you ever see any baby butterflies like those on the flowers?" Before giving them time to answer, he continued, "No, nor did any one else ever see any."

The children could not understand. They did not know any living thing that did not have babies. They asked Tom to tell them about the butterflies.

"Do you see that little case hanging from that milkweed branch?" he said.

The children went close to the weed that Tom had pointed out. They were just about to touch the case, when something happened. The case began to split open.

"Look, look!" they shouted.

Tom bent closer. "You are lucky," he said. "You can see for yourselves where the butterflies come from."

Molly and Bob saw a queer-looking bug slowly work his way out of the case. It was not like anything they

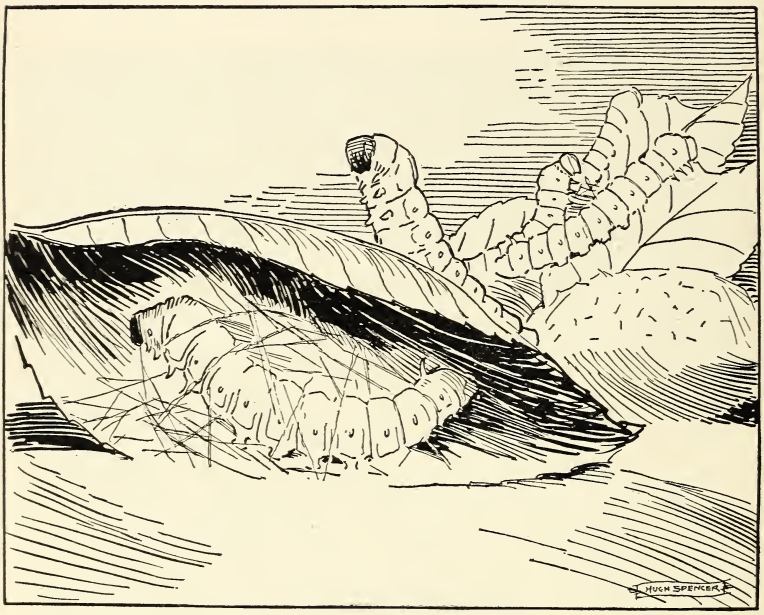
had ever seen before. Its body was fat and long, and there were wrinkled wings folded upon it. While they watched, the wings kept growing larger and larger.

"The wrinkles are being ironed out," exclaimed Bob.

"It will not be long before this queer little bug will have turned into a brown and black butterfly, like those on the milkweed blossoms," said Tom. "The life of a butterfly is wonderful indeed. Until it is full-grown, it is not a butterfly at all. Like all other insects, it hatches

from an egg. Instead of being a butterfly at first, it is shaped like a fat little worm with short legs."

"I've seen lots of them eating leaves in our garden,"



said Bob. "I did not know that they turned into butterflies."

"Yes, you have seen lots of them," continued Tom. "Different kinds of butterflies have different kinds of caterpillars. Caterpillars is the name we give these wormlike things. Some are all colors of the rainbow.

Some are as ugly as dragons, for they have humps and bristles and great jaws. The main business of the young caterpillars is to grow. They are great eaters, and some of them do a world of damage to plants and trees."

"What happens when they cannot grow any larger?" asked Bob.

Tom answered, "Each caterpillar builds a case around himself. This case is like the one that you just saw. Protected by this covering, their bodies slowly change in shape. They lose their humps and bristles and jaws. They turn into butterflies, and leave their cases. Then they go in search of mates. Each lady butterfly soon lays many eggs. These eggs hatch out into ugly little caterpillars. These in time turn into butterflies.

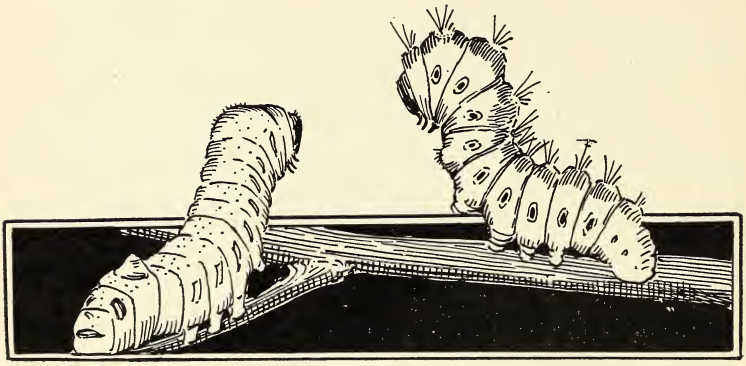
"The butterfly has a cousin, called a moth. Butterflies and moths are nearly alike. The moths fold their wings close to their bodies. The butterfly does not. He brings his wings together above his back. The butterfly flies by day. The moths fly mostly by night."

"Do the moth caterpillars make the same kinds of cases as the butterflies do?" asked Bob.

Tom replied, "Most caterpillars which will be moths

spin sacks of silk around themselves. These cases are called cocoons. Butterflies do not spin silk cocoons.

"The caterpillars of some kinds of moths travel in armies. They eat everything green that lies in their way. Others build large tents of silk in the trees. The caterpillars live in these tents at night and in bad



weather. The rest of the time they spend in eating the leaves of the trees."

"Do all caterpillars do harm?" asked Molly.

"They all hurt plants, but some do more damage than others," Tom responded. "Butterflies and moths do good instead. They carry a kind of dust from flower to flower. This dust is called pollen. The eggs from which plants grow need this pollen. If it is not brought to them they will not grow into new plants."

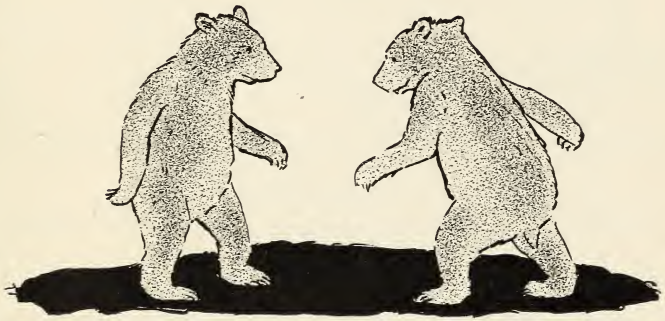
The children went home very glad that they had gone to see the hermit.

QUESTIONS

1. Where were the butterflies hanging?
2. Can you tell where the butterflies come from?
3. How do some caterpillars damage plants and trees?
4. Can you tell how a butterfly differs from a moth?
5. What is a cocoon and how is it made?
6. Do moths and butterflies do some good deeds? Tell about them.

HOW ANIMALS PLAY

From the time that Tommy's father brought home two little bears, Tommy had few idle moments. The cubs, as little bears are called, were always doing something interesting. They spent most of the time playing.



Tommy loved to watch them. They always had such good times.

"I almost wish I were a cub," he said to his father one day. "They have so much fun."

"Some wild animals do have a pretty good time playing when they are young," answered his father. "When they grow up they are so busy hunting food and keeping away from enemies that they don't have much time for play.

"It is well that they can play when they are growing. If they could not play their bodies would not grow strong."

"Is that the reason boys and girls like to play so well?" asked the little boy.

"That is one reason," was the reply. "Another is, they learn many things by playing. Play teaches them how to use their hands and feet and other parts of their bodies. Besides, they find out how others act. They soon know what to do every time the other one does something new."

Tommy's cubs loved to box. They often stood on their hind legs and cuffed each other over the ears. The blows they gave were not very light either. Sometimes they tried to bite one another's cheeks or ears.

When one managed to do this the other fell to the ground. The one that was on the ground pushed with his feet the jaws that held him. That is the way he freed himself.

Tommy could not tell which the cubs liked to do better—to box or to wrestle. They never seemed to get tired.

Boys very soon get enough wrestling or boxing to

last them a long time. But the bears were always ready for more. Tommy noticed that they were growing larger and stronger as the days passed by. He knew

from what his father had told him it was their play that was making them strong.

One day Tommy's father took him to the zoo. After looking at many different kinds of animals, they came to the monkeys.

His father said, "You will notice that the monkeys are even more playful than your cubs."

After he had watched the monkeys a little while, Tommy agreed with his father. He noticed how the monkeys delighted to play tricks on one another. Their greatest joy was in pulling a tail or twisting an ear.

They spent a great deal of time running after one another and in rough and tumble play of all kinds. It was all in fun. They never seemed to hurt one another.

"Don't the animals ever get angry when they play," the little boy asked. "Boys and girls often do."

"Very seldom," his father replied. "Sometimes when one is hurt, he wants to fight for a while. But he soon forgets that he is angry, and starts in playing immediately."

Tommy saw many great, strong animals at the zoo. He realized that they would not have been so strong if they had not played when they were young.

One does not have to own bear cubs or to go to the zoo to see animals at play. Every boy and girl has seen puppies play many times. How they love to tussle with one another, and to pretend to bite! Most of a puppy's time is spent in this way; that is, if he has anyone to play with. Puppies seem to have as much fun playing with people as they do playing with each other.

It is wonderful how dogs know just how hard to bite without hurting. This is one of the things they learn by playing.

Kittens keep their sharp claws covered up while playing. They forget, though, sometimes and give one a good scratch. It is wise to be careful when playing with a kitten.

There is one thing that boys and girls should watch out for when playing. They should play out of doors

as much as possible. That is what the animals do when they are not shut up in cages and houses. The boys and girls who play most in the fresh air and the sunshine will be the strongest and healthiest men and women.

QUESTIONS

1. What is another name for little bears?
2. In what way does play help young animals?
3. What lesson can boys and girls learn from watching animals play?
4. Can you name several animals that play a great deal when young?
5. Where should boys and girls do most of their playing?
6. What can be gained from fresh air and sunshine?

BEES AND ANTS

Molly and Bob were eager to learn more about the wonderful things that happen in Nature. So the next day found them again at the hermit's cabin.

After greeting them, Tom, the hermit, said, "Here is one of the smartest creatures in the world."

Bob glanced in the direction that Tom indicated. "Why, it is just a honey bee!" he exclaimed.

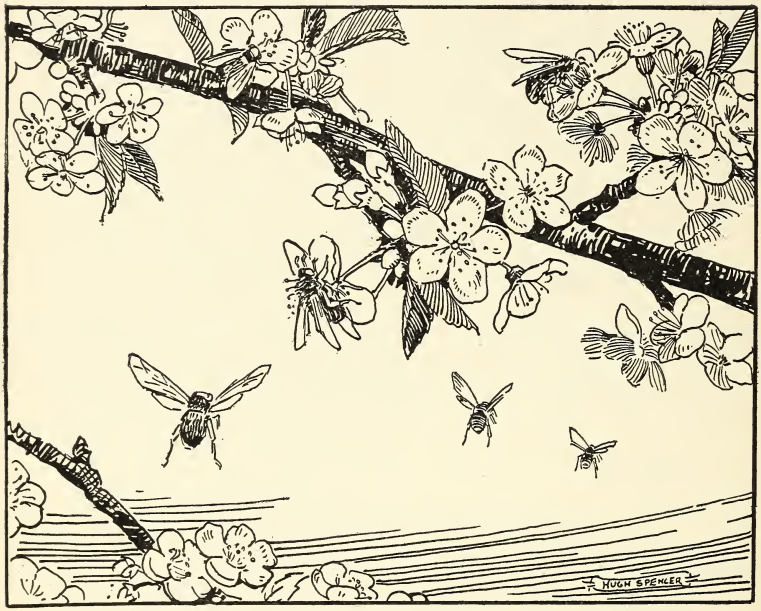
"Yes, just a honey bee," Tom said. "But the honey bee is very wise. Thousands of bees live in one great family, under one roof. The work of the hive, as their home is called, is divided among the members of the household. There is a great deal of work done, but no confusion."

"What a big family!" exclaimed Bob. "I should think everything would be topsy turvy."

"It would be," replied Tom, "if each bee did not have his own duties. Most of the members of a hive are called workers. Some gather the sweet nectar and the pollen from blossoms. Others change them into honey and bee food. Still others make wax from the honey. Certain bees make storehouses for the honey

from this wax. These storehouses are called cells. Some of these cells are used also as cribs for the baby bees."

"Do bees do all of these things?" asked Molly.



"Yes," replied Tom, "and many more. But the most wonderful thing they do is to keep the air of the hive fresh and pure. Certain of the workers stand at different places and keep the air moving by revolving their wings. The fresh air helps the little bees grow up well and strong."

"They are almost like people," said Bob.

"They are wiser than some people that I have known," replied Tom. "They like to be clean. One group of workers is busy all day carrying out dirt from the hive. They know that dirt will make them sick."

"Are the baby bees like the grown-ups?" asked Molly.

"No," said Tom, "they are very much like the babies of the butterflies and moths. They are shorter and fatter though. Each of these little fellows hatches from an egg that was placed in a cell. He eats the food that was put in his cell for him and grows very rapidly. When he becomes large enough, he changes into a bee, just as the caterpillar does in the case."

"Are all bees workers?" asked Bob.

"I am glad you asked that question," said Tom. "I almost forgot to tell you that in every hive there is a queen. She lays the eggs for the whole family. She is much larger than the rest. She does no work, and the others wait on her. There are some men bees in every hive. They are called drones. They do no work either.

"I must tell you a little about the ants. They also

live together in large families. They, too, have a queen, men ants, and workers in each nest. The workers are not all the same size. The largest workers are the soldiers. They drive away enemy ants and other insects. The other workers have their own duties, just as the bees have."

"Do ants have wings?" asked Bob.

"They do at first," said Tom. "They need them so that they can fly around and find their mates. After they find their mates, they both bite off their wings. They do not need them any more."

"You must tell us about the baby ants," said Molly.

"They are almost like the baby bees," said Tom. "They grow up in about the same way."

"Some other day I will tell you about a few of the larger animals that help each other," added Tom.

On their way home the children talked over all that Tom had told them.

"Why do you suppose the bees and the ants want to live in large families?" asked Bob of his sister.

Molly replied, "It must be because they can do so many more things by living together."

Do you think that Molly's answer was right?

QUESTIONS

1. Why is the bee called a wise insect?
2. Can you tell about the bees' home life?
3. What are some of the bees' duties?
4. How is the air in a beehive kept fresh and pure?
5. What is the difference between the queen bee and the drones?
6. What can you tell about the family life of ants?
7. Why do you think so many ants live together?

ANIMALS THAT WORK TOGETHER

"I promised to tell you about some of the larger animals that help each other," said Tom to Molly and Bob the next time that they made him a visit.

"Oh, please do," they exclaimed together.

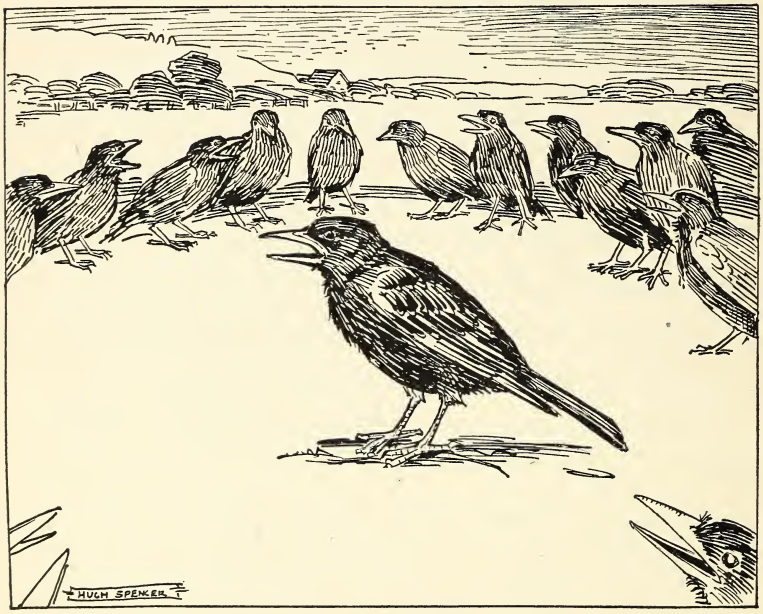
"I will tell you first about the crow," he began. "I am sure you would never dream that one crow would take the trouble to help another. They do though. When these birds are stealing grain or seeds, one of them perches on top of a tree or post. If he sees a man or dangerous animal approaching, he gives the alarm. The other crows hear him caw and fly away."

"They are much wiser than I thought," remarked Bob.

Tom continued. "I once saw a flock of crows do a very strange thing. About fifty of them were arranged in a circle. In the center of the circle was one lone crow. He was chattering as fast as he could make his tongue go. Then he stopped. All at once the rest began to caw at the top of their lungs."

Bob excitedly burst out with, "What were they doing?"

"The crow in the middle had done something that the rest did not like," said Tom. "They had first given him a chance to defend himself. Then they showed by their cawing the way they felt about it."



"What did they do next?" asked Molly.

"Suddenly," said Tom, "every crow in the circle flew to the center of the circle and began pecking the poor fellow. In a minute there was little left of him. Of course I do not know just why they punished him. But

I do know that no matter what the reason was, they all had the same thing in mind. They were working together."

Both Molly and Bob felt very sorry for the poor crow that was killed.

"I will tell you about some sparrows," continued Tom. "I will not make you feel sad this time. Last year two sparrows had a nest in a tree in front of my cabin. One day I heard a loud chattering in the tree. I hurried to the door and saw several dozen sparrows flying around the nest."

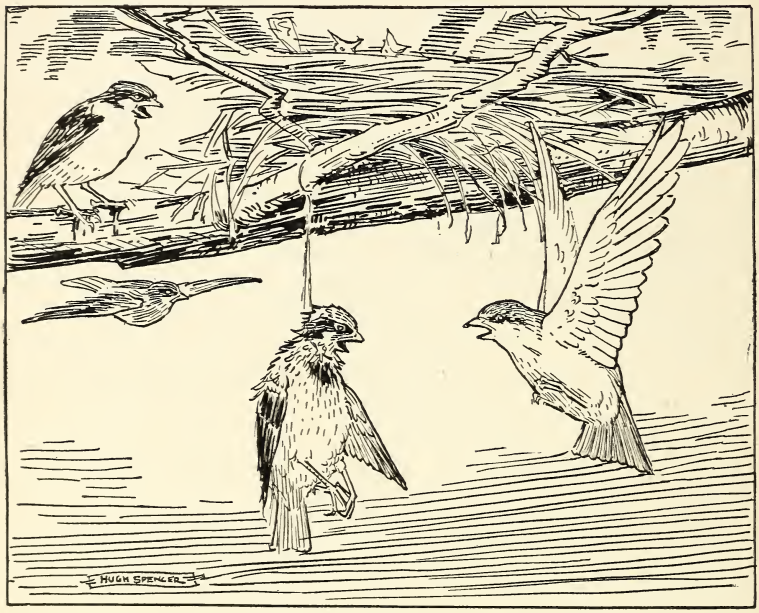
"Were they trying to hurt the two sparrows that lived there?" asked Bob.

"No," replied Tom, "they were trying to help one of them. In some way a horse hair had caught around the neck of the mother bird. There she hung from the nest. All she could do was to flutter her wings a little. The other birds that had come in answer to the frightened calls of the father bird knew just what to do."

"What did they do?" asked Bob. The little boy was so excited he could not keep still.

"They tried to cut the horse hair in two with their sharp beaks," said Tom. "But the poor sparrow swung

back and forth in her struggle to free herself. Her friends could not reach the thread for a long time. All they did was to pull the feathers out of her neck. At



last one of the sparrows managed to cut the hair, and she was free."

"What happened then?" said Molly.

Tom answered, "All the birds that had come to the rescue flew away. She who had had such a narrow escape sat on a branch for a few minutes smoothing the

feathers that remained. In a little while she was flying about among the leaves, chirping as usual."

"The little sparrow would have died if the others had not come to help," said Bob. "It is nice that birds sometimes help each other!"

"The only trouble is that they do not always do it," said Tom. "Sometimes four-footed animals also help each other in the same way."

"Please tell us about some of them," asked Bob.

"I have known several cats," he said, "that have pitched in and helped their dog friends that have been attacked by other dogs. I have also known many dogs that have fought together against other dogs. A dog will almost always help his friend, whether his friend is a man or another dog.

"There are many animals such as wild horses and cattle that travel together, because they find it best. There are wild animals that gather in groups when they attack their prey. I will tell you about these animals another time."

The children went home, knowing much more about animals than they did before.

QUESTIONS

1. How do crows guard against enemies?
2. In what way did the crows punish one of themselves?
3. Can you tell a story to show how sparrows help each other?
4. What animal will often help a man in trouble?
5. Can you name several other animals that work together?
6. Do you think working together is a good thing? Why?

THE DOG, MAN'S FRIEND

"Please tell me something about dogs," pleaded Tommy one evening.

Tommy's father was glad to see that his boy was interested in animals, so he gladly agreed.

"The dog has been man's friend for thousands of years," he began. "Just how long, no one knows. Even the cave men had dogs."

"What kinds of dogs did they have?" interrupted Tommy.

"They were not much like the ones you know," he said. "At first they were more like wolves and foxes. They were just as wild. These wild dogs had to find their own food, as the cave men did.

"These wild dogs soon discovered that the cave men threw bones outside of their caves. There was usually some meat on them. The wild dogs found it easier to get meat this way than to hunt for it, so they stayed around the cave men.

"When the cave men went hunting, the wild dogs followed. There was always plenty of meat when the hunters killed a large animal. The hunters could not

carry large animals home, so they left part behind. When this happened the wild dogs had a good feast."

"Did not the wild dogs ever get tame?" asked Tommy.

"Not the grown-up ones," replied his father. "Some of the cave men raised the puppies of the wild dogs. The puppies were tame while they were small. When they grew up they became wild again. But they were tamer than the wild dogs that the cave men had not raised in the caves.

"After thousands of years had passed, the wild dogs slowly changed. Finally, they came to be like our dogs today."

"Now I see why the dog is man's best friend," said Tommy. "It is because he has lived with man so long."

"Yes," said his father, "and it is well for both. Man protects and feeds the dog. The dog does many things for man."

"Are there any wild dogs now?" asked Tommy.

"In certain parts of the earth there are dogs that are as wild as wolves. They are as wild as those that followed the cave men. The Eskimo dogs are very wild too. Some of them are half wolves. They draw the Eskimo's sleds. In return for this work, the Eskimos feed the dogs. They are not tame like our dogs. They are not family pets."

"What else do dogs do for men?" asked Tommy.

"Many things," replied his father. "In some countries in Europe they draw carts just as horses do. Shepherd dogs are used by men who keep cattle. The dogs gather the cattle together and drive them home at night. These dogs are a great help to man. Men who raise sheep also have dogs to bring the sheep home.

"In every country in the world dogs serve as watchmen. They give warning if a stranger comes near. Most dogs will attack such a stranger, especially at night. Dogs do not have to be taught to be watchmen. They seem to know that strangers may do harm to their masters."

"What do St. Bernard dogs do?" asked Tommy.

"Where did you hear about them?" asked his father.

"I saw a picture of one in a book," answered Tommy. "He had something tied to his neck."

"The St. Bernard dogs live in the Alps. They carry flasks tied to a cord around their necks. In the flask is something to drink. When one of these dogs finds a man who is nearly frozen to death, he goes to him. The man drinks from the flask. This warms

his body. The dog then barks for help. Good men who live on the mountain come and rescue the poor man."

"Tell me more about dogs," pleaded Tommy.

"Not tonight," said his father. "It is your bed time and you know boys and girls to be healthy must have regular sleep."

QUESTIONS

1. How did the cave man's dog differ from ours?
2. Why did the wild dogs follow the cave-men hunters?
3. Can you tell how wild dogs became tamer?
4. How many different kinds of dogs do you know?
5. What are some of the ways in which dogs serve man?
6. Can you tell about the Eskimo dog or the St. Bernard?

INSECTS AND THEIR FOES

Mary had just learned in school that insects are very interesting creatures. Her teacher had told the class about a few of them. She knew that there were many more than the teacher had mentioned, because she had seen them herself. So one day Mary said to her mother, "I want to know more about insects."

"What do you wish to know, dear?" her mother asked.

"Oh, lots of things," answered Mary, "but most of all, why they have different colors."

"I do not know about all of them," said her mother. "But I do know why some of them are colored as they are. Did you ever notice that butterflies sometimes seem to come from nowhere?"

"Yes," answered the little girl. "Only today I was looking at a flower. All of a sudden there was a butterfly on it. He seemed to have come by magic."

"Some of the butterflies," said her mother, "have wings that are brightly colored on top. The undersides of their wings have a dull color. They look like bark or dead leaves. When the butterfly is resting, his

wings are held straight up in the air. They are pressed close together, so the colored sides do not show. Only the dull-looking undersides can be seen."

"Now I see," said Mary, "the butterfly was there all the time. I did not notice him because the colored sides of his wings were hidden. Then he just unfolded his wings and I saw him."

"The wings of some butterflies have ragged edges," said the mother. "When one of these butterflies is resting, he looks for all the world like a leaf."

"How are the moths protected?" asked the little girl.

Her mother replied, "The front wings of most moths are not brightly colored. The back ones usually have bright colors. When a moth rests, he lays his wings almost flat on his back. The front wings lie over the back wings. It is hard to see a moth when he is resting. It is well for the butterflies and moths that they cannot be seen when resting."

"Why, Mother?" asked Mary.

"Because," replied her mother, "birds and other enemies that would eat them cannot see them.

"There are certain kinds of flies whose bodies are

colored like the bodies of bees and wasps. When a bird comes along looking for something to eat, he lets these flies alone. He thinks they are wasps or bees. He knows that wasps and bees can sting.

"Some day you will see an insect called a walking stick. His body is long, and it is the shape of a slender twig. His legs are also shaped like little twigs. It is hard to see him when he is quiet, because he looks so much like the twigs of a tree."

"Are insects protected in any other way?" asked Mary.

"Some kinds have a very bitter taste," was the reply. "The enemies of insects have learned that these are not good to eat. So they are safe."

"Oh, I know them," exclaimed Mary. "I ate one once on a raspberry. It tasted like medicine."

Her mother continued, "There are beetles with great horns sticking out of their heads and backs. Some beetles have very tough coverings. Other insects and animals do not care for them as food.

"Of course, you know that bees and wasps and hornets can sting. There are other insects that can sting too. Many beetles and other insects can bite hard. Stinging and biting insects escape many enemies.

"There are a few insects that can squirt acid out of their bodies. This burns any foe that it strikes. Certain caterpillars have bristles that have poison in them. Birds and other enemies leave all these insects alone."

Mary's mother noticed that it was time for the little girl to go to bed, so she said, "There are many more ways that insects protect themselves, but it is getting

late. Some other time I will tell you about them. To-morrow I will tell you how animals are protected from their foes."

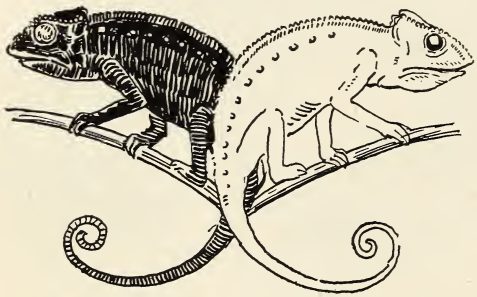
Mary hoped that she would be able to remember all she had heard. She wanted to tell her friends all that her mother had told her.

QUESTIONS

1. Why is the butterfly a different color when resting?
2. Can you tell why the moth folds its front wings over its rear wings?
3. Why do moths and butterflies need protection?
4. How do some insects protect themselves?
5. How would bees or wasps act if attacked?
6. Do you know any insects that are poisonous to birds?

ANIMALS' SELF-DEFENCE

The next evening Mary could hardly wait for dinner to end. She wanted to hear how animals are protected from their enemies. As her mother arose from the table, Mary said to her, "Will you tell me now about the animals? Please do, Mother."

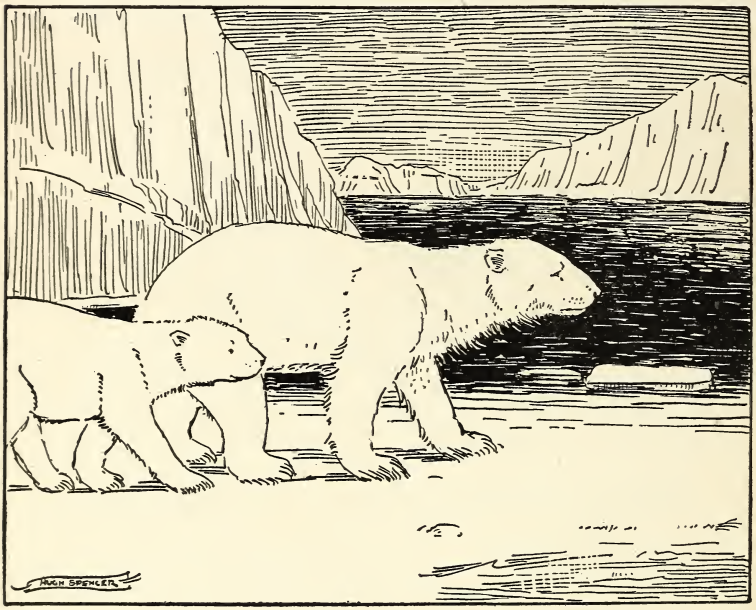


"Surely," said her mother. "Different animals are protected differently. I will begin with the little lizard, called a chameleon. This little animal is able to change the color of his skin. He can make himself look almost like the thing that he is sitting on. It is very hard to see the chameleon. His enemies do not often see him."

"He is more wonderful than the butterflies!" exclaimed Mary.

"Other animals are protected by the color of their

hair," continued Mary's mother. "The polar bear and the ermine live near the North Pole. They are as white as the snow around them. Most animals, like the deer,



that live in the woods, can hardly be seen when they are not moving. Their fur is almost the same color as that of the trees and bushes.

"A little fox that lives in the icy regions is white during the winter. In summer he goes south where it is warmer. There is no snow in the country to which

he goes. His fur then turns dark. He becomes the same color as the things around him. His enemies cannot see him in winter, because he is the same color as the

snow. In summer they cannot see him either. At that time he is dark like the bushes and the tree trunks."

"Do all animals escape from their foes because of the color of their hair?" asked Mary.

"No, indeed," answered her mother. "They have many different ways of defending themselves. The

porcupine has long sharp spines that stick out all over his body. If an enemy comes near him, he makes these spines stick out straight. No animal can bite him without biting through these spines. Very few animals dare attack him.

"Of course, you know what cats and dogs have to fight with. Their teeth and claws can badly injure any animal that attacks them. There are many other animals that drive away their foes by using their teeth and claws."

"Do animals have still other things to fight with?" inquired Mary.

"Yes," said her mother, "many more. Cows and buffaloes use their horns against their foes. The deer, the elk, and the moose fight enemies with their antlers. These animals can keep wolves away with their antlers, unless there are too many wolves."

"How does a lady deer fight her enemies? She has no antlers," said Mary.

"The stags, as the men deer are called, fight for them," said her mother.

"I do not see how antelopes and gazelles protect themselves. They seem so helpless," said the little girl.

"They have no weapons, but they are very swift

runners," was the reply. "They can run on uneven ground, and they can jump from rock to rock. Very few animals can catch them. They are protected by their swift feet. The horse and the giraffe use their feet in a different way. They brace themselves on their front legs, and they let their hind legs fly out backward. Both animals can strike terrible blows with their hoofs."

"Is it true that a bear can hug another animal to death?" asked Mary.

"Yes, a bear is a very powerful animal," was the reply. "If he can get his front legs around his foe, he can crush him. Other animals know this and are very careful to keep out of his reach.

"Certain snakes are called boas. They wrap themselves around an enemy, and squeeze him until he is dead."

"Do not snakes bite too?" asked the little girl.

"Certainly," said her mother, "they have strong jaws and sharp teeth. Some of them have pockets filled with poison inside their cheeks. When they bite an animal, some of this poison goes into the wound. It comes out of the holes in two of the snake's teeth. A bite from such a snake will kill most animals."

"Are there any of these snakes with poison in their cheeks in this country?" asked Mary.

"Yes, there are several different kinds. The most common is the rattlesnake. He makes a rattling noise with his tail. If you ever hear one rattle, stand still until you see where he is. Then run as fast as you can in the opposite direction.

"Animals have other ways of defending themselves, but I will tell you of them another time."

QUESTIONS

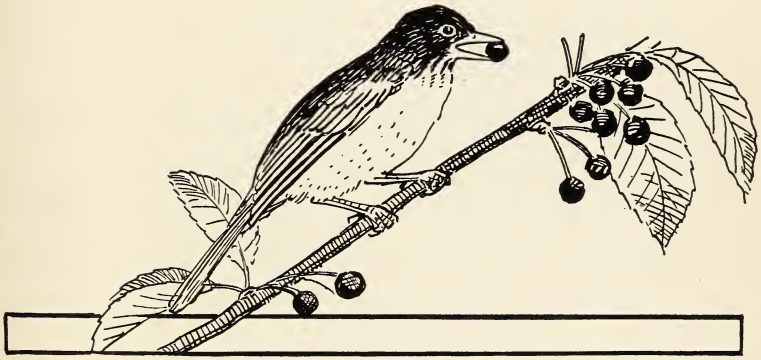
1. How does the chameleon protect itself?
2. What other animals have the same power of protection?
3. Why is it hard to see the polar bear, the fox, and the deer?
4. Of what use are the spines of the porcupine to him?
5. What means of protection has the horse and the giraffe?
6. Can you tell how some snakes protect themselves?

HOW BIRDS HELP MAN

One day in June, Fred and Jane said to their uncle, "Let's take a walk."

"Why do you want me to go?" he asked.

"Because you know so much about the birds and animals," answered Jane.



So the three started off across the fields. They had gone but a short distance when they came to a cherry tree.

"Look at those naughty robins eating cherries," exclaimed Fred.

"The robins are not as naughty as you think," said their uncle. "It is true, they do eat some cherries, but during the rest of the summer, when the cherries are

not ripe, they eat many insects. They more than pay for the cherries by the amount of good that they do."

"What good do they do by eating insects?" asked Jane.

"The robins and other birds do lots of good by eating insects," he said. "You see, insects destroy growing things, because that is what they live on. If there were no birds to destroy some of the insects, the farmers could not raise anything for us to eat."

"But I thought insects did good by carrying pollen from flower to flower," said Fred.

"Of course they do," answered his uncle. "But if there were too many insects they would eat up all the flowers and every other growing thing. There would be too many insects, if the birds did not eat them."

"Do moths and butterflies eat plants and flowers?" asked Jane.

"No, the moths and butterflies do not," answered her uncle. "Caterpillars do though. All moths and butterflies are caterpillars when they are young. Caterpillars are very hungry. One of them can eat many leaves.

"We have the woodpecker to thank for saving many

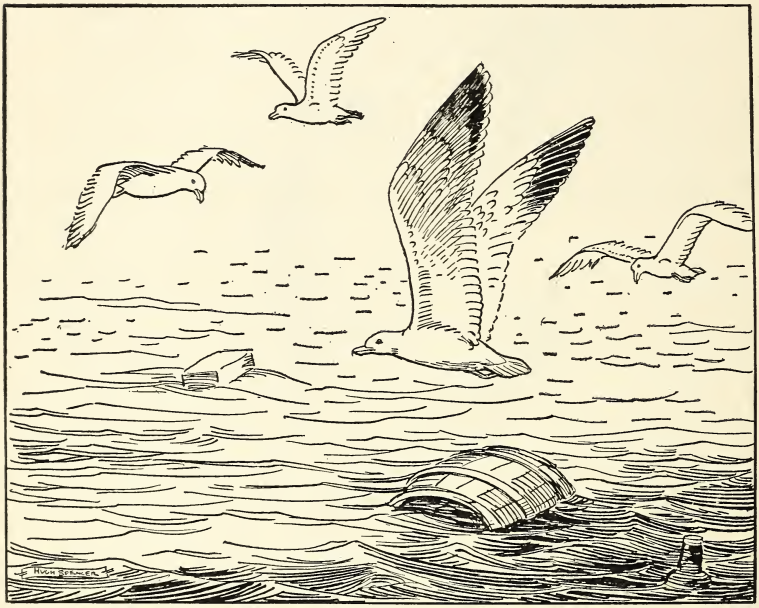
trees. He digs into the bark and wood and catches wormlike insects called larvae that have bored holes in the wood. Each larva, as one of them is called, turns

into a beetle when it grows up. If there are many larvae in a tree, the tree will die."

"I did not know that birds did so much good," remarked Jane.

"Life would be very hard for us, if it were not for the birds," said her uncle. "In some countries almost

all of the birds have been killed. The people that live in them can hardly raise any vegetables or grain. The trees and shrubs die too. This is because the insects



eat them all. If there were more birds, there would not be so many insects."

"There are so many insects in those countries because the people interfere with Nature by killing the birds," observed Fred.

"Yes," agreed his uncle. "There would be just

about enough birds to keep the insects from becoming too numerous if man did not kill them."

"What else do birds do to help us?" asked Jane.

Her uncle answered, "Some birds do good of an entirely different kind. Gulls eat refuse and dead fish. These things would make people sick if it were not for the gulls. Vultures are large birds that do the same thing. Gulls and vultures both help keep the world clean.

"I did not tell you of another thing that the robins and many other birds do. They carry seeds of fruit from one place to another. This is one way by which different kinds of trees and plants are scattered all over the earth.

"There is also a certain humming bird in some parts of the world that carries pollen from plant to plant."

"Why, he does the same kind of work that insects do!" exclaimed Jane.

While Jane was speaking, Fred was lifting the lid of the lunch box. Suddenly he said, "I'm hungry. Let's eat our lunch."

"Good!" his uncle agreed. "I will tell you more about the birds after we have finished."

QUESTIONS

1. Why did the children want their uncle to go tramping?
2. How do the birds help the farmer?
3. What harmful things do insects do?
4. What birds help to keep the world clean?
5. Can you name some other ways in which birds are helpful to man?

MAN'S USE OF BIRDS

After they had finished eating, the three trampers sat down under a shady tree. The children waited patiently for their uncle to begin. After a few minutes he said, "I will tell you first about the feathers that we get from birds.

"The down that makes the finest pillows comes from the eider duck. These ducks pull out the small soft feathers from their breasts, and line their nests with them. Men then take these feathers from the nests. The feathers are used for making pillows and other things. The feathers of the goose are also used for pillows, because they, too, are soft."

"I think it is cruel to take the feathers of the eider duck from their nests," said Jane.

"Men do far worse things to birds," replied her uncle. "In some countries they kill thousands of them just for their feathers. Many feathers are worn on hats, are used in making fans, and other things. Many men make their living by selling the feathers that have come from birds that they have killed. Many kinds of beautiful birds have been nearly all killed for their feathers."

"I will never have a bird's feather on a hat or anything else," said Jane.

"That is right," said her uncle. "There are some feathers, though, that are obtained without killing the birds. Ostrich feathers are of this kind.

"We must not forget the common birds that give us so many things. Much of our food comes from birds. What would we do without the hen, that gives us meat and eggs?"

"And the turkey on Thanksgiving Day," added Fred.

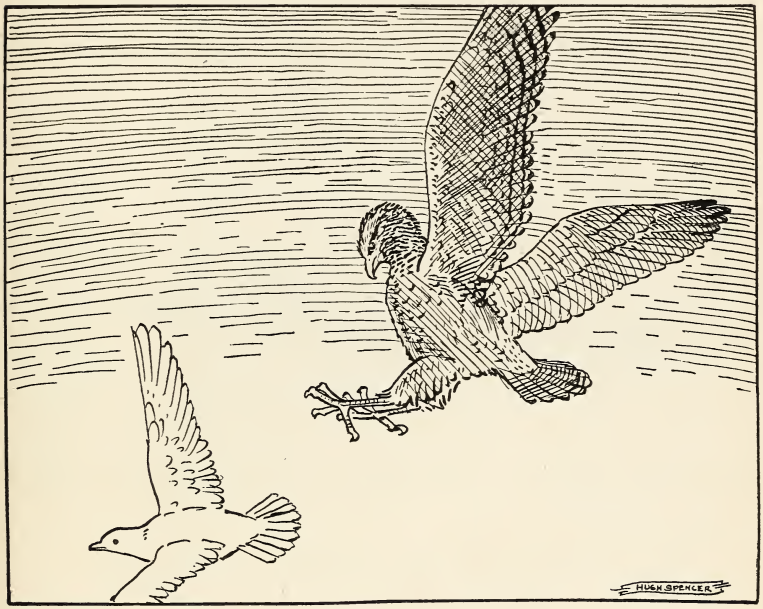
"Also the duck and goose and guinea hen," said his uncle. "There are many other birds from which we get meat and eggs.

"In some places wild birds, like the pheasants and grouses, are kept in large forests. Men are hired to do nothing but watch over them. The owners of these forests hunt these birds at certain times of the year."

"That is cruel," said Jane.

Her uncle agreed with her. Then he continued, "In some countries men train a bird called the falcon to hunt animals and other birds for them. In some places men teach a certain kind of bird to fight for them. This bird is called a game bird.

"The men put steel spurs on the game birds' legs. The birds fly at each other trying to strike one another with these spurs. Usually one of them manages to kill the other."



"I never heard of a bird fight before," said Fred.

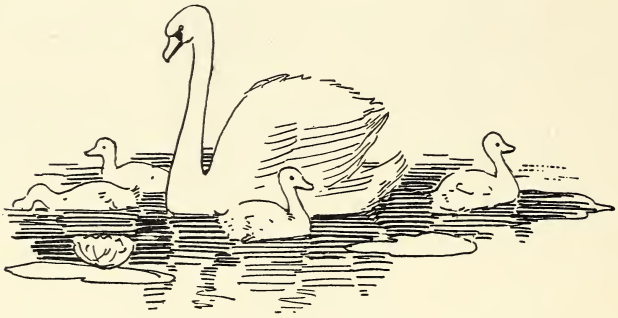
"I am glad to say that people do not have as many of them as they used to," said his uncle. "Nor do they hunt with falcons much nowadays."

"It is a shame to make birds do such things," said

Jane. "It is bad enough for us to have to kill them for food."

"What else do birds do for us?" asked Fred.

"They give us pleasure," was the reply. "You know how sweet are the songs of many birds. The thrush and the nightingale and hundreds of other birds are



wonderful singers. Man has never been able to make sweeter music."

"Some birds are lovely to look at," said Jane.

"That is true," agreed her uncle. "The bright colors of many birds are indeed beautiful. The peacock has wonderful colors. The swan is one of the most graceful creatures that lives."

"The yellow bird is lovely too," added Jane.

"Yes," continued her uncle, "and thousands of other

birds are pleasing to our eyes. There are few birds that do not help make the world more beautiful."

"Why do not people treat them better?" asked Fred.

"They are beginning to," answered his uncle. "In many countries laws have been passed to protect them. Many people are doing all they can to save the birds from their enemies, including man."

Jane and Fred decided to fight for the birds in every possible way, and to keep up the fight after they had grown up.

QUESTIONS

1. Where do some pillow feathers come from?
2. Why are bird feathers useful for pillows?
3. For what other things are bird feathers used?
4. How has the use of feathers harmed bird life?
5. What are some of the birds that give us food?
6. Can you tell of other ways in which birds are useful?

THE WINGS OF BIRDS

"Did you ever notice that all birds do not have the same kind of wings?" asked Nancy's mother one day.

"I never thought anything about it," answered the little girl.

"There are great differences in the wings of birds," said her mother. "Some are very large and powerful, others are small and weak. There are some birds that have such small wings that you would not believe they had any. Birds that spend a great deal of their time flying have long pointed wings."

"The swallow is one, is it not?" asked Nancy. "I've seen them flying back and forth for the longest time."

"Yes, the swallow is one and the gull is another," said her mother. "You have seen gulls flying over the sea. They are as tireless as the swallow."

"What are the swallows and the gulls doing when they suddenly swoop down?" asked Nancy.

"The swallows are catching insects," said her mother, "and the gulls are catching fish.

"The bodies and wings of both swallow and gull are

so shaped that these birds can stay up in the air a long time. They can fly very rapidly too."

"Tell me about some other kinds of birds, please," said the little girl.

"The song sparrow," her mother replied, "stays near the ground most of the time. His wings are smaller and rounder than those of the swallow or gull."

"The song sparrow can fly pretty swiftly," said Nancy.

"Yes," said her mother, "but only for short distances.

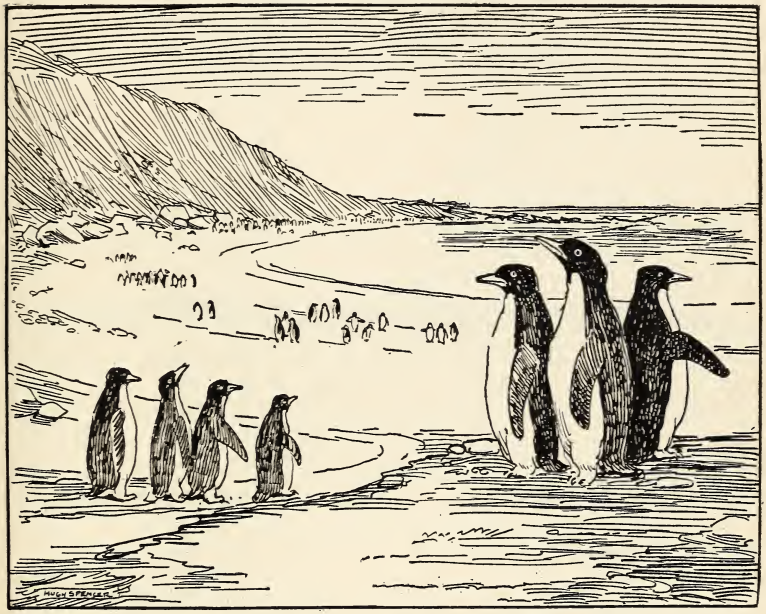
"A bird that is very different from those that you know is the penguin. He has small paddle-like wings that are covered by scaly feathers."

"Why does he not have feathers that are like those of other birds?" asked Nancy.

"Because," replied her mother, "he does not use his wings for flying. He uses them as paddles when he is swimming under water. While swimming he uses these paddles one at a time, just as people sometimes use a double bladed paddle, when canoeing. The penguin uses his legs for steering when he is swimming."

"Please tell me about the birds that we see when we are on the farm," asked Nancy.

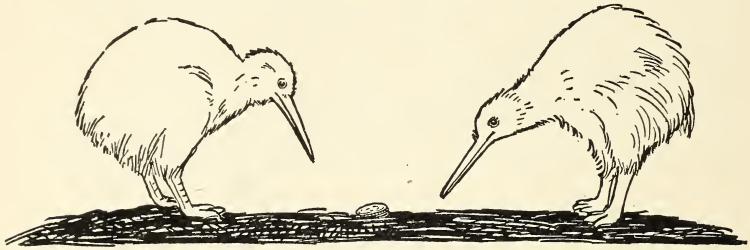
Her mother answered, "The duck and the turkey do not need to do much flying, because most of their



food is provided for them. They can fly only very short distances, because there is little strength in the muscles of their wings. You see, that is what happens when a bird or animal does not use its muscles. The muscles become very weak.

"The wild goose and the wild duck are very powerful fliers. The great-grandfathers of the common goose and duck were once wild, too. They also had strong wing muscles and could fly great distances.

"Some birds have wings but they do not fly at all. The ostrich, which you saw at the zoo, is one of this



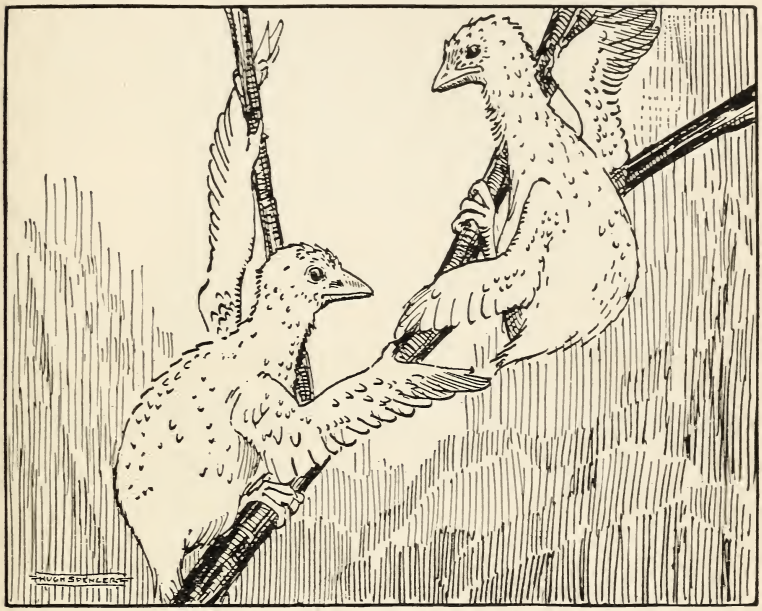
kind. An ostrich has a very heavy body and powerful legs, but his wings are very small. His wings are useless, so he does all of his traveling on foot."

"I once saw a picture of a bird without any wings at all," said Nancy.

"It probably was a kiwi," said her mother. "The kiwi's wings are only stubs. You cannot see them at all. He is a queer-looking bird because he has no tail and a very long bill. He picks his food from the ground with this bill."

"Are there any more funny-looking birds like the kiwi?" asked the little girl.

"One of the strangest birds in the world is one that has claws on the front of its wings when he is young. He is called the hoactzin. This bird is able to use his



claws for climbing trees. He is able to use them before he is able to use his wings for flying."

"We believe that all birds at one time, many thousands of years ago, had legs instead of wings. Men have found, way down in the rocks, traces of a bird that had teeth, and three claws on each wing. We think that all birds came from such creatures as this."

QUESTIONS

1. Why do swallows and gulls have long pointed wings?
2. How do the wings of the song sparrow differ from those of the swallow? Why?
3. Can you describe the wings of the penguin and their use?
4. What happens when animals do not exercise their muscles?
5. What are some of the birds that have strong wing muscles?
6. What birds have wings but do not fly?
7. What other kinds of wings are there?

ANIMALS THAT AID MAN

Daisy and Dolly were trying to decide which one of the animals is the most useful to human beings. Dolly thought that the horse does the most for us. Daisy was sure that the cow is the most useful.

Their mother heard the girls talking. She decided to tell them of some of the things that the horse, cow, and other animals do for man. "Children," she said, "would you like to hear about some of the animals that work for us?"

"Oh, yes," said both girls, "do tell us about them."

"The first men lived in caves," their mother began. "After thousands of years they learned to build homes. After many more years they began to tame some of the wild animals that they hunted for food."

"What kind of animals did they tame?" asked Daisy.

"The horse and the cow were among the first," replied her mother. "But there were many others. The camel, the goat, and the sheep were some that they tamed.

"Some of the animals that they tamed lived in one country, some in another. The men taught the animals

to carry their burdens. Then, after a while, the men began to ride these animals."

"What animals did they ride?" asked Dolly.

"The horse, the camel, and the elephant were the principal ones. They even rode these into battle."

"Do men ride the camel and the elephant now?" asked Daisy.

"Oh, yes," she answered. "They still ride on the backs of elephants. They also have the elephants carry heavy burdens. The elephants do many things like piling logs and moving large stones.

"The camel is still ridden in the desert. It is an animal that can exist for a long time without water. There is no water in a desert except in a few places long distances apart. The camel can also live through sand storms. The sand which is blown by the wind kills almost all other animals."

"What other animals work for man?" inquired Dolly.

"The reindeer is one," was the answer. "This animal lives in Lapland, which is in one of the cold parts of the earth. The reindeer draws sleds and does many other things.

"There is a little animal that lives in South America called the llama. He is a great deal like the camel, and like the camel he can carry heavy loads on his back. He is especially good as a mountain climber."

"Do any other animals carry things for man?" asked Daisy.

"Oh, yes," her mother said. "There are many others. I almost forgot to tell you that in some countries the people hitch dogs and goats to carts. The dogs and goats pull heavy loads, just as horses do in this country."

"What else do animals do for man besides carrying burdens?" asked Dolly.

"The dog guards man's home," answered her mother. "He tends sheep and cattle, and he is man's friend and companion. The cat catches mice and rats, and is often a pet in man's home.

"Many other animals, like the monkey, are companions too. They do a great deal of good because they make man happy.

"Besides all these animals, there are others of different kinds that help make the earth a better place to live in. The toad and the frog catch insects. The

snake eats mice and rats. The hyena and the jackal carry away things that might cause sickness."

"Some of the worst animals seem to do good," commented Dolly.

"I have not mentioned some of the most important things that animals do for man," said her mother.

"They furnish much of man's food and clothing and many other things that he uses. I will tell you about them some other day."

QUESTIONS

1. Name some of the animals useful to man in our country.
2. Who were the cave men and how did they live?
3. Can you name some of the first animals to be tamed?
4. Why is the camel a good animal for the desert?
5. What animals work for man in far-away lands?
6. Can you tell a story about animals that are companions?
7. How do the frog and the toad help man?

THE HOMES OF ANIMALS

"Dolly and I have been wondering what kinds of homes the animals live in," said Daisy to her mother one afternoon.

"If you and Dolly will come into the library, I will tell you about some of them," was the reply.

In a few minutes the girls entered the library, and their mother began, "The homes of some animals are better than the homes that certain wild people live in today."

"Are there wild people living now?" asked Dolly.

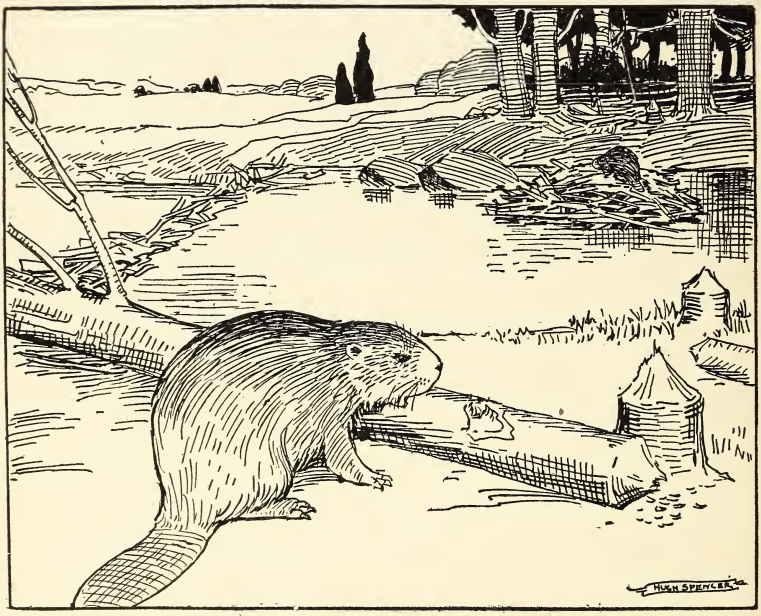
"There are wild people on some of the islands of the Pacific Ocean. They can also be found in other parts of the world."

"Please tell us about them," said Daisy.

"Not now," answered her mother. "I will tell you about the homes of some of the animals first. I wonder if either of you knows what a beaver is?" Without pausing she continued, "A beaver is an animal that is very similar to a big fat rat. He has a great tail that is flat at the end."

"What does he do with a tail like that?" asked Dolly.

"He steers himself with it while swimming. He also uses it to brace himself with when he is sitting on his hind legs. But the most interesting thing about the beaver is the way in which he builds his home."



"I want very much to hear about his home," interrupted Daisy.

Her mother continued, "The father and mother beavers decide upon a stream on which they wish to live. They first choose several trees near the water's

edge. Then they gnaw the bark off a little way from the ground."

"Why do they gnaw the bark off?" asked Dolly.

Without noticing the interruption, her mother continued, "They next gnaw the woody part until the tree is almost cut through."

"They must have awfully sharp teeth to be able to do that," said Daisy.

"The beavers' teeth are almost like knives," said her mother. "The little animals know that the tree is going to fall, so they are ready for it. When it does fall, the beavers scamper out of the way. After several trees have been cut down, the beavers cut them up into logs."

"They are going to build a bridge," said Daisy.

"You are wrong," said their mother. "The little animals then lay the logs across the stream. Next they pile up sticks and weeds and stones against them."

"What are the beavers doing?" asked Dolly.

"They are building a dam across the stream. This dam will hold the water back. There will soon be a pond above the dam."

"I don't see what the beavers want to make a pond for," interrupted Daisy.

"The beavers are getting ready to build their home," continued her mother. "A beaver's home is at the edge of a pond, because the water of a pond is always on the same level."

"What is their home like?" asked Dolly.

"The beaver builds a house of sticks, stones, and dirt," was the reply. "It is six or seven feet across inside, and several feet high. This gives him a nice big room to live in. The beavers then dig two tunnels down into the pond. One opens just under the surface of the water. The other opens much further down."

"What are the tunnels for?" asked Daisy.

Her mother answered, "The beavers use the tunnels whenever they enter or leave their home. There are no other entrances. Many land animals are always trying to kill beavers. These animals cannot get into the beaver's home, because the entrances are under water."

"Why," asked Dolly, "do they have two tunnels?"

"In winter, when the pond freezes, the upper tunnel becomes closed," her mother said. "They then use the lower tunnel."

"My, but the beavers are smart little fellows!" exclaimed Daisy. "Are any other animals as smart?"

"Yes," was the reply, "but I will tell you about them some other time."

QUESTIONS

1. What does a beaver look like?
2. How do beavers cut trees?
3. Why does the beaver build dams across streams?
4. Can you tell how the beaver builds his home?
5. Do you know why the entrance to the beaver's house is under water?
6. Why does the beaver's house have two tunnels?
7. When is the upper tunnel used? When the lower?

HOW ANIMALS TREAT THEIR BABIES

"Mother, won't you tell me how the animals treat their babies?" asked Mary one evening.

"I cannot tell you about all of them, because there are so many different kinds of animals," was her reply. "But I will tell you about some of the common ones.

"The babies of almost all four-footed animals are as helpless at first as the babies of human beings. The mothers of these four-footed babies treat them almost as well as human mothers treat their babies."

"Yes," said Mary, "Kitty takes good care of her kittens."

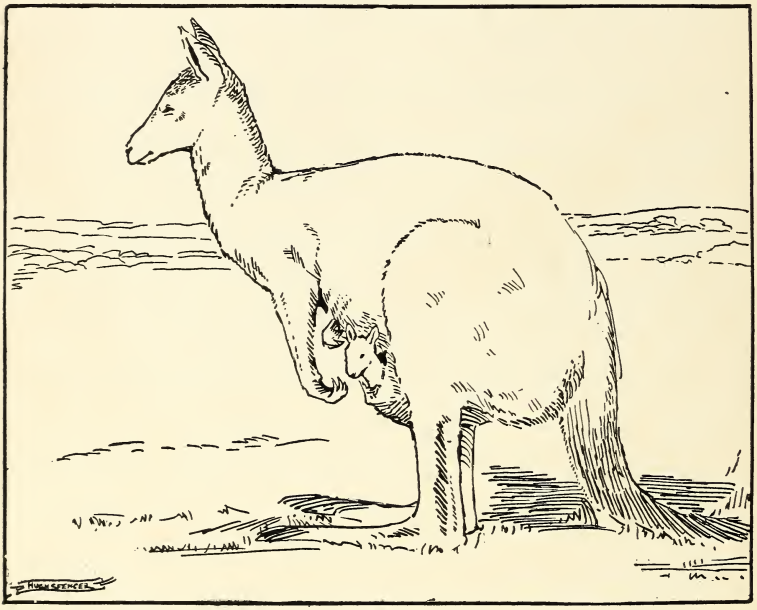
"Even the great wild kittens, the lions, love their little lions," said her mother.

"Is a lion a kitty?" asked Mary.

"The lion is a cousin to the kitty," answered her mother. "So is the leopard. The tiger is too. All of the members of this great big family teach their little ones many things. The most important thing that the mother lion teaches her children is how to catch other animals for food."

"What do the monkeys do for their baby monkeys?" asked Mary.

"They nurse their babies in almost the same way that human mothers nurse theirs. Sometimes the mon-

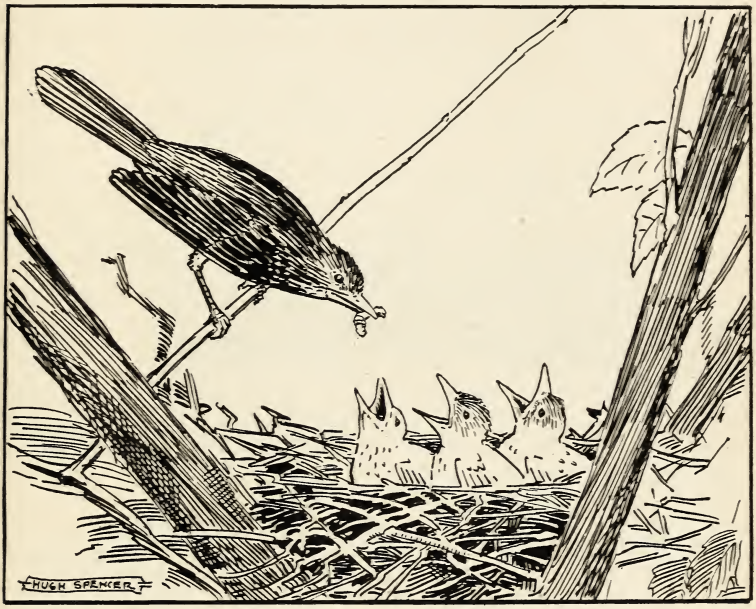


keys carry their babies on their backs. The little monkey clings tightly to its mother, with his tiny arms around her neck. Sometimes the mother monkey holds her baby exactly as a human mother holds her child.

"Some other animals carry their young in a different way. The kangaroo mother has a pocket made of a

fold of her skin. The little kangaroos jump into this pouch, and the mother carries them wherever she goes."

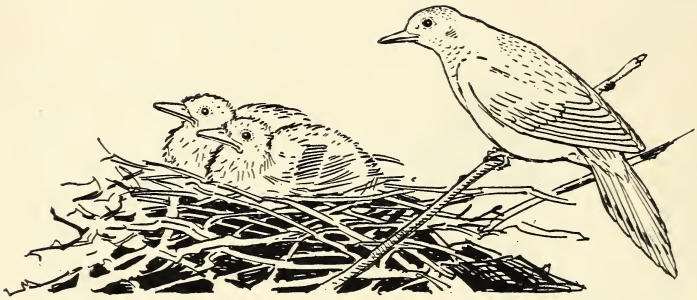
"How do birds take care of their babies?" asked Mary.



"Bird mothers take care of their little ones for a while," was the reply. "About all the parents do is to feed their young. When the young birds become large enough and their feathers grow out, some mothers push their little ones out of their nests."

"Can the little birds fly at first?" asked Mary.

"Yes, they know how to fly without being taught," her mother said "But they are very weak at first. They can then fly for short distances only. They soon get strong though. The bird mother usually watches over the little ones until they can fly to safety."



"Are all animals good to their children?" asked the little girl.

"Oh, no," answered her mother. "There are some kinds of animals that pay no attention to their babies. The turtle is one of this kind. The turtle mother lays many eggs and buries them in the ground. Then she goes away and leaves them."

"What becomes of the little turtles?" asked Mary.

"They break out of their shells," said her mother, "and immediately hunt around for something to eat."

"How can they do that, since all animals are so helpless when they are small?" asked the little girl.

"They are not all helpless," was the reply. "Many animals that come from eggs are able to take care of themselves from the very first."

"They are just like orphans," said Mary, "since their mother leaves them. They might just as well have no mother at all. What other animals treat their babies that way?" she asked.

"The alligators, and the lizards," replied her mother. "They, too, lay eggs and do not bother to look after their children. The alligator, though, does guard her nest until the eggs are hatched."

"What does the frog do?" asked Mary of her mother.

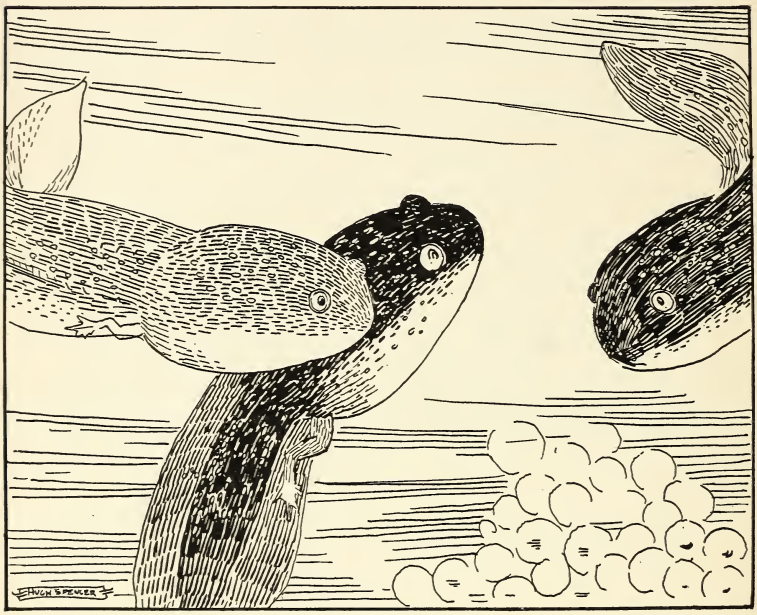
"The frog mother lays many eggs in the water and then leaves them," said her mother. "She would not know her babies even if she were to see them."

"Why not?" asked Mary.

"Because when the baby frogs hatch from the eggs they are like little fishes. They swim in the water. They are called tadpoles. After a time they change into frogs and can live on land.

"The animals that know the most take care of their

babies the longest. The wise mother does not neglect her baby as the stupid mother turtle does. The wisest



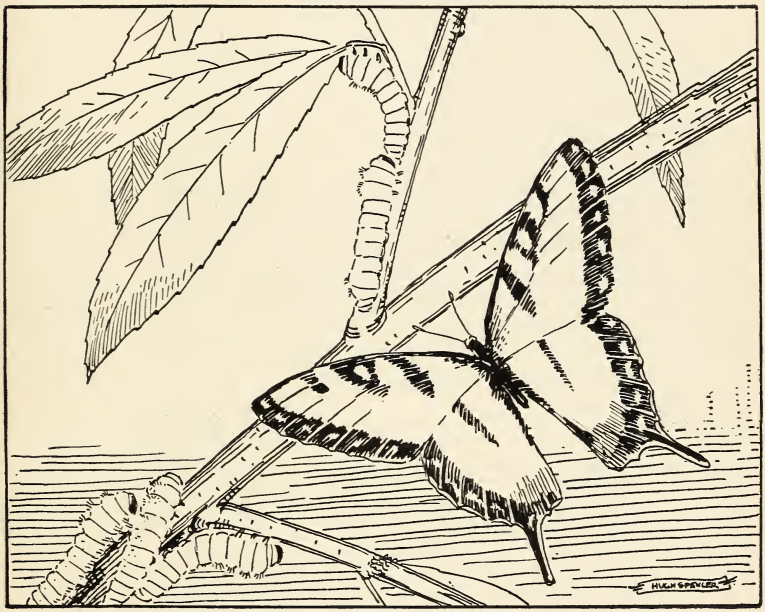
animals want their children to become wise too. That is why they spend a long time teaching their children."

QUESTIONS

1. Do most animals treat their young well?
2. What are some of the things parents teach baby animals?
3. How do the monkey and the kangaroo carry their young?
4. Tell how birds help their little ones.
5. Name some animals that pay no attention to their young.
6. Do you think these animals are as wise as those that help their babies?
7. Why would not the mother frog know her babies?

THE GROWTH OF ANIMALS

"You told me the other evening that the young frog is much like a fish," said Mary to her mother. "Are there any other animals that are as different from their parents as the little frogs are from theirs?"



"Yes, there are many others," said her mother. "Nearly all the insects are unlike the grown-ups. The butterfly's egg hatches into a caterpillar which looks like a worm.

"Later the caterpillar forms a hard case around himself. It is now called a chrysalis. While it is a chrysalis it turns into a butterfly."

"Oh, yes, we learned about the butterfly in school," said Mary, "and about the grasshopper too."

"What did you learn about the grasshopper?" asked her mother.

"The little grasshopper is not a caterpillar when he hatches from the egg," said Mary. "He has no wings, and he is a clumsy little fellow with a big head. He grows gradually into a real grasshopper with wings."

"That is right," said her mother. "Did you learn about clams in school?"

"No, Mother," was the reply.

"Then I will tell you about them," she said. "When a clam is a baby it has nothing but two little shells and hardly anything inside of them. The shells have hooks."

"What are the hooks for?" asked the little girl.

"The baby clam fastens itself to a fish by means of the hooks," explained her mother. "Then the fish carries the baby clam far away."

"Why does it go far away?" asked Mary.

Her mother continued, "If all the baby clams stayed with their parents, there would be many clams in one place. Then none of them would get enough to eat."

"Are all birds like their mothers?" asked Mary. "The chicken is, I know."

"Young birds do not change from one form of animal to another as the frog and the clam do," she said. "But a baby bird does not look much like its mother at first.

"There are many differences between them. A little chicken has downy feathers, while his mother has not. His body is much rounder than hers."

"Tell me, please, about some other birds," asked Mary.

"The young dove is even less like his mother than the chick is like the hen," her mother continued. "The young dove has hardly any feathers at first. He has a big round stomach, and a great big head."

"Doesn't he look at all like a dove?" asked the little girl.

"You would never dream that he was a dove," her mother answered. "A full-grown dove is graceful and beautiful. A young dove is ugly and clumsy."

"Are the babies of four-footed animals like the grown-ups?" asked Mary.

"All except such animals as the frog," she said. "But most babies of four-footed animals have to do a lot of growing before their bodies are the same shape and color as their parents. But they don't have to change into different kinds of animals."

"Yes," said Mary. "Our little puppies did not look very much like their mother at first. They were awkward and their bodies were different."

Her mother said, "The baby lizards, alligators, and turtles look like the grown-ups. One can easily tell what kind of animal each one of these babies is."

"What are the baby fishes like?" inquired Mary.

"They resemble their mother," was the reply. "They hatch from eggs that their mother lays in the water. Some sharks though do not lay eggs. Their babies are born without hatching from eggs.

"The shrimp that we sometimes have for dinner has queer babies. These babies change four times into different-looking animals. Each time they change they have more legs than they had before. When they are

born, each baby has only one eye. When they grow up each one has two eyes."

"Why are the babies of some of these animals so different from their mothers?" asked Mary.

"Because different kinds of animals lead different kinds of lives," was the reply. "Nobody knows why one animal leads one kind of life and another animal a different kind."

QUESTIONS

1. What is a chrysalis?
2. Can you tell how the baby grasshopper looks and grows?
3. How does the baby clam travel?
4. Why does the baby clam want to go away?
5. How do baby birds differ from their parents?
6. Name some baby animals that look like their parents.
7. Why do different animals grow differently?

ANIMALS THAT GIVE US FOOD

"Did you ever stop to think of all the things that animals give us?" asked Tommy's father one evening.

"Meat is one of them," answered Tommy.

"Yes," said his father, "meat is the most important."

"Do all animals give us meat?" asked Tommy.

"No," was the answer. "Only those that do not live on other animals. The cow, the pig, and the sheep are some of them that do. We do not use the meat of the dog, the cat, and the wolf."

"Why not?" asked the little boy.

"Because the meat of animals that eat other animals tastes bad," said his father. "Men do eat it though, when they are starving and have nothing else."

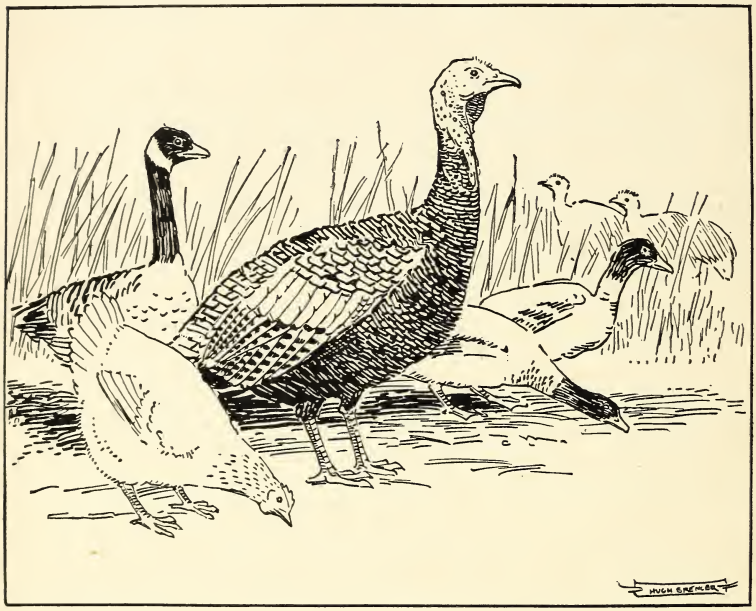
"Can people live without meat?" asked Tommy.

"Yes," he replied. "Some of the Chinese people live entirely on rice and similar things.

"Other races have nothing but animals to eat. They are the people who live in the cold parts of the earth. If it were not for the animals they would starve to death."

"Cows give us milk and hens give us eggs," said the little boy.

"Men drink the milk of many different kinds of animals besides the cow," said his father. "The camel,



the goat, and the reindeer are a few that give us milk. The eggs of other birds besides the hen are eaten. The eggs of most of the birds that one sees on a farm are good. In many places people use the eggs of wild birds."

"Another thing that animals give us is honey," said Tommy.

"Of course," said his father. "And man has made it easy for the bees. He builds a home called a hive for the bees. Sometimes he makes honeycomb and puts it in the hives."

"What is honeycomb?" asked the little boy.

"It consists of tiny boxes made of wax. The bees put the honey in them," replied his father.

"I see," said Tommy. "The men make the honeycomb so that the bees won't have to. That gives the bees more time in which to make honey."

"You are right," said his father.

"What other animals give us meat besides those like the cow, the pig, and the sheep?" asked Tommy.

"The deer and rabbit and many more wild animals. Different kinds of turtles are used as food. Some of them weigh hundreds of pounds. In this country we do not eat turtle meat often, but in some countries much of it is used. Even snakes are eaten in some countries."

"I would not want to eat a snake," said Tommy.

"You would be surprised to find how good a snake's meat is," replied his father.

"Of course, you know that we have clams and oysters often for dinner," he continued.

"Oh yes, and lobsters and crabs," said Tommy.

"It is really too bad to kill lobsters and crabs, because there is so little meat on them. The same thing is true of the frog. We kill them and then eat only their hind legs."

"I can think of some other animals that you have not mentioned," said Tommy.

"What are they?" asked his father.

"The fishes," was the reply.

"Fish meat is eaten in all parts of the world," said his father. "It is the principal food of many people. I have not mentioned the birds. Birds are eaten in every land. Some of them are raised by the farmer, like the chicken and turkey, while others are wild.

"There are still other animals that are used as food, like some of the insects. But I have told you about enough of them tonight."

QUESTIONS

1. From what animals do we get meat?
2. Why do we not eat the meat of the dog or wolf?
3. What people eat mostly plants?
4. Name other animals that supply us with food.
5. What is a honeycomb and what is it for?
6. What is the principal food taken from the water by man?

THE CAVE MAN

Little Tommy lived with his father, mother, and little sister in the big city. One day he had been to the museum and had seen a picture there of wild people that lived in caves. He was very much interested in these people. So he asked his father to tell him about them.

His father seated himself comfortably and began by asking him a question. "Do you remember the holes we saw in the bank when we were fishing last summer?" he said.

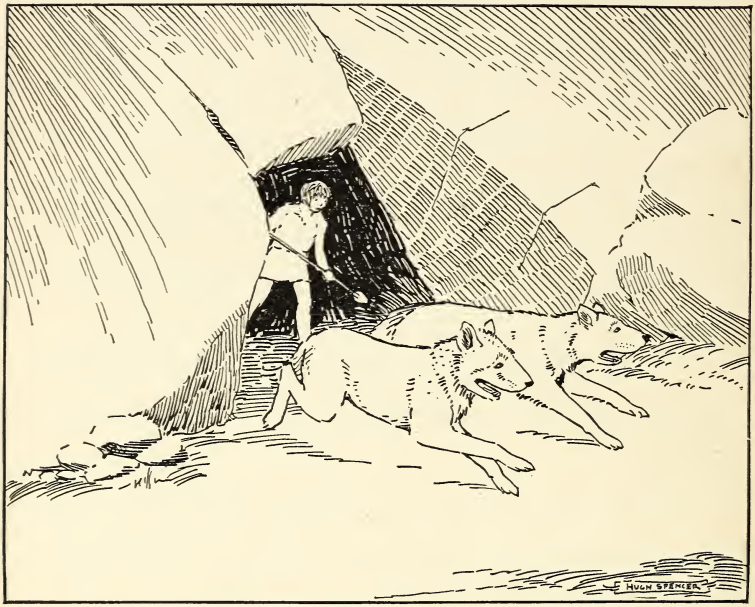
Tommy remembered them well, because his father had told him that they had once been the homes of wild animals.

"There was a time," continued his father, "when human beings lived in just such caves. They were almost as wild as the animals. They did not even know how to build homes."

"Why did not someone tell them?" questioned Tommy.

"Because there was no one that knew how to build anything," was the reply. "The best that a man could do was to hunt around until he found a cave that was big

enough to hold his family. If the caves were inhabited by animals, the man chased them out. The man then moved in with his family."



"Did they live in caves during the winter?" the little boy asked.

"Yes," his father answered, "caves were the only homes they had. They must have suffered terribly during the winter. Their caves were cold and they did not have enough clothing to keep them warm. The best they could do was to sleep huddled together.

"The cave men must have been pretty strong and healthy. You see, they had very little protection. For a long time they did not even have fire, although the winters were just as cold as they are now."

"What kind of food did they eat?" asked Tommy.

"Their food was very tough and coarse," replied his father. "It was the raw meat of wild animals, wild vegetables, and wild fruit. There is one good thing about eating tough food: it has to be well chewed."

"Did they have any trouble getting food?" inquired the little boy.

"Often," said his father. "Sometimes food was so scarce that the cave people had to eat the bark of trees. If they had not eaten the bark, they would have starved to death.

"There was a reason why they could stand such hardships. They lived out of doors. They were always in the fresh air and the sunshine. That is one way to keep well.

"The cave men spent most of their time hunting animals for meat. It was hard to kill the animals, because they had such poor weapons. These were mostly wooden arrows with stone heads. Sometimes they used

spears. Spears are like arrows, only they are several feet long."

"What else did they do?" asked Tommy.

"Hunting was about the only thing that the cave men did. Even the women and children went along with them. They helped bring back the meat. They also gathered fruit and vegetables on the way. You see, the whole family had lots of exercise. It was good for them all, and it made them strong.

"If we had to do some of the things that kept the cave men busy, we would be in much better health. If we chewed our food as the cave children did, we would not need the doctor so often."

Tommy thanked his father for telling him about these people who lived so long ago. He told his father that he would try to remember to do some of the things that kept the cave men well and strong.

QUESTIONS

1. What do we mean by cave men?
2. Can you tell a story about how they lived?
3. What did they eat and how did they get it?
4. Do you know why the cave men were so strong?

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