

**FIRST LESSONS
IN NATURE STUDY**

***Books by
Edith M. Patch***

NATURE STUDY

Dame Bug and Her Babies

Hexapod Stories

Bird Stories

First Lessons in Nature Study

Holiday Pond

Holiday Meadow

Holiday Hill

Holiday Shore

Mountain Neighbors

Desert Neighbors

Forest Neighbors

Prairie Neighbors

NATURE AND SCIENCE READERS

Hunting

Outdoor Visits

Surprises

Through Four Seasons

Science at Home

The Work of Scientists

FIRST LESSONS
IN NATURE STUDY

by

Edith M. Patch

illustrated by

Robert J. Sim

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TO
ANNA BOTSFORD COMSTOCK

A WORD TO THE READER OF THIS BOOK

THIS is a book about plants and animals. Some of these plants and animals live in the city, some in the country, and some live in both places. Some of them live in the north, some in the south, some in the east, some in the west, and some in all four parts of North America.

So you see that, wherever your own home is, you are likely to meet some of the very same plants and animals that are mentioned in this book. It will not matter, however, if you meet different ones instead of the same, since different ones are just as interesting.

If you watch them when you meet them, you will see much besides what this book tells you. Perhaps, then, you will know the use of this book. It is partly to tell you interesting facts about plants and animals of different kinds, and it is even more to ask you to look and find out all you can for yourself.

EDITH M. PATCH

ORONO, MAINE

April, 1926.

CONTENTS

I. SUGAR	1
II. MILK AND ANIMALS THAT FEED IT TO THEIR YOUNG	17
III. SEEDS.....	42
IV. MEAT AND HUNTERS.....	63
V. HUNTERS THAT HAVE BACKBONES..	83
VI. THE COTTON PLANT AND SOME OF ITS RELATIVES	102
VII. FLAX AND SOME OTHER FIBER PLANTS	114
VIII. SPINNERS OF SILK	124
IX. FUR COATS AND ANIMALS THAT WEAR THEM.....	140
X. FEATHERS AND ANIMALS THAT WEAR THEM.....	155
XI. CAVES AND DUG-OUTS.....	168
XII. BUILDINGS OF STONE AND OTHER EARTHY STUFFS	187
XIII. TRAVELING HOMES	198
XIV. HOUSES OF WOOD	209
XV. QUESTIONS AND EXERCISES.....	234

CHAPTER I

SUGAR

As you nibble candy and feel pleased with the taste of it, do you sometimes wonder where all the sugar in the world comes from?

BET SUGAR

Some of it comes from beet plants. The pretty, red, tender beets we eat at the table have sugar in them, as we can tell by the sweet taste. But these red beets are not the kind that people grow for sugar. *Sugar beets* are larger and they have pale roots.

Once upon a time, about one hundred years ago, there were no fields of sugar beets growing in the United States. There were not even any seeds of sugar beets here. Then people began to bring the seeds across the ocean from France and other places where these plants grew.

At one time or another during the hundred years since the seeds were brought here for the first time, people have tried growing sugar beets in Michigan and in California and in many states between. In some of

FIRST LESSONS IN NATURE STUDY

these places there are now great fields of sugar beets every year, but in some places the people would rather grow other crops. Perhaps you know whether you live in a sugar-beet state.

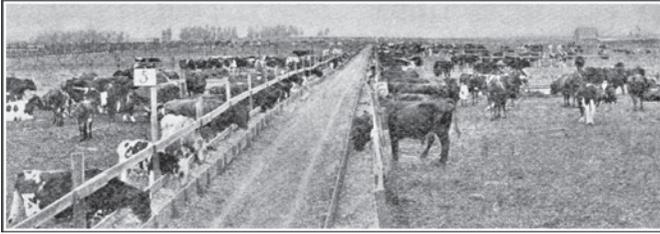


A field of sugar beets. The man has pulled up one of the beets and is holding it to show its thick root. The roots are sent to the sugar factory. The leaves are fed to sheep or cattle.

A beet plant puts most of its sugar into its root; so the root is the part that is sent to the factory. Sheep and cattle like to eat beet leaves, and the men who have beet fields often keep these animals so that the leaves will not be wasted. Sheep and cattle also like to eat the pulp that is left from the root after the sugar is taken out. Sometimes this pulp is given to cattle wet, just as it comes from the factory. Sometimes it is dried into a

SUGAR

kind of beet hay. Sometimes it is kept in a silo and not used until winter.



Cattle are often kept near beet-sugar factories and are fed what is left of the roots after the sugar has been taken out.

There are many sugar-beet factories in the United States now, but there was a time when there was not one in this country or in any other country either. The French people were the first who made much sugar from beets. That was in the days when a man named Napoleon was living in France. Napoleon started some schools where people learned about sugar beets; and he told the French farmers to plant beets so that they could have that kind of sugar at home instead of needing to buy *cane sugar* from other countries.

CANE SUGAR AND SORGO

Cane sugar is the kind that people in the United States used before beet sugar could be had here. Now we use both kinds.

The *sugar cane* is a plant that grows tall and straight, something like a giant corn stalk. (*Cane is a word that is sometimes used instead of stalk.*) There is sugar in a

FIRST LESSONS IN NATURE STUDY



Children who live where sugar cane grows like to bite a stalk and suck the juice.

corn plant, too, as you can tell by cutting the stalk and sucking it. And there is so much sugar in some corn seeds that we call them “sweet corn” and like to nibble them from the cob when they are cooked. But there is a great deal more sugar in the sugar cane. This plant will not grow so far north as the sugar beet will, but in the south there are cane fields so big that men have built railroads through them. When the cane is cut, it is put into the cars that are waiting on the tracks and taken at once to the mills where the juice is pressed out. There are such fields in Louisiana, where more sugar cane is grown than in any other state.

When men plant sugar cane, they do not use seeds as they do when they plant beets. They cut the stalks

SUGAR

into pieces and put these pieces into the ground. There are buds at the places in the stalks near where the leaves drop off, and after the pieces of stalk have been in the ground for a while these buds sprout and grow up into new sugar-cane plants.

Perhaps some day you will ask your teacher to tell you about the hard times the people in Louisiana had trying to grow other crops before they began to grow sugar cane. For though sugar cane has been grown in this country a great many years longer than sugar beets, there was a time when not even sugar cane grew here.



Sorgho plants have sweet juice which people make into syrup. This picture shows how much higher than a man sorgho grows.

If you never saw a field of sugar cane, perhaps you have seen a field of *sorgho*. (This word is also written

FIRST LESSONS IN NATURE STUDY

sorghum.) Sorgo is grown in forty-eight states, so you would not need to travel many miles to see how it looks. It belongs in the same family of plants as sugar cane and corn. The juice is pressed out as the juice of sugar cane is. This juice is not made into sugar, but is sold as syrup.

Once there was no sorgo in this country either. No sugar beet! No sugar cane! No sorgo! What did the people do then, when they wanted something sweet to eat?

MAPLE SUGAR

In those days they used *maple sugar*. When the white men first came to America, the Indians sold them sugar made from maple trees. Then the white men learned how to make it for themselves, and they have been making it every year since. Holes are cut through the bark of the trees in the spring before the leaves grow, when the sap runs fast. Some of the sap runs out of these holes and is caught in pails. It is then poured into big kettles and boiled, getting thicker and thicker all the time until first it is syrup and then, if it is boiled a much longer time, it is sugar.

Boys and girls who visit sugar camps in Vermont or other places like to see the sugar maples because they are large and handsome trees. There is something else they like to see and like to smell and like to taste. They like to see the sap running through the holes in the bark into the pails, and they are surprised to find how much comes out through one hole. They like to drink some

SUGAR

of the sap just as it comes from the tree to see how sweet it is before it has been boiled at all. Some of them think that the very best candy in the world is the kind that can be made by pouring thick, hot maple syrup into some snow that is packed hard in a pan. This candy is called *maple wax*. Of course you do not have to visit a sugar camp to eat maple wax. Anybody who lives where there is clean snow can make this kind of candy, if he can get a little maple syrup to boil.



When a hole is cut through the bark of a maple tree, the sap runs out. A pail is placed to catch the sap.

Maple sugar used to be the only kind of sugar that was sold in stores in America. But now the kinds made from cane and beet plants are what we commonly buy, and some people have never tasted maple sugar.

BEES AND HONEY

The beet plant stores its sugar in its root, the sugar cane and sorgo keep their syrup in their stalks, and the maple tree has sweet sap under its bark; but many plants put their very sweetest juices into their flowers. This sweet liquid is called *nectar*.

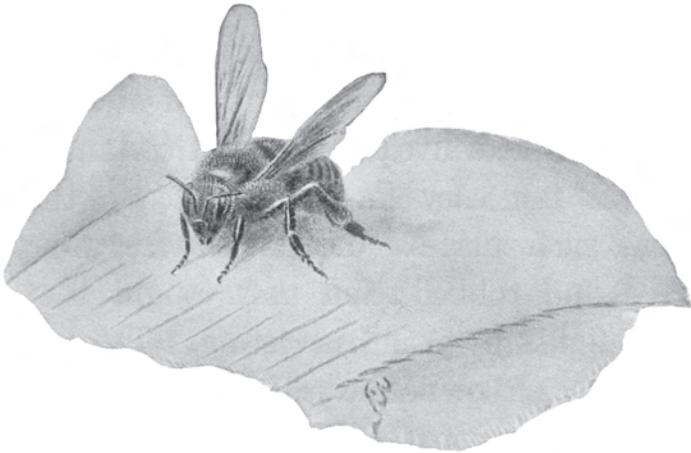
It is from flower-cups with nectar in them that the *honeybees* sip. Honeybees made honey for themselves long before men learned how to get sugar or syrup from plants. When men found how good honey is to eat, they began to take it away from the bees. At first bees lived in hollow trees and in caves, and it was not easy for men to scoop the honey out from such places. The bees were angry when disturbed and robbed, and they fought the men.

A bee fights by using her sting. The bee's sting is like a fine, sharp needle. If she is not touched or frightened, she keeps it hidden at the tip of her body; but she can push it out very quickly when she needs to protect herself or her home.

After a while men thought of a way to get honey without frightening the bees. They made boxes which the bees could use, instead of caves or hollows in trees, for homes. Such boxes are called *beehives*. Nowadays men make hives in such a way that they can open them at the top and take out honey without being stung. Of course they must not take out all the honey, because the bees need some for themselves.

SUGAR

Indeed so many hundreds of bees live together in one hive that they need a great deal of honey to use for food. That is why they are so very busy all summer taking nectar from flowers and making it into honey. The bees that do this and the other work about the hives are called *workers*.



A honeybee which gathers sweet juice from flowers and makes honey of it.

A bee has a long tongue and she can poke the tip of it into a flower-cup far enough to reach the nectar at the bottom. She draws up the sweet liquid into her mouth, and from there it passes into a place inside her body that is sometimes called a *honey sac*, where it is changed into thin honey. After a worker has come home to her hive, she puts the thin honey from her honey sac into a waxen *cell* in the *honeycomb*, where it stays open to the air until it “ripens.” When honey is ripe, it is thicker than when it is first put into the cell.

FIRST LESSONS IN NATURE STUDY

There are, as I have said, many hundreds of bees living together in one hive and most of them are workers. When wax is needed for the cells of the honeycomb, some of the workers make it. First they eat as much honey as they can swallow and then they hang themselves up in the hive in a sort of bee curtain. To do this each bee reaches up with her front feet and catches hold of the hind feet of the bee above her. After a while the wax forms in little flakes in some *wax pockets* which are on the under side of the bees' bodies. The workers chew this wax until it is soft and then make cells of the honeycombs with it. They use their jaws as tools when they are building the cells. The cells have six sides like little six-sided boxes, and, when the honey in them has ripened, the bees close the ends by covering them over with waxen caps.

You must not think that all the cells in a beehive are filled with honey. Many of them have baby bees in them. Such cells are called *brood cells*. Baby bees do not look like grown bees. They are fat, white, wingless, footless little things; and each one stays in its own cell. These baby bees are tended by some of the workers, which draw up partly digested food from their own stomachs and give it to the young ones.

Bees do not eat honey alone. They need *pollen*, too. Pollen is the yellow or brown "dust" that is in flowers. Worker bees gather pollen by poking it into the little hollow *pollen baskets* on their hind legs. Each worker has two of them, one on each hind leg. After the bees have brought the pollen to the hive they take it out of their baskets and pack it into cells. It is then called

SUGAR

beebread. The workers eat honey and beebread for their own food and share what they eat with the baby bees.

When a baby bee is large enough to fill a cell, it is time for it to change into a grown-up brown bee with wings and legs. Such a change as this cannot be made suddenly. So the cell with the baby in it is closed over; and the young one takes a sort of nap, during which something wonderful happens in its body. When it awakens, it is a grown bee like the others in the hive; so it comes out of its cell and lives the same sort of life the other grown bees do.

There is room in this chapter to tell only a few of the things that are done by honeybees. Because so many things happen in a hive, honey is, perhaps, the most interesting sweet food we have.

APHIDS AND HONEYDEW

The tongues of honeybees are shaped for licking and sipping, and no harm comes to plants from the visits of these insects. There are some much smaller insects, however, called *aphids*, that punch holes in plants with their beaks. Through these holes they stick their long, slender mouthparts and drink as much plant juice as they need. You may not have heard as much about aphids as you have about honeybees; but there are a great many more of them in the world. There are so many kinds of aphids, indeed, that I think you cannot be among plants very much without seeing some of them.

The smallest kinds of aphids are so little that it

FIRST LESSONS IN NATURE STUDY

would take more than twenty of them going single file to make a procession an inch long. Twenty aphids of the largest kinds would make a procession about four inches long. You can take a ruler and make marks on a paper to show how long a small kind of aphid is and how long a large kind is.

You will probably be able to find some of these insects if you watch. It does not matter very much where you are when you look, for there may be aphids on the trees and bushes and other plants in a city park as well as in country places. Nearly every kind of plant that you can think of, beets and sugar cane and maple trees and roses and lilies and ferns and evergreen trees and all the rest, sometimes have aphids on them.

Many kinds of aphids are green. Some other kinds are brown or gray or pink or black or white. Whatever color they are, they are thirsty from the very first day of their lives. They can feed themselves even when they are very young. They do not need to have the older aphids feed them. Some kinds feed on the underground parts of plants. More kinds, however, spend their time on the stems or leaves or on the blossom clusters. Wherever they stay, they stick in their sharp little beaks and drink plant juice even more steadily than bees sip nectar.

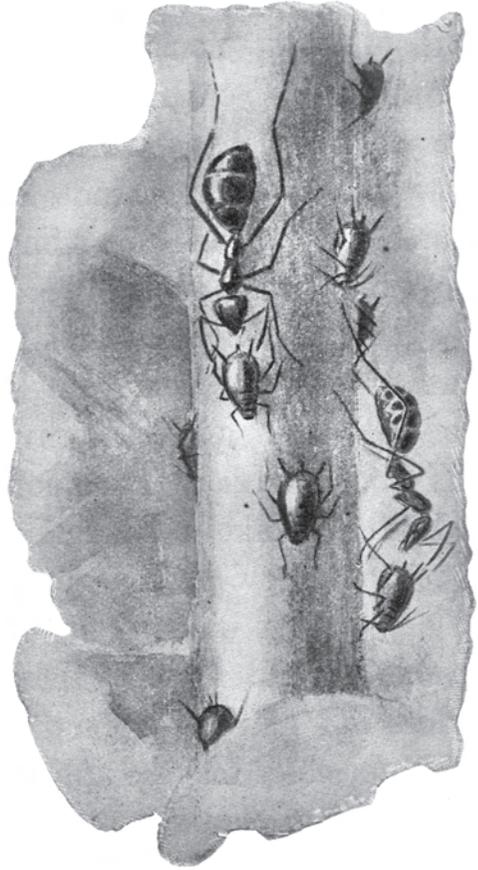
Aphids suck up a great deal of juice. Some of it is used by these insects to make them grow; and some of it is passed through their bodies in clear, colorless, sweet drops. These sweet drops fall on the leaves and on the ground, and people call them *honeydew*.

Just as honey is sweeter after it has been in the

SUGAR

honey sac of the bee than it was when it was gathered from the flower as nectar, so honeydew is sweeter than the plant juice the aphids sip. It is a favorite drink with sweet-loving insects. Wasps come and lap it up from the leaves. Honeybees sometimes take it and mix it with their honey. And ants like it best of all.

Indeed, ants are so very fond of honeydew that they do not wait for it to be spattered around on the leaves. They creep up among the aphids and drink from the aphids' bodies. Aphids are used to this and when an ant comes up behind an aphid and touches it with its feelers, the aphid lets out a drop gently from the tip of its body. The ant laps it up before it falls. Many people have watched ants feeding among a flock of aphids; and they think it is so funny that they laugh and call the aphids the



The ants taking honeydew from aphids.

FIRST LESSONS IN NATURE STUDY

“ants’ cows” and say that the ants are milking their herd. Sometimes ants build a little shed over a colony of aphids on the stem of a plant. For this they use something that looks like sawdust stuck together. Sometimes ants carry their little “cows” in their mouths to fresh plants where there is a better chance to feed.

Just as maple sap changes to sugar when most of the water is boiled off in steam, and just as honey turns sugary when it is left where it dries in the sun and air, so the honeydew syrup becomes sugar when it dries.

Once I saw a whole hillside crusted over with honeydew sugar like a giant cake with sugar frosting. The sugar made a crunching sound under my shoes as I walked up the hill. There were very many evergreen trees on the hill and almost every twig was covered with aphids. The honeydew had been falling like raindrops for days, and it had dried into sugar in the sun. Indians used to gather honeydew sugar when they found a lot of it, and they ate it with their food. It has a pleasant taste.

SUGAR IN ALL GREEN PLANTS

The fact that aphids can make honeydew from so many plants shows that there is sugar in a great many more plants than beets and cane and sorgo and maple trees. Indeed, there is sugar in every growing plant that has green leaves. You do not need to visit Colorado or Louisiana or Vermont to see a sugar-making plant. You do not even need to go into the country. It is rather fun, don't you think, to know that there is sugar in

SUGAR

grass in the park, and sugar in all the trees and bushes there? There is sugar in the growing plants in the shop window and in those at home or in the schoolroom. If you wanted to, you could put a bean or any other seed in some earth; and as soon as it grew big enough to have leaves it would begin to make sugar.

The green stuff in the leaf is what makes the sugar. It makes sugar all day while the sun shines. In the sunlight the green stuff in plants can make sugar. It cannot do this in the dark. So every plant is a sugar factory running by sunlight.

You may guess that plants would not go to all this work of making sugar all day long unless this is very important to the plant. So it is. Indeed, sugar, changed in one way or another, is the chief food the plant needs for its growth. Every plant in the world needs it.

GUESSING GAME

I know a guessing game about food that it is fun to play. The most interesting thing about this game is that if you guess back far enough you always find a green plant. It does not make one bit of difference where you start. You may begin with honey and get back to the bee and then to the flower of a green plant. You may begin with an egg and get back to the hen and then to the cracked corn the hen eats, which is the seed of a green plant. You may begin with milk and get back to the cow and then to the hay the cow eats, which is the leaves and stems of green plants. You may play this game for a

FIRST LESSONS IN NATURE STUDY

day or a year; but you can never think of any real food you eat that does not lead you back to the flower or the fruit or the seed or the leaf or the stem or the root or some part of a plant that has green color.

The same thing happens if you play this guessing game about the food of any other animal besides yourself. Sometimes the hunt will be a crooked one with many turns in it; but if you do not lose your way, you will come to the green plant at last.

This is because it is only plants with green color in them that can make sugar—the substance that all animals depend upon in some way for their lives. Animals cannot make sugar for themselves; but they need it, changed in one way or another, just as much as plants do.

So when you nibble candy and feel pleased with the taste of it, there are many things for you to think about. It is interesting to know why sugar is so very, very important. It is because sugar, changed in different ways, is a food that all plants must have to keep them alive. And if there were no plants, whatever would we and all the other animals eat?

CHAPTER II

MILK AND ANIMALS THAT FEED IT TO THEIR YOUNG

You have read in the first chapter of this book that sugar, changed in one way or another, is a food that animals need.

Milk is another food that is needed by many kinds of animals. These animals need milk especially while they are babies. Indeed, it is the only sort of food that certain animals can take at all while they are very young. Animals whose babies must have milk are called *mammals*.

There are many different kinds of mammals. In this chapter you will read about some of them that are unlike in size and shape and habits. The bodies of mammals may differ from one another in many ways. But in some ways they are all alike.

Mammals all have warm red blood and breathe with lungs as birds do. But they do not have feathers. They have hair instead. Some mammals have very little hair and others are covered with thick fur.

All mammal mothers have milk to feed their babies.

FIRST LESSONS IN NATURE STUDY

They have *milk glands* in their bodies where the milk is made. The milk glands have openings where the babies can put their mouths when they suck the milk.

A human baby must have milk just as all the other little mammal babies do. If the mother is well and strong, the human baby is better off with the milk it finds in its own mother's breast than with any other kind, when it is very young.

But people learned long ago that their babies could



A goat likes to eat while it is being milked.

live on the milk of other animals, also. So people keep herds of animals for the sake of their milk. People living in the far North, where the winters are very, very cold, use the milk of reindeer. In many countries people use the milk of goats. In this country we use the milk of cows more than any other kind.

Milk is important for babies because it is the only food they can take at first. Boys and girls grow stronger if they keep on drinking milk even when they can eat

MILK AND MAMMALS

other kinds of food, too. Milk is good for grown people; and it satisfies both hunger and thirst, since it is food and drink at the same time.

Soon after you drink sweet milk it *curdles*. When it curdles, it becomes thick. It curdles before you can digest it. If you drink cows' milk rapidly, as you drink water, the milk is likely to curdle in big lumps and give you a stomach ache. That is why it is a good plan to sip milk a little at a time instead of drinking it down in big mouthfuls, for then the curds will be in smaller lumps.

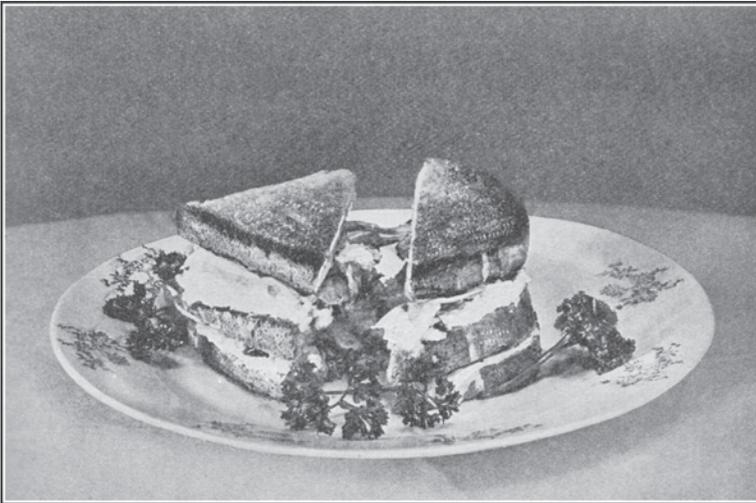
Goats' milk curdles in finer, softer bits than cows' milk does. People who have studied this matter say that on this account babies that are fed on goats' milk do not have colic so much as those that are given cows' milk, and that they thrive better on it.

Some people like to curdle milk before they eat it. There are different ways of doing this. One way is to squeeze lemon juice into sweet warm milk. When the milk begins to thicken, it can be stirred with a spoon or with an egg beater. If a little sugar is added, it makes a very good kind of milk lemonade.

Another way to curdle milk is to buy buttermilk tablets and put one into a pitcher of milk. The pitcher should be kept in a warm place until the milk thickens. Many people like milk this way. The tablet has *bacteria* in it. Bacteria are plants so tiny that we cannot see them unless we use a microscope. (A microscope has a piece of glass shaped so that it makes small things look large.) There are many kinds of bacteria. Some kinds are very

FIRST LESSONS IN NATURE STUDY

good for our health and some kinds make us ill. Both helpful and harmful bacteria will grow in milk if they have a chance. That is why it is important that the men who handle our milk supplies should take proper care of it and keep it safe to use. The bacteria in the buttermilk tablets are harmless and to use them is an easy way to thicken milk. However, good sweet milk (if it has not been heated) usually has enough of these same bacteria so that it will have a good taste if it is allowed to “sour” in a warm place.



This is a picture of slices of toast with cottage cheese between them. Cottage cheese is one of the good foods made from sour milk.

The white, thick part of curdled milk is called *curd* and the watery thin part that separates out is called *whey*. You may have heard about little Miss Muffet who sat on a tuffet, eating her curds and whey. Curd, or thick milk, is eaten more in some other countries than in the United States. It would probably be good for us to use

MILK AND MAMMALS

more of it than we do. You may like to try some with brown sugar sprinkled on top and a little bit of nutmeg grated over it.

Milk is called a perfect food because it has in it all the things our bodies need to make them grow. If you watch your mother or someone else who knows how to cook, you will be interested to see that she uses sweet milk in some things and sour, curdled milk in others.

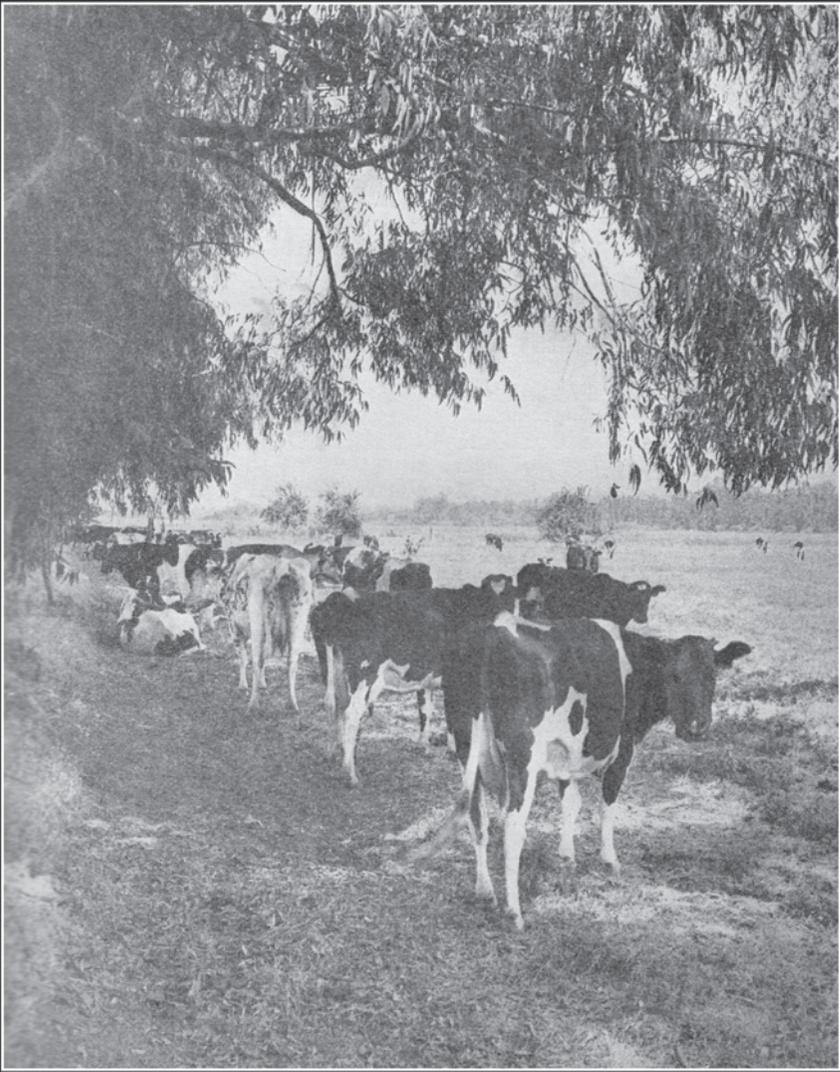
I made a bow to our old cow
And said, "Good morning, Red,
I'd like some cheese and, if you please,
Some butter for my bread."

And one hot day I went to say,
"You are a friendly beast;
So give me, please, some cream to freeze;
A quart or two, at least."

THE COW, A MAMMAL WITH HOOFS AND HORNS

The feet of cows are not like those of dogs, with digging nails. Their feet have hoofs, but they are not like the hoofs of horses. Do you know what the difference is?

Perhaps you will tell me that cows do not have *horns*, and then I shall have to confess that nowadays many of them do not. Farmers have a way of rubbing something on the heads of calves that prevents horns from growing. If they forget to do that, they sometimes cut the horns off the heads of the grown cows. Cows do not shed their horns, but keep them as long as they live, unless they



When the day is hot and sunny, cows enjoy resting under a shady tree.

MILK AND MAMMALS

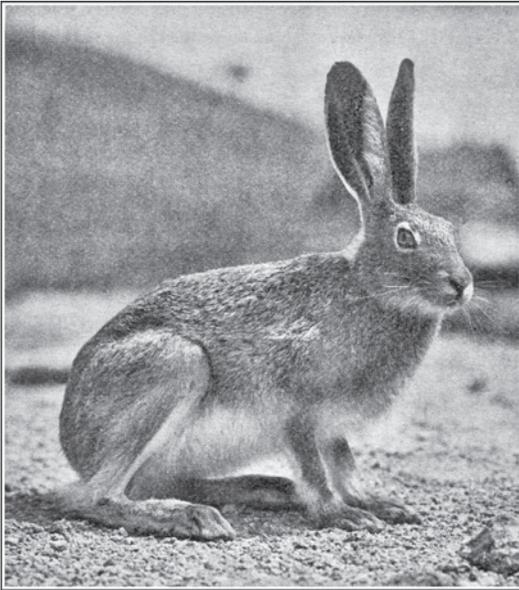
are taken off. It is very much easier for men to take care of cows without horns. You may have heard about the cow with a crumpled horn who tossed the maiden all forlorn. It was because cows sometimes did unpleasant things with their horns that men decided to have new-fashioned hornless cows. But, for all that, horns do look very well on cows' heads. I hope that, when people put cows into zoos for city children to see, they will choose old-fashioned cows with handsome horns.

I hope, too, that you will happen to meet a cow some day while she is chewing her *cud*. If you do, you will see that she has a contented look. She will not feel pleased if you disturb her then, for she likes to be quiet while she is chewing. When she first eats her grass and hay she does not chew it much. Then, after a while, her food comes up into her mouth again and such food is called her *cud*. This she grinds to bits with her strong teeth.

The cow's *milk bag* is in front of her hind legs. Her calf can find it and stand up to feed when it is only a few hours old. Sometimes a hungry calf seems to be in a hurry and bunts the milk bag with its head to make the milk come faster. This bunting habit is a funny one. If you ever try to feed a calf milk from a pail, you will find that after it puts its head into the pail it will begin to bunt. Then what will happen? More likely than not you will be having a shower bath of milk. Then I think you will laugh, since it does no good to cry about spilt milk.

THE RABBIT, A HOPPING MAMMAL

Baby rabbits are not strong enough to walk when they are very young, as calves are. They are weak and blind at first and they have no warm fur on their bodies. Their mother makes a snug straw nest for them and lines it with fur which she pulls from her own body. There they can snuggle down together and be cosy and warm.



A rabbit has long hind legs and big ears.

When they are hungry, they suck their share of milk, which makes them grow. By the time they are three weeks old they can hop about quite fast.

There are so many kinds of animals that like rabbit meat, that a rabbit needs ways of keeping safe. One way is by kicking. Sometimes a rabbit jumps over its enemy and kicks it with its strong hind legs. But a rabbit cannot

Their mother goes away to find food when she wants some grass or fresh green leaves, but she comes back to the nest and spends much time with her babies. When they are hungry, they suck their share of milk, which makes

MILK AND MAMMALS

fight very well, so often it runs away from danger by taking long and lively jumps until it reaches a hiding place. Nothing suits a chased rabbit better than some bushes with thorns on them; for it has a way of creeping under the prickly branches without getting hurt, and not many animals will crowd into such places after it. Sometimes a rabbit can hide when it is very near danger, by merely keeping so still that there is no motion to show where it is.

Many animals chase rabbits and try to catch them; but rabbits have a very good time for all that. They do not *stay* frightened. As soon as danger is over they busy themselves with their own pleasant doings. With their long ears they can hear sounds that are made far off. They can turn these ears in different directions to catch noises from all around them. Sometimes they stand up on their hind legs and look to see what is near. When they do this, their front paws drop down in a pretty way.

Rabbits do not stay asleep all winter. So they need to find things to eat even when the ground is covered with snow. If you go out for a walk near some woods in winter, you may find some rabbit tracks. Perhaps you can see where the rabbits have gone to nibble tender bark from some young tree, or perhaps you can follow their tracks and find where they are hiding.

When rabbits hop, on a winter's day,
They throw their feet in the queerest way;
For their long hind legs reach ahead in the snow,
And 'tis hard to tell how the rabbits go!

THE PIG, A ROOTING MAMMAL

Pigs often live in dirty pens, but that is not the fault of the pigs. They like clean places. A farmer once showed me the home of his pig, whose name was Curly. Curly had a covered shed with a clean bed of straw in it and she kept the straw fresh and dry. She could go out of the door in her shed into a pen where she could run about or lie down in the sun. A stream of water ran through one corner of her pen and Curly rooted with her nose in the ground near the water. When the weather was hot Curly liked to wallow in the soft mud until she was nearly covered up in it. It made her body feel comfortable on a hot day. It was not foul, bad-smelling mud, though, and the farmer told me he thought pigs always like decent places to live in if they have a chance.

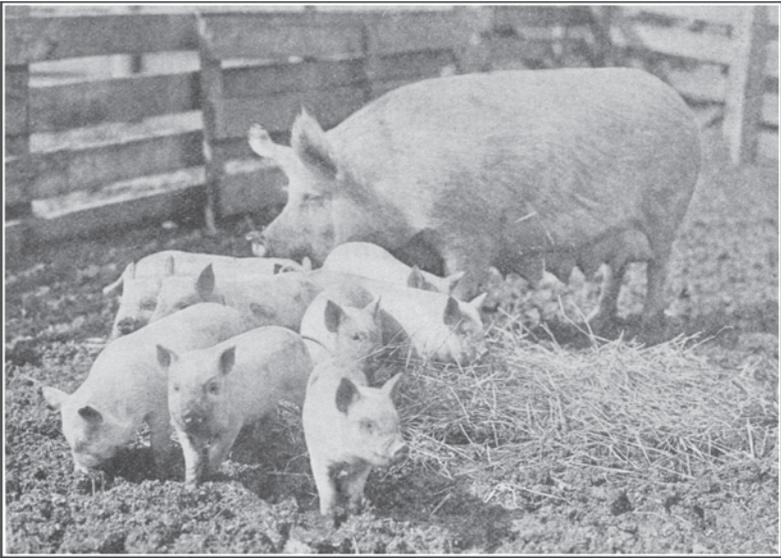
Before the farmer planted his vegetables, he used to let Curly play in the garden. That was a happy time for her. She poked into the earth with her strong nose and found many things she liked. There were *white grubs* that feed on the roots of plants for a while and then turn into brown beetles called *June beetles*; and there were other root-eating insects that the farmer was glad to have Curly eat. He said that her nose was better in some ways than a plow.

In the evening when the farmer was milking his cow, Curly used to come to the doorway which opened into her pen. She would stand up on her hind legs and

MILK AND MAMMALS

put her front feet on the door sill and open her mouth. Then the farmer would throw a stream of milk into her mouth, instead of into the milk pail, until he thought he could not spare any more. That farmer was a jolly man and Curly's funny way of coming to ask for milk made him laugh.

Curly had a wooden trough in her pen where she was fed waste food from the kitchen and sour milk and some grain. Vegetables and fruits that were not suitable to sell in the market were thrown into her pen and she ate a great deal and was fat.



*One baby pig is rooting in the ground with its nose.
The mother pig will probably lie down on the clean
hay when it is time for the little ones to eat.*

When Curly grew up, she had a family of nine little baby pigs. At mealtime they used to beg for milk, too. But they did not go and ask for milk from the cow. They

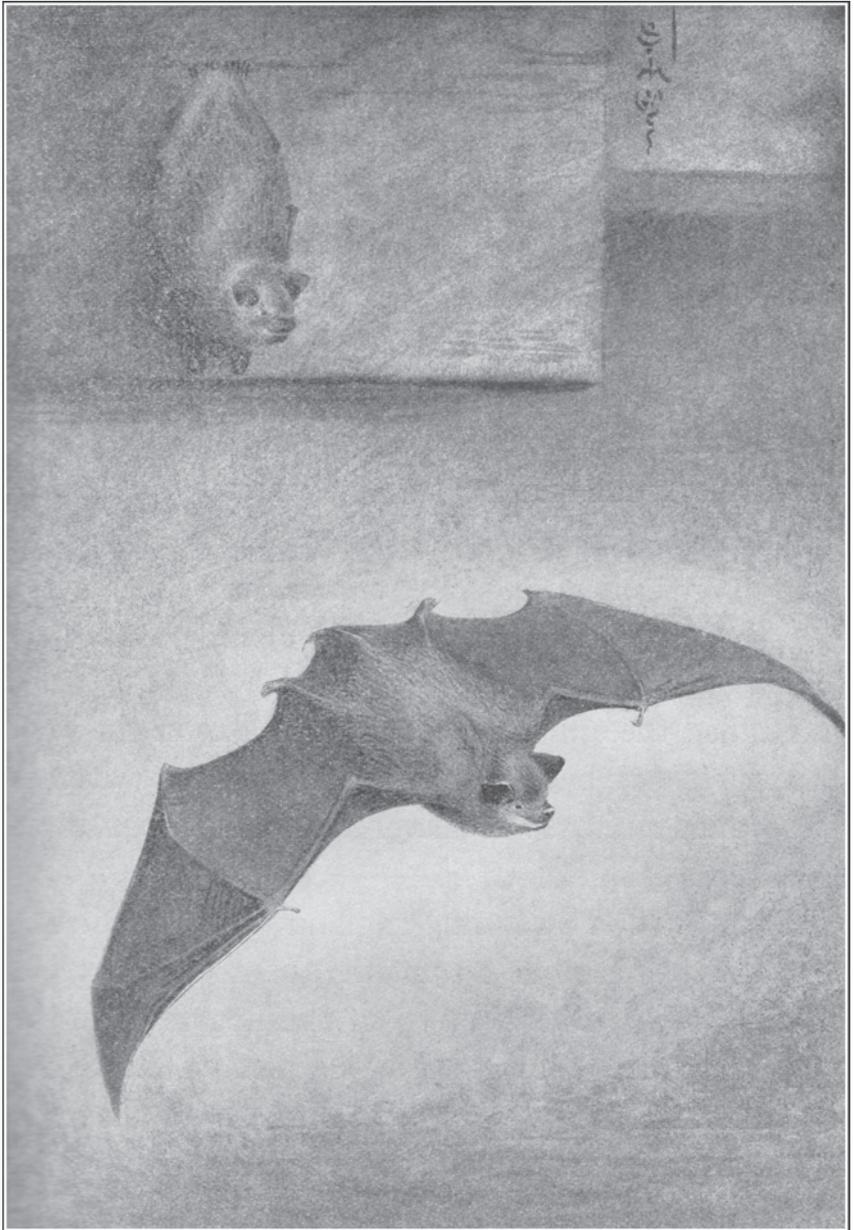
FIRST LESSONS IN NATURE STUDY

tagged about after their mother and made squealing noises that meant "We are hungry." Then Curly would lie down on her side and give pleasant-sounding grunts that seemed to mean "Dinner is ready." It would not take those nine pigs long to line up in a row and suck their little stomachs full of milk. They were a happy sight.

In some places in the South people do not keep their pigs in pens but let them run in the woods, where they root with their noses and find underground insects. They feed on wild plants and eat acorns and other nuts that fall to the ground. Such pigs have so much exercise that they do not grow to be so fat as pigs do that are kept in pens.

THE BAT, A FLYING MAMMAL

Most kinds of birds can fly. Many kinds of insects can fly. There are some flying fishes. Among the mammals there are flying squirrels that can spread out their side-flaps and sail from a high place to a low one; but that is not really flying. The bats, though, are mammals; and they can fly wonderfully. Just at dusk it is a strange and interesting sight to see bats flying over quiet water, whirling and dipping and swooping. They get little drinks of water that way without stopping in their flight. They get their food also without stopping, for they catch night insects while they swirl about in the air. They hunt in this way twice a day, once in the evening at dusk and once in the morning before it is light.



A bat flies in the morning before daylight and again in the evening. At other times it hangs itself up and rests with folded wings.

FIRST LESSONS IN NATURE STUDY

When I was a little girl, a bat came into my room one night. I saw it flying in the moonlight between my bed and the window. There was a screen in the window and the bat could not get out. It flew very near my ear, but I could not hear its wings. I lighted a lamp and hunted, but I could not find anything. After a while, when I had put out the light and was quiet, it began again its silent flight. In the morning I looked for a long time and at last found the bat. It was clinging to the wire behind a picture. I put it into a cage and tried to tame it. Its wings, when they were not stretched out, hung down limp and saggy, like a toy balloon when the air is out. There was no hair on its wings, but its body was covered with very soft fur. When I tried to touch it, the bat squeaked piteously and trembled. The little creature looked so cross and unhappy all day that at dusk I took it out of doors and let it go. So instead of having a pet bat, I watched the free ones flying near the house every evening.

When winter came, I found a bat hanging up in the woodshed. I touched its soft fur. It did not squeak or tremble or move. It stayed there stiff and still both night and day. It had been caught by the cold weather and was sleeping through the winter. This very special kind of long sleep that some kinds of animals take we call *hibernation*.

Once there was a bat (did you know that?)
Who slept the winter through.
He never saw the snow, or heard it blow.
A funny way to do!

MILK AND MAMMALS

I called the stiff little hibernating bat in the woodshed my "pet bat"; but it disappeared when the cold weather did, so it never found out that it was a pet.

There was a man in England who once had a tame bat. When he let it flit about in his parlor, the bat would take a fly from the fingers of anyone who offered it. It would take bits of food, very carefully and gently, from the lips of its master.

Once a woman found a boy abusing a bat. She took away the trembling, frightened, little thing and kept it. After a while it would lap milk from her finger and take meat and insects from her hand. She used to let it out of doors in the evening, and it would hunt for insects for about two hours and then come back and hang itself up near the window until it was let in.

A mother bat does not make a nest for her babies. She carries them about with her as she flies. Her babies take hold of the under side of her body with their mouths and hang on so firmly that way that they do not fall. There is a fold of skin in the body of some mother bats that helps hold the young in place. When the mother finds that her young ones have grown too big and heavy to carry about in this way, she hangs them up in a safe place while she is hunting for food and then goes back to them while she rests.

Most mammals have four legs. Even the bat has bones enough for four legs. These bones, instead of being shaped to serve as legs and feet and toes, are long and slender. They spread out and make a frame for the strong, thin skin of the wings. When the wings are in

FIRST LESSONS IN NATURE STUDY

use, this thin skin is spread tight like the cloth of an open umbrella. When the bat is not flying, it folds up its wings and the skin hangs close to the body.

In different countries there are different kinds and sizes of bats, with different-looking faces. In some warm countries there are big bats that eat fruit, and sometimes they eat much fruit that people want to use. In some warm countries, too, there are small bats that sometimes bite people at night if they go to sleep where it is easy for the bats to get at them. But this is such a gentle little bite that it does not hurt enough even to waken the sleeper, and the spot that is bitten heals very quickly.

All the bats in this country are very useful to us, because they eat troublesome insects such as mosquitoes that bite us, and certain beetles that damage our growing plants. The bats in this country do no harm whatever and they do much good.

People used to be silly about bats and sometimes fear them. Now that we understand their habits, we know better than to be frightened by these most interesting flying mammals.

THE WHALE, A SWIMMING MAMMAL, AND THE BIGGEST ONE OF ALL

Did you once think that a whale must be some kind of fish? Other people thought that, too, once upon a time. That was before they understood that a creature shaped so much like a fish can be a mammal and give

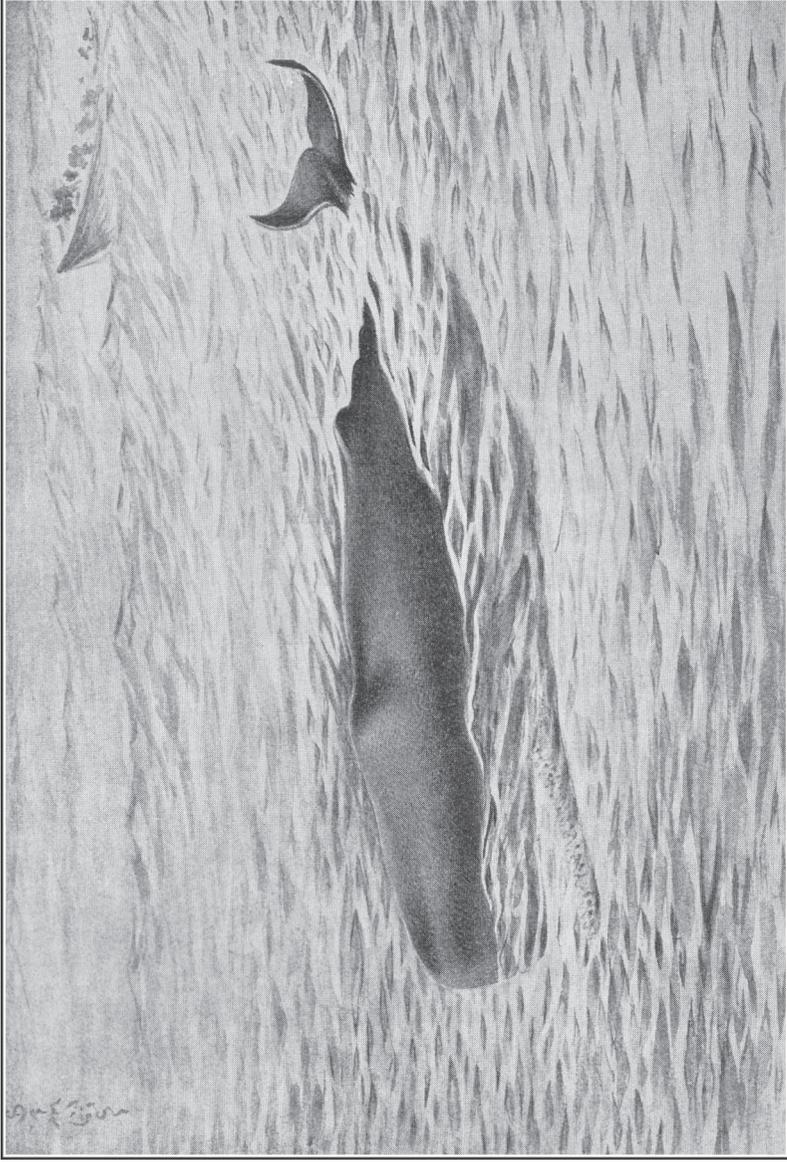
MILK AND MAMMALS

milk to its young. The whale certainly has a fishy look. It has no hind legs at all that can be seen outside its body. Inside, however, there are a few bones that are really feeble stubs of hind legs. The front legs of the whale are paddle-shaped and are called *flippers*.

The whale's baby is sometimes called a *pup* and sometimes a *calf*. The mother whale is careful of her calf while it is very young, and stays where the water is shallow and warm. She can more easily take care of her baby in shallow water. The young calf is comfortable where the water is warm. It has a good time playing there. When it is old enough it goes on long journeys in deep water with its mother. The calf has more hair on its body than the old whales, which have only a little near their mouths.

Different kinds of whales live in different places. The most enormous kind of all lives in the Pacific Ocean. It is said that a whale of this kind can grow to be more than ninety feet in length. You can count off that number of feet on the ground with your ruler, if you want to see how long a whale can be.

Although this great whale needs much food, it does not eat big things. It goes through the water with its mouth open when it is hunting, and gathers in a lot of little sea animals and, of course, a whole mouthful of water. It keeps the tiny fishes and other small creatures it gets into its mouth, and it strains out the water with its *whalebones*, or *baleen*, which hang down in a thick fringe from its upper jaw and serve as a sieve. This kind of whale has no teeth.



All kinds of whales have fish-shaped bodies and swim in the sea.

MILK AND MAMMALS

The calf of this largest kind of whale is said to be about nineteen feet long when it is born. You can take a foot ruler and measure to see how long that would be.

There are different kinds of whales that have whalebone, or baleen, hanging in fringes from the upper part of their mouths. Besides these, there are kinds that do not have baleen in their mouths but do have teeth. The names of some kinds of toothed whales are *sperm whale*, *porpoise*, and *dolphin*. The very smallest kinds of toothed whales are only a few feet long when they are full grown.

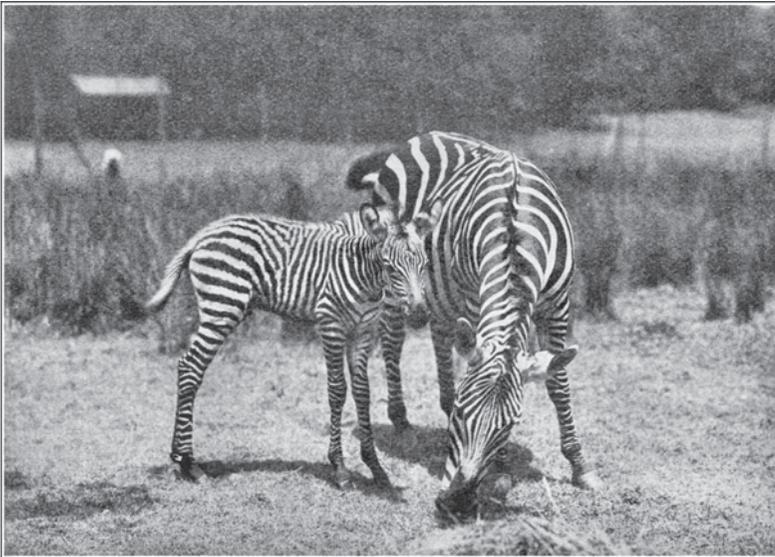
All kinds of whales, whether young or old, whether toothed or with baleen, have fish-shaped bodies and swim in the sea. Of course there are plenty of mammals besides whales that can swim. Perhaps you can swim, yourself! There are some mammals, such as seals and beavers, that spend a great deal of time in the water. But there are no other mammals whose bodies are so fish-like that they need to live in the water all their lives.

SOME MAMMALS AT THE CIRCUS OR THE ZOO

When you go to a circus or a zoo, you can see many interesting animals, some of which have been taken from wild places in the United States and some of which come from other countries.

The Zebra

Wild zebras live in herds in Africa. They are related to horses and have about the same shape. When you next look at a zebra, be sure to see how many things about its head and tail and feet are like those of a horse. Horses, too, were wild once, before men learned to tame and use them. There are wild horses still in a desert in Asia, and they have long, shaggy hair.



*In what ways are these zebras like a horse and its colt?
How are they different?*

Zebras have stripes on their bodies. Some people who have seen these animals in their own wild places say that the stripes look like streaks of light and shade. Because of this zebras are hard to see when they are a little way off, and the stripes thus help them to hide.

MILK AND MAMMALS

Tigers and Lions and Panthers

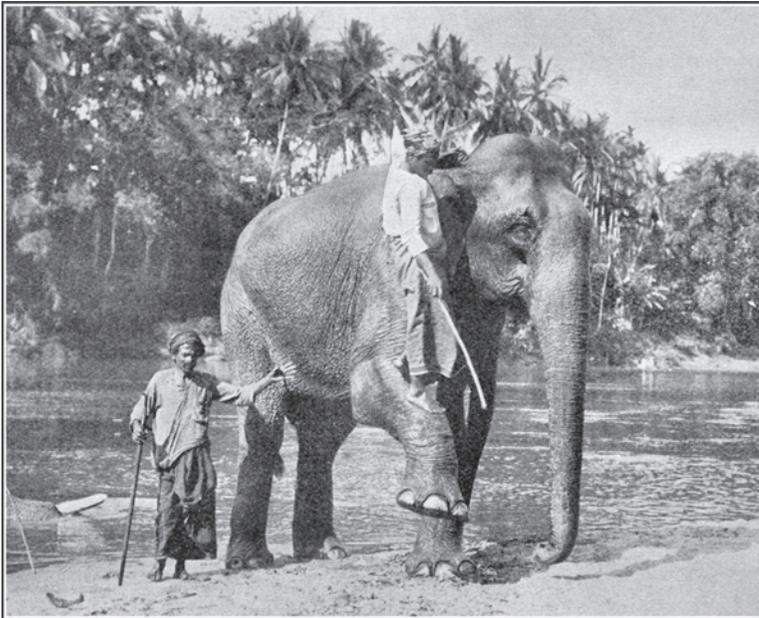
The home of tigers is in Asia. The big lions come from Africa. Panthers live wild in America; once there were many more of them than there are now. These three kinds of animals, and others that have bodies shaped like theirs, are relatives of cats. Like cats, they have “whiskers” on their faces, and they have soft padded paws and sharp curved claws that can be pushed out and drawn in. When they are free, they are all hunters, as cats are.



When you see a tiger at the zoo, notice in what ways it looks like a cat.

Elephants

There are no animals anything like elephants living wild in America. There were once though, as we know, because bones of such animals have been found buried in different parts of the United States. Perhaps the next time you feed peanuts to a gentle, tame circus elephant you may think you would rather meet him there than see a wild one in the woods.



This elephant is lifting its great foot to help the driver climb to its back.

Most of the elephants seen in circuses are from India, where there are wild elephants. In India these animals are caught and tamed and taught to work. In

MILK AND MAMMALS

Africa there are elephants which are even bigger than those in India. The largest elephant ever brought to America was from Africa and his name was Jumbo.

An elephant has such a long nose that he can reach down to the ground with it without kneeling. He can reach his nose up into the branches of a tree without climbing. It is such a strong nose that he can lift heavy logs with it, and the tip of it is shaped so that he can handle small things very gently. This wonderful sort of nose is called a *trunk*.

Deer

A young calf that is frisking about the farmyard looks like a young deer in some ways. It has similar hoofs and its head is shaped much the same, but a calf is not so graceful as a young deer.

The deer are related to cattle and they have the same habit of chewing their cud. The father deer have horns, but they are different from those of cattle, for they are larger and branched. One wonderful thing about deer horns is that they drop off every year and then new ones grow again.

There are wild deer in America and in some other countries, too. It is a lovely sight to see wild deer in the woods. But these creatures are so very timid that it is much easier to see them at the zoo.

The Black Bear

There are different kinds of wild bears in America. The smallest of them are called the *black bears*. They make very lovable pets while they are young and they are fond of their human friends. When they are older they are not safe to have loose because they grow to be rough and very strong. The wild ones have very good times in the summer eating berries. Sometimes their tracks can be seen among blueberry bushes, and then people know that a bear is near.



A bear living in Yellowstone National Park.

By the time winter comes bears are fat from eating so many berries and other good things. They are, indeed, so very fat that they can live all winter without eating anything more.

Before the snow comes the black bear carries dry leaves into a deep hole in the ground or other cave.

MILK AND MAMMALS

After she has her bedroom made comfortable enough to suit her, she settles down and keeps quiet and snug and warm until spring comes. She is not too sleepy, however, to take care of her little baby bear. It is a very little baby for so big a mother to have, for a young baby bear is not much bigger than a kitten. The mother has milk enough so that the little one does not need to go without food. When spring comes the young bear has grown from a tiny, feeble, blind thing to an active little bear that can run about and climb trees and have a happy time playing.

Once there was a bear; and she knew where,
If cold days came, to hide.
She went to her den, and she didn't care when
Everything froze outside.

In other places in this book, you will find something about several other mammals. It is well to remember that mammals differ from all other animals in certain ways. They all have warm red blood as birds have, but they do not have feathers. They all have at least some hair on their bodies, though the hippopotamus has so little that we might as well call him “bald” all over. Most mammals have four legs, and then we call them *quadrupeds*. There are some exceptions, as you have seen, to the four-footed plan, since the bodies of some (as the bats) are fitted for flying and the bodies of some (as the whales) are fitted for swimming. People are exceptions, too, for they walk on “all fours” only when they are very young and have to creep. In one way, though, mammals are all alike—the mothers all have milk to feed to their young.