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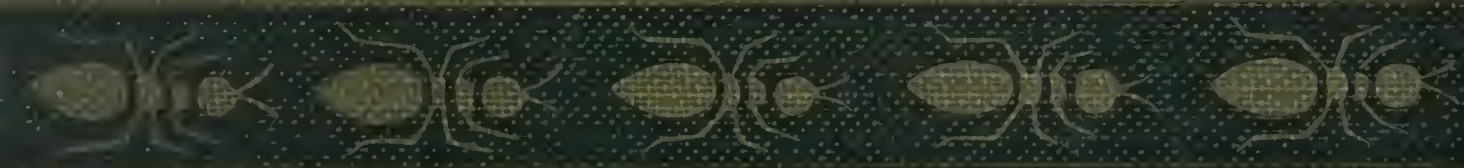
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LIFE

IN AN

ANT HILL





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Book \_\_\_\_\_

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Writers' program. Penny Poona


# LIFE IN AN ANT HILL



COMPILED BY WORKERS OF THE  
WRITERS' PROGRAM OF THE WORK  
PROJECTS ADMINISTRATION IN THE  
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## FOREWORD

*Life in an Ant Hill* is the thirteenth of thirty booklets in the Elementary Science Series. It was prepared by the Philadelphia Unit of the Pennsylvania Writers' Project, sponsored by the Pennsylvania Department of Public Instruction.

This booklet, written by Mark Bartman, was edited by Katharine Britton of the Editorial office.

Acknowledgment is made to John W. Cadbury, 3rd, Associate Curator of Insects, the Academy of Natural Sciences of Philadelphia, and to W. L. Brown, Jr., American Entomological Society, for acting as consultants to assure accuracy of the text and illustrations. It must be emphasized that the habits, behavior, castes, and activities described in this book are actually not those of any one species, but are combined in one here only to simplify and dramatize.

Illustrations were prepared by Mary Procopio of the Pennsylvania Art Project, under the direction of Michael Gallagher.

C. C. LESLEY  
*State Supervisor*

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## LIFE IN AN ANT HILL

Anyone out walking — in fields, in parks, even on city streets — is likely to be stopped sometimes by a crowd of insects scurrying across his path. Ants! One step more and dozens of little lives would be crushed out. The ants move in streams, like people at a country fair, or workmen swarming out of a factory.

How fast they go! They do not stop even for a moment. But where are they going? What are they doing? Into the grasses they scurry, or along the pavement cracks and into the ground, until they are lost to sight.

What fun it would be to follow them for a while, to find out how they live! And it is not so hard to do this as we may think. For some men have spent

many years studying the ants to find out all about them and their way of living. So, even though the ant and his fellows are out of sight in the grasses now, we can follow them in our imagination. In our imagination we can go right into the ant hill if we wish.

### PICTURE OF AN ANT

But first, let us push aside the grasses, pick up one little ant, and put it under some kind of magnifying glass that will make it look much bigger.

The ant's body is divided into three parts. There's the head. Then there's the chest. Behind that is the part that contains all the digestive system. This is much larger than the rest of the ant. It is joined to the chest by a very tiny waist.

The ant has no bones inside its body. It does not need them, for it is covered with shell. This protects the body, just



1. BIG WORKER  
4. PRINCE

2. LITTLE WORKER  
5. PRINCESS

3. SOLDIER  
6. QUEEN

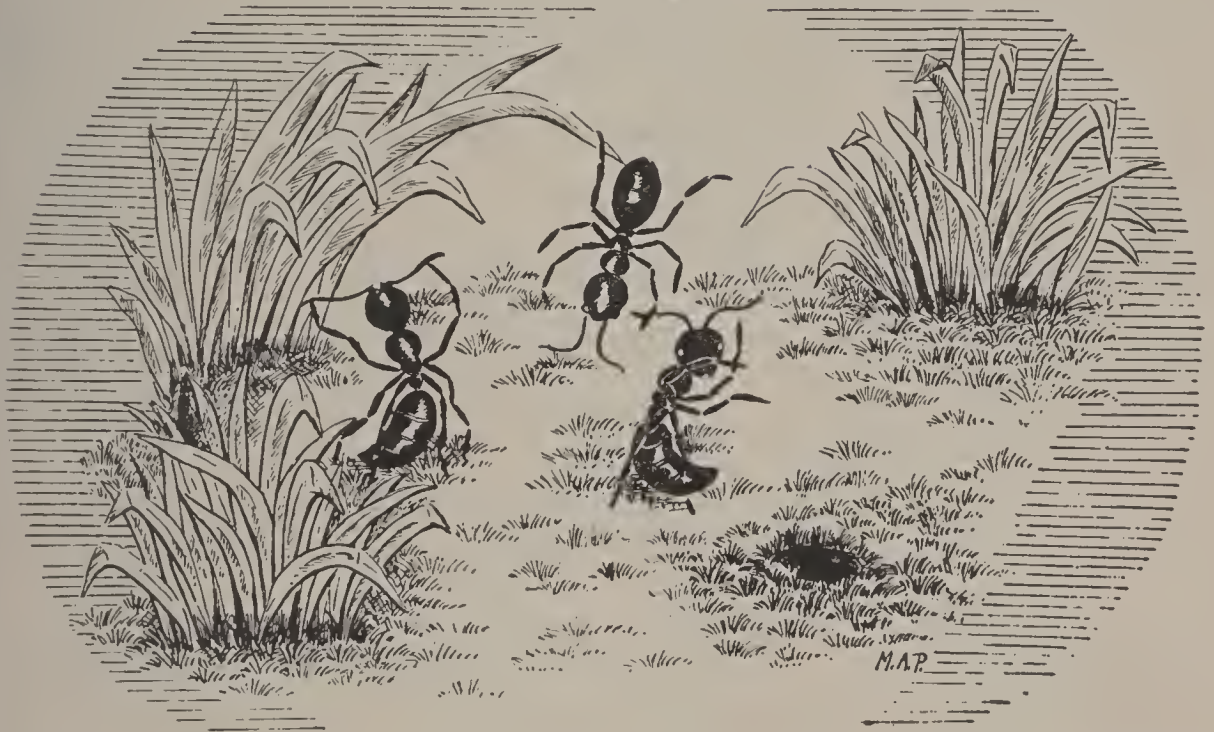
as armor protected the knights of old when they went into battle. The armor is in sections, except on the head, and along the sides there are holes. Through

these the ant breathes. The sections of armor move apart and together, just as an accordion does. This movement lets air into the body, and then squeezes it out. It is just like breathing from the hips!

On each side of the head are many eyes, bunched together like pinheads on a pin cushion. But the ant cannot roll them up and down or from side to side. It cannot move them at all. In fact, it cannot even see very well with them. Some kinds of ants cannot see at all.

Poor eyesight seems like a bad thing to us, for people depend more on sight than on any other sense. But that is not true of the ant. The ant depends mostly on touching and smelling things. On its head are two long feelers, which it uses to find out what is going on about it. It keeps touching the ground with them as it runs along, feeling its way much as we do with our fingers in the dark.

The ant also smells with its feelers. Sometimes it lifts its head and waves them high in the air. Perhaps danger is near. Perhaps there is the good smell of food.



EVERY ANT IS CAREFUL TO KEEP ITSELF WELL-BRUSHED,  
CLEAN, AND TIDY.

When the ant is placed back on the ground, away it goes into the grasses again. But once safe, it stops to clean itself, for there is dust on its body. Its legs are covered with hairs, and with

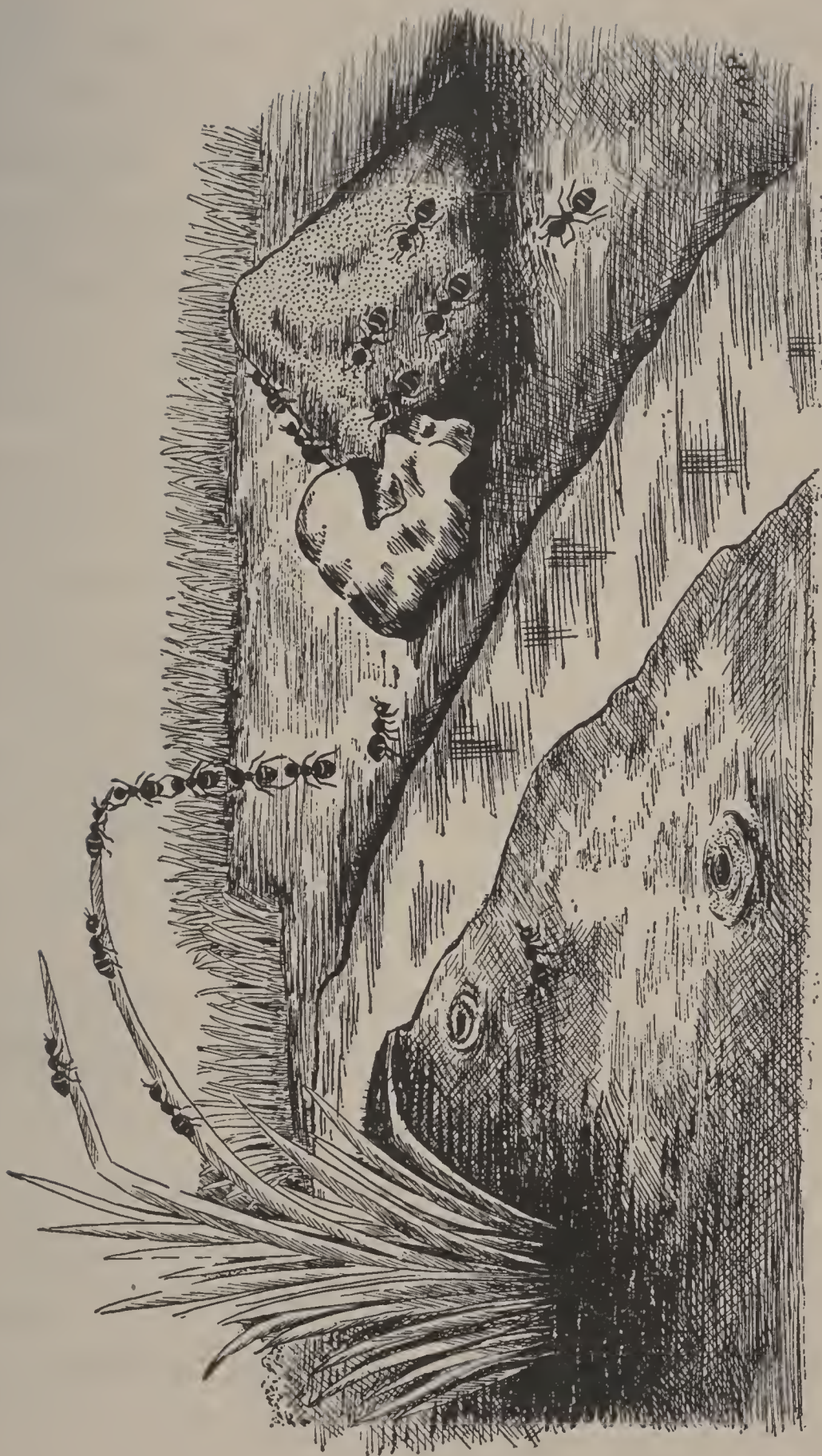
these it can brush and comb itself very well.

Keeping very clean is one thing that ants never neglect. Since they live underground, they cannot permit either their bodies or their homes to get dirty. If they did, they might become sick and die. Even the ant colony itself might grow smaller and die out at last. Ant colonies sometimes last longer than a man's life time, and one reason for this is the fact that the ants are so clean.

## OUTDOOR WORK

Dusted and cleaned, the ant hurries after its fellows. It must get back to its job as quickly as it can. Like all worker ants, it is driven by something inside itself to toil all the time. It does not know such a thing as play.

All the ants are moving very fast. Suddenly they stop. Their path is blocked by a trickle of water. Ants can-



THIS IS ONE WAY IN WHICH ANTS MAKE A BRIDGE TO CROSS WATER. THE STORY TELLS OF ANOTHER WAY.

not swim. Will they give up the trip? No, they begin to hunt. They find small grains of sand and toss them into the water. The grains pile up. Soon there is a perfectly dry bridge, and across this they march.

At last they reach a cluster of beautiful flowers. Up the stems they climb, out upon the leaves. Feelers wave excitedly. There on the leaves are a number of little green insects, even smaller than the ants. They have long, sharp, hollow beaks, which they push into the leaves of the plant to suck out the juices. In their bodies this turns to a sweet syrup, called honeydew.

At once the ants begin to stroke the little green insects, and as they do this, out come tiny drops of honeydew. The green insects are really ant cows, and the ants who milk them are dairy maids!

Every time a drop of honeydew oozes out, a tongue-like thing shoots from an



ant's mouth to lap up the sweet. But the honey is not really being eaten, though the ant swallows it. When people swallow food, it goes into their stomach to be digested. But when an ant swallows food, there are two things that can happen to it. For the ant has two stomachs. One of the stomachs digests food to give strength to the body. The other is like a store house. The food can be kept there until it is needed.

Later the ant can bring food out of this extra stomach, then swallow it again and send it into the real stomach. Or the ant can bring up the food and give it to another ant that needs it. So this stomach is sometimes called the public stomach. Whatever food the ant carries there is for public use. Ants share everything they have.

Though the dairy maid ants are eating some of the honeydew from the cow insects, they are storing most of it to take

back to the ant hill. They lap it up until the back part of their bodies is swollen to a great size. Now they are ready to go. But they are not going to leave the cows here. The cows are soft



THE ANTS PLACE THEIR COWS ON PLANTS NEAR THE ANT HILL.

and helpless. If they were left alone, there might be no cows when the ants returned for more honeydew.

So the ants pick up the cows carefully in their strong jaws, and climb down the stem of the plant with them. They

are going to take them to plants nearer the ant hill. When the cow insects have sucked most of the juice from one plant, the ants will move them to a fresh plant. In this way the ants make certain that the cows will be able to keep on giving honeydew. Of course, this is very bad for plants, because the ant cows destroy the plant leaves.

As the dairy maid ants march back toward the ant hill with their cows, they pass other ants working at other tasks. Some of the ants are climbing grasses that are taller to them than the tallest trees are to us. They are nipping off seeds from the grasses, and carrying them away to be stored for later use. Sometimes the seeds are much larger than the ants themselves. But ants have strong bodies and strong jaws. Those jaws must be used for biting, carrying, digging, grinding, — even fighting, when the ant must protect itself.

## THIEVES

At last the dairy maid ants are close to the ant hill. Again it can be seen that the ants are very clean. The ground around their home is not littered with trash. If one crumb or a bit of leaf is dropped, the first ant that passes picks it up and carries it to the trash heap nearby.

Some ants are coming out of the hill to go about their tasks. Others are moving toward it from many directions. Almost all of the returning workers carry seeds or other food in their mouths. They stream up long clean pathways paved with bits of stone.

But though the ants do not know it, the food for which they have worked so hard is in danger. Stranger ants are lying in wait for them! Certainly these strangers are up to no good.

Now a worker ant coming out of the ant hill stops one of those going in. The returning ant is bringing up a drop of

honey from its public stomach, and the other ant is ready to take it. The ant has been working hard and it is hungry.

Suddenly, out darts one of the stranger ants. It snatches the drop of honey from between the two before the hungry one can take it, and runs away.

Bandits! That's what the stranger ants are. Ant bandits! They wait near the entrance to the ant hill, knowing that many ants laden with food will pass by. These bandit ants do not work for themselves. They live on the work of others.

But the worker ants do not always chase the bandits. They may go right on with their work. Up the pathway they hurry. At the top of the hill is the entrance to their city.

## INTO THE ANT HILL

At the doorway stands a soldier ant, a guard. A real soldier ant has much

bigger and stronger jaws than a worker ant. Among ants that have no special soldiers, the worker ants must do the work of soldiers. They must protect the ant hill from invasion and fight off enemies.

The guard taps almost all the ants as they come up to the doorway. Its feelers go over them lightly as a detective goes over a criminal to see if he's hiding a gun. But the guard is not searching for weapons. It is looking for strange smells. That is how the ants tell friends from enemies. All ants who belong in this ant hill have the same smell, while strange ants have different smells. The guard will not let any stranger in.

The stranger does not always mean harm. Sometimes it is simply lost, and is seeking another home. For all ants must live with other ants. They cannot live alone. If an ant loses its home and cannot find another, it will die. But the

guard cannot take chances. He turns all strangers away.

Into the ground the ants go, into the dark tunnel that leads down, down, to the rooms of the ant city. The city may extend from several feet to several yards into the earth. Every bit of this had to be dug out by the little ants, with their strong jaws. And then all the loose dirt had to be carried out to leave the tunnels and chambers clear. Think what a task this must have been! Now the ant home is big enough for a colony of thousands of ants.

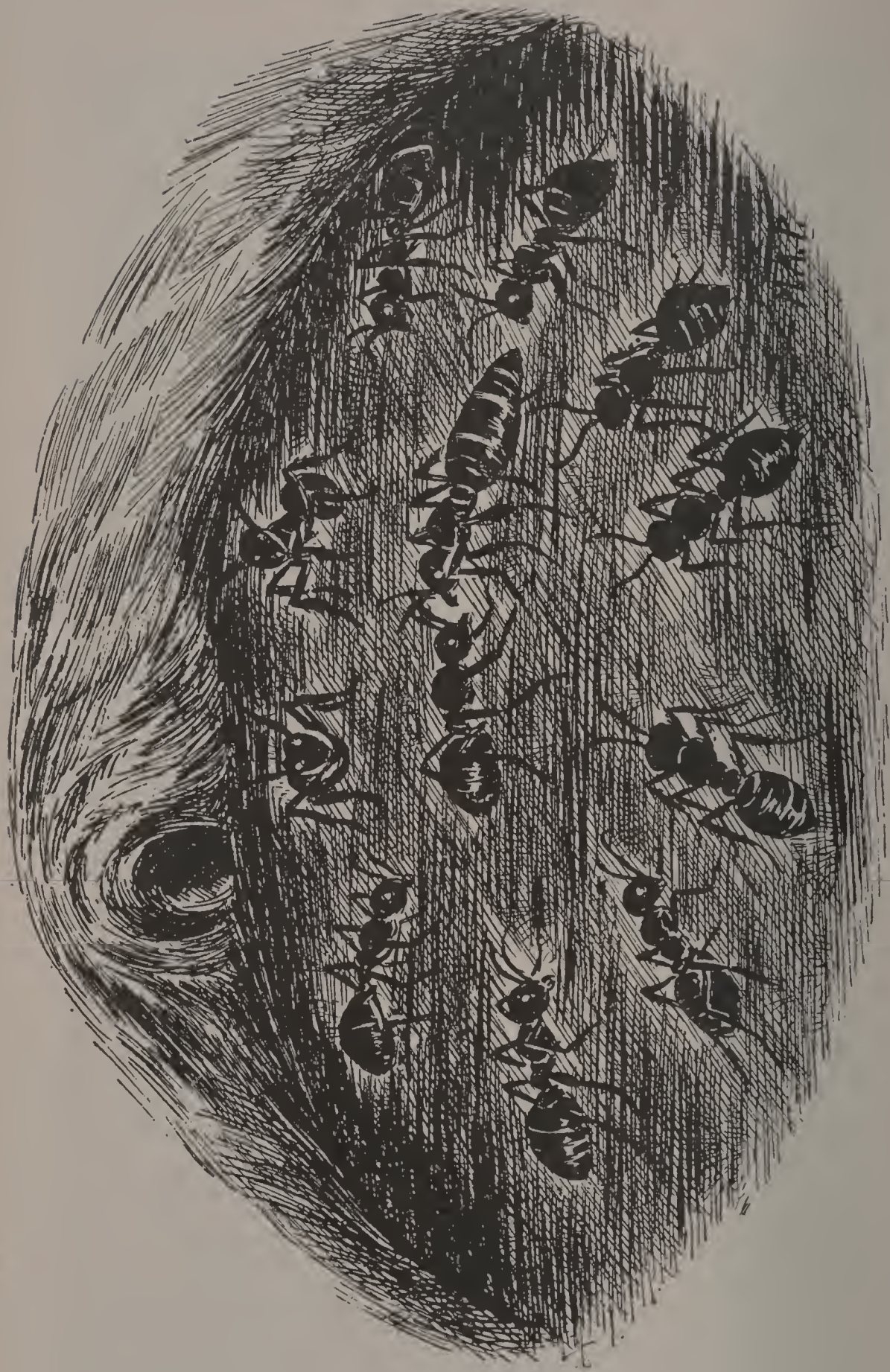
### THE QUEEN

The ants pass room after room. At one doorway some of them stop to look in for just a moment. This is the chamber of the Queen, the mother of this ant colony. All the ants that live here are her children. Sometimes in an ant hill there is more than one Queen









WORKER ANTS ARE CLEANING THE QUEEN AND FEEDING HER. AT THE SAME TIME THEY ARE KEEPING HER PRISONER.

mother, but in this hill there is just one.

The Queen is standing in the middle of the chamber. She is much larger than the worker ants about her. They are cleaning her, feeding her, combing her, attending to all her wants.

But at the same time they are really keeping her prisoner. For the Queen is never permitted to leave the ant hill. She never sees the sun or the sky. She always lives underground. Her only task in life is to lay eggs so that the ant colony will not die. She may live many years, but she will never do any other work.

Years ago, maybe five or six years ago, she was a princess in some other ant hill. She and the other princesses were different from the young worker ants. Someday they would be queens. That was why they were fed better food than the workers. That was why they had no

work to do. All the time there were servants feeding them, nursing them, caring for them. All they did was eat and rest and play with their brothers, the princes.

At last the wedding day came. The princes and princesses were ready to



EACH PRINCE AND PRINCESS GREW BEAUTIFUL FILMY WINGS.

leave the ant hill. Each of them had grown beautiful filmy wings. None of the workers or soldiers had such wings. Only princes and princesses had them.

Out in the open air, in the sunshine that she had never seen before, the princess spread her wings. Round about,

princes and princesses were streaming from other ant hills. The air was full of silvery wings.

Higher and higher flew our tiny princess, dancing her wedding dance. High in the air she met her prince.

All the princesses would have long and full lives ahead of them. But not the princes. The honeymoon was over. There was no further use for them. The workers in their ant hills would not let them return, for the princes did not know how to work. Before the wedding the workers were willing to support them. But now they would simply be a drain on the colony.

Because they did not know how to work, the princes could not find food for themselves. Because they did not know how to defend themselves, they were helpless before their enemies. Their honeymoon had a terrible ending. Many of them were eaten by birds before the

day was over. If they were not eaten, they soon starved to death.

## BEGINNING OF THE ANT COLONY

Although her mate died, our princess was very busy. Her honeymoon had carried her far from her old home, and she must look for a place to build a new one. When she found a spot to her liking, she began to dig a hole in the ground.

Very soon the new Queen found that the wings that had carried her on her wedding flight were heavy and uncomfortable. They had served their purpose. Now they were in the way, so she broke them off.

Little by little she burrowed deeper and deeper into the ground. When she was deep enough, she sealed the opening to her nest. There in the dark she curled up and waited. She was preparing to lay her eggs.

When the eggs were laid, she waited a while longer. She didn't eat anything or drink anything. Then one day the little eggs broke open. Out came a lot of little live white things without heads or legs. They looked like tiny worms. These were the larvae that would later turn into slim strong ants.

To feed the larvae, the Queen laid more eggs and mashed them into a tasty dish. After a while the larvae began to spin cocoons, just as caterpillars do. Now they were no longer larvae. They were pupae. Their cocoons were like baby blankets. In the cocoons the pupae slept for several weeks while their bodies grew and changed.

At last the cocoons began to open. Weak as she was from lack of food, the Queen helped the new-born ants out into the world. Then she laid more eggs to feed them. The young ants were still pale and yellowish. Their bodies would

not become dark until they went out into the sunshine.

For a short time the new ants did nothing but rest. But they were all worker ants, and very soon they began to get busy. First they dug their way into the open air. Then they went out to find food for their mother. They brought her this food quickly, for she would die if she were left without it much longer. Then some of them set to work to dig more tunnels and more rooms, so there would be space for many more ants. Their life of hard work had begun. They would live perhaps four years, and they would do nothing but work, work, work, every waking moment of that time.

Strong and well fed again, the Queen laid more eggs. Some of the older ants took up the duties of nursing. It was their work to carry the larvae and the pupae out of the ant hill for sun baths to make them grow faster. They brought



the larvae food, and helped the young ants to come out of their cocoons. Soon there were hundreds of eggs hatching. The family was beginning to grow.

At first only workers hatched from the eggs. But later the Queen laid special kinds of eggs, which hatched into winged princes and princesses. The ant colony was complete.

### INDOOR WORK

Not far from the Queen's chamber are the nurseries. Here the little larvae are being fed. The nurses are giving them drops of honeydew. Then they begin to clean the baby ants with their tongues. From the baby ants' skin comes a very sweet fat. No wonder the nurses like to feed and clean them!

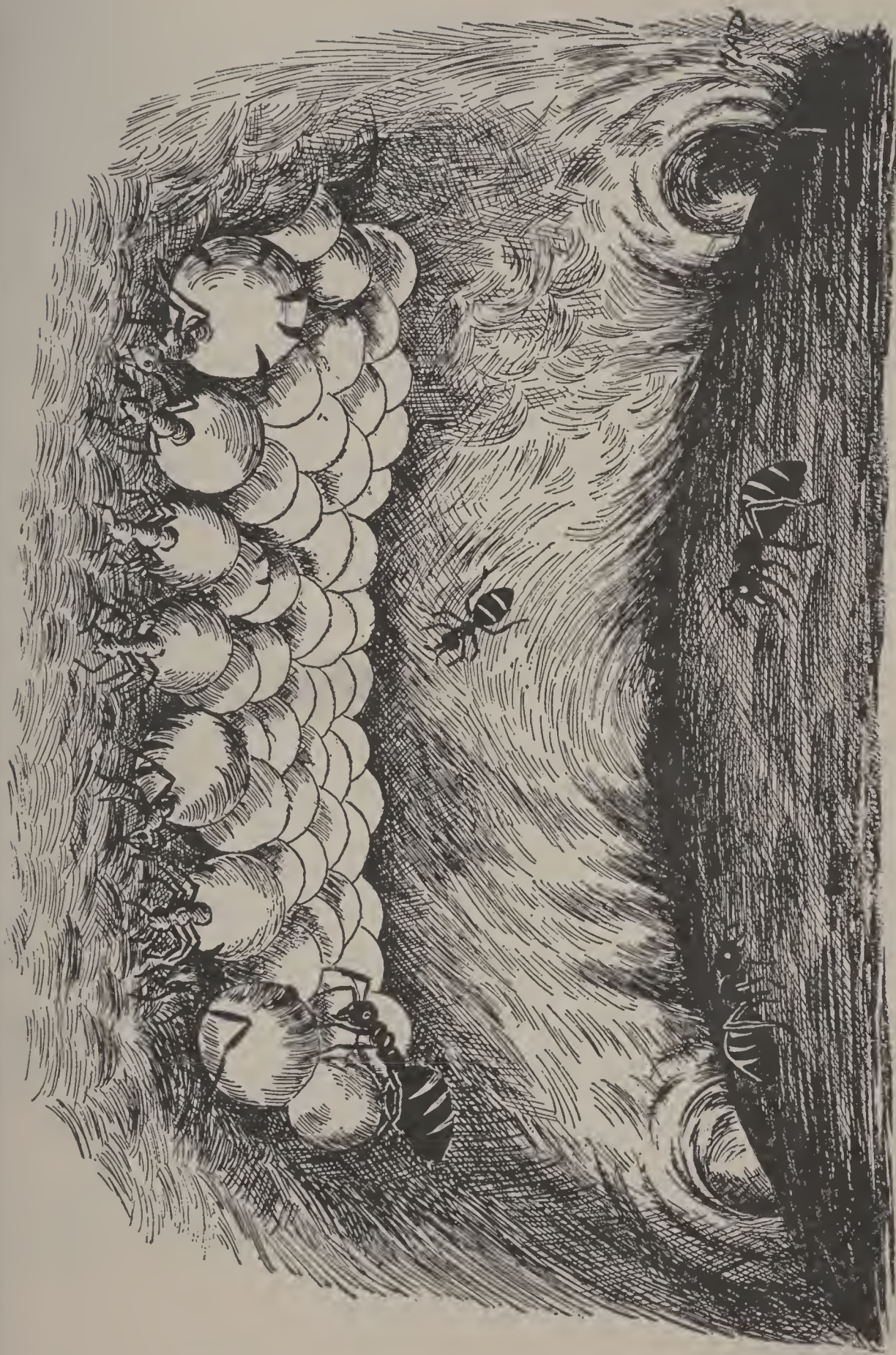
Outside the nurseries, the halls are as busy as the streets of a city. Ants hurry to and fro, some carrying food, some carrying dirt, some on their way to work.

Once in a while an ant that has been doing indoor work stops a dairy maid returning full of honey. With its feelers the indoor worker tells the dairy maid that it is hungry. Out of the dairy maid's public stomach comes a delicious drop of honey, which is lapped up by the other. Then both ants hurry on.

Down the winding halls are some rooms into which the dairy maids go with their loads of honeydew. When they come out they are no longer swollen. What has happened to the honeydew?

A peek into one of those shows something strange. Hanging from the ceiling are what seem to be bags as large and round as grapes. The dairy maids, climbing the walls, are pouring into these bags their loads of sweets.

But now a closer look shows that these bags are not bags at all. They are ants! Their public stomachs are big and round with honeydew. They are ant bankers.



HANGING FROM THE CEILING ARE WHAT SEEM TO BE BAGS, AS LARGE AND ROUND AS GRAPES.

They save the store of honey for the colony, just as a banker keeps money for people, until it is needed. When any ant wants something to eat, it can climb up to the ceiling of the honey storeroom, let one of the bankers know that it is hungry, and out comes a drop of honey-dew.

Well, there must be storerooms for other food too. One way to find them is to follow the ants bearing seeds, and peep into the rooms where they go. Here on the ground are piles of seeds. The incoming ants place their seeds on the piles, and hurry off to bring in more. All the time soldier ants are at work on the seeds, breaking away the shells with their powerful jaws and placing the meat, or kernels, on separate piles. Other ants carry the seed kernels into chambers where they are stored.

As we can see by this time, every ant has a very special kind of work. Men

and women, and boys and girls, have special kinds of work, too. But there is a difference. Most people can change their jobs if they wish. Most ants cannot. Usually each does only one kind of work all its life. The Queen lays eggs. The workers support the colony. Besides farmers, dairy maids, nurses, bankers, seed-crushers, and packers, there are also street cleaners, house maids, watchmen, diggers, and builders.

### ENEMIES WITHIN THE CITY

Except for the princes and princesses, every ant in the colony is earning its living and working hard. No worker ant is ever a loafer or an idler. But, just as happens among people, there are enemies ready to live on these hard-working ants.

Outside there are bandits. But some enemies dare to live right within the ant hill. They are very small ants, and what

sly little fellows they are! They tunnel their rooms and halls right alongside those of the worker ants. They make small openings from their halls into the halls of the ant hill. Then, when it seems safe, they creep into the store rooms of the larger ants, and carry food back into their own tunnels. The large ants cannot follow because the openings are too small for them to creep through.

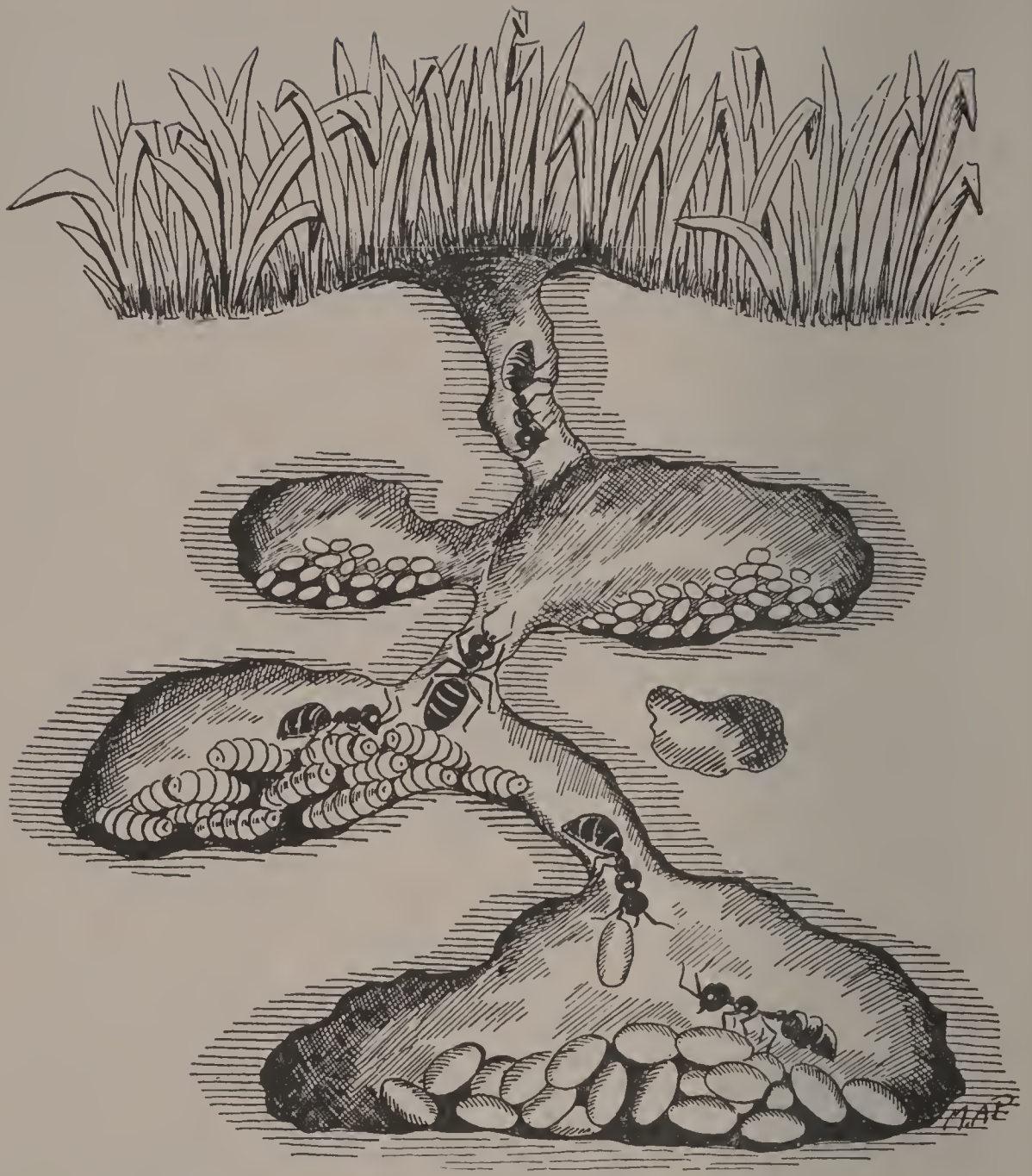
These little ants act much as mice do in the homes of people. But they are by no means the worst enemies that the ants could have. Some ant hills are bothered by strange insects known as traveling bars because they give out a sweet liquid. They are like the bars, or counters, at which people buy drinks and sweets. The ants become very fond of the liquid given to them by the traveling bars, and they feed the bars instead of storing food for their own colony. Sometimes whole ant colonies become poor, or

even die out, because of traveling bars. So our ant hill can be counted very lucky when it is bothered only by such things as little mice-ants.

## WAR

But the day comes when the ant hill is attacked by its worst enemies — other ants. One afternoon the scouts and guards posted around the ant hill come running to the entrance. They bang their heads in a certain way against the walls of the tunnel. This banging carries a message to the ants inside. It is a danger signal! “Red ants! Red ants!” That is what the guards are telling. The message is carried through the walls, taken up by other ants and repeated, and in an instant all the ants in the hill have been warned.

At once all regular work stops. The colony must be saved. Guards are placed at the entrance. The Queen, the ant



WHEN THE RED ANTS COME, EVERYTHING IS CARRIED DEEP INTO THE HILL.

cows, the stores of food — everything is carried deep down into the hill. But it is the eggs and larvae and pupae that



are most carefully hidden, as far below ground as the tunnels go. For the red ants come mainly to steal eggs and baby ants. Red ants are fighter ants. They do not live by working. They have other ants to do their work. When they do not have enough slaves to bring food for them, they go out to capture more. They carry off the eggs and larvae and pupae, so that when these become full-grown ants they will be used to the red ants and will work for them as they would for their own kind.

Now the ants have done all they can. Most of them try to run away to hide until the attack is over, for they stand little chance against the powerful fighter ants.

Suddenly the red enemies are upon the hill. They fall upon the fleeing workers. Many of the workers have their legs and feelers torn off. Some have their heads torn off, and their bodies live

for hours afterward in squirming agony.

The red ants break past the guards that are holding the entrance. Into the hill they go, fighting their way through the tunnels. And now there is nothing to keep them from carrying off whatever they can find.

When the red ants have gone at last, there are few signs of life around the hill. They have left destruction behind them. Many of the eggs and young ones are gone. The ground is littered with wounded bodies.

Those ants that managed to escape returned. Some of the wounded stir, begin to move, and crawl wearily to help others worse off than themselves. There is a great deal of work to be done.

First they make certain that their Queen is not harmed. Then the young ants and eggs that remain must be tended more carefully than ever, for the colony has lost many of its workers. The battle-

field must be cleaned. The dead must be carried to the cemetery. Tunnels, which have been broken in places, must be rebuilt.

## SLAVERY

In this case the red ants just attacked and took the slaves they wanted. But sometimes worker ants become the slaves of red ants in another way. And the second way is much worse for the colony.

This is how things *might* have happened. One day, while all the worker ants are busy at their tasks, a strange Queen ant slips unnoticed into the ant hill. Along the halls she goes until she comes to the rightful Queen's chambers. She enters, but for some reason the Queen does not give the danger signal. Perhaps this strange Queen has already got the smell of the ant hill on her. At any rate, the two Queens seem to be getting along in a friendly way. In a little while the

stranger Queen is on the rightful Queen's back, caressing her head with her feelers.

Now that seems very nice until we know the real state of affairs. Because that wicked stranger isn't really just caressing the Queen's head. She had begun by doing that, and the Queen liked it. But now — and who knows whether it hurts or not — the invader is — nipping the Queen's head off!

Now the old Queen lies dead, but strangely enough, all the other ants keep right on working as before. They even let the new Queen rule in the place of the old one.

All this is very puzzling. It seems that death does not disturb ants as it does people. When an ant dies, it is carried to the cemetery, and that's all there is to it. The life in the colony goes on. There is no excitement unless something happens that may harm the whole colony. It may seem that the

death of the Queen Mother — the Queen that had founded the colony — would be a great blow for that very reason. But to the ants the new Queen seems as good as the old one. She has the ant-hill smell on her. She will lay eggs and the colony will go on growing as before.

But there is one thing that ants cannot realize, because they do not have minds and cannot think as people can. They have been fooled by this stranger, simply because she smells all right. She is really a red ant. When she begins to lay eggs, the eggs hatch into red ants. And the red ants make slaves of the real builders of the colony.

They won't do a bit of work for themselves. They have to be fed and cleaned and tended, just as if all of them were princesses. They are parasites, the kind of insects that live on others.

After a while there are so many parasite ants that the ant hill has a hard time

to keep going. Before this the black ants had done rather well, since everyone was working. But now half of the colony are idle and the other half have to feed and tend both themselves and their masters. So the red ants have to go out from time to time and attack other hills to bring home more slaves.

We might expect that the slaves would fight against their masters. They have the strength to do this if they would. But ants do not want freedom as people do. They do not understand the reason for their troubles. They go right on working.

## WINTER

Luckily, this is only what *might* have happened to our ant hill. And so, while the attack of the red ants was a terrible thing, the colony is not so badly off as it might have been.

There are only a pitiful few of the

workers left, and only a few eggs and young ones. The colony must be built up again. So, when the wedding day comes for the princes and princesses of the countryside, our ants are on the watch. They must capture as many young Queens as they can and take them back to the ant hill. They used to need only one Queen. But now the more Queens they have, the more eggs there will be, and the more ants will hatch.

And so, by the end of the summer, the ant colony is almost as well off as it had been before.

Now winter comes. The work of collecting food stops. The cows are dragged in out of the cold and carried far down into the barns. The barns are tunneled out right around the roots of a corn plant. So all winter the cows can feed on the corn-plant juice, while the ants tend them, just as any man would do on his dairy farm.

For the most part, the ants sleep through the winter, staying down in the winter living rooms deep in the ant city where it is warmer. When spring comes again, most of them are still alive and well. The dead are carried above ground to the ant cemetery. The living ants go out into the sunshine and fresh air to work and grow strong again after their long stay underground.

### CLOSE RELATIVES

This is the story of only one ant hill. It tells very little of all there is to know about the ant kingdom. There are about thirteen thousand different kinds of ants! They live in many different parts of the world and on many different kinds of food. Some eat living insects. Some eat dead ones. Some eat fruit, and some eat vegetables or grain. Some even eat tiny mushrooms that they grow in underground gardens. What the ants eat



depends on the food that they can get where they live.

Just as different ants eat different kinds of food, so they can build different kinds of houses. Some build entirely



THIS IS THE TERRIBLE BLIND DRIVER ANT, BEFORE WHOM  
WHOLE VILLAGES FLEE.

underground. Some build hills of dirt above the ground. Some bore through dead trees. In some very hot countries ants build balls of earth high up in trees. Then they plant seeds of certain flowers

there, and as the roots spread out, the ants tunnel their halls and chambers in the balls of earth. High up in their tree-top home they live pleasantly, safe from floods.

The ants we find in our country sometimes annoy us when they get into our homes, or into our food on picnics. But we are not afraid of them. Yet in Africa there is a kind of ant that is really dangerous. These terrible blind driver ants move in great armies, millions together, over the country. They eat everything before them — insects, snakes, lions, elephants, and even people. Sometimes whole villages must flee to escape them.

But no matter where they are and what kind they are, all ants are alike in certain ways. All of them live in colonies, and all of them have a social life. Always they are clean, and most of them are hard-working. We can find many

things about them to admire. It is not surprising that for hundreds of years men have pointed to the ant as a shining example for people to follow.







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