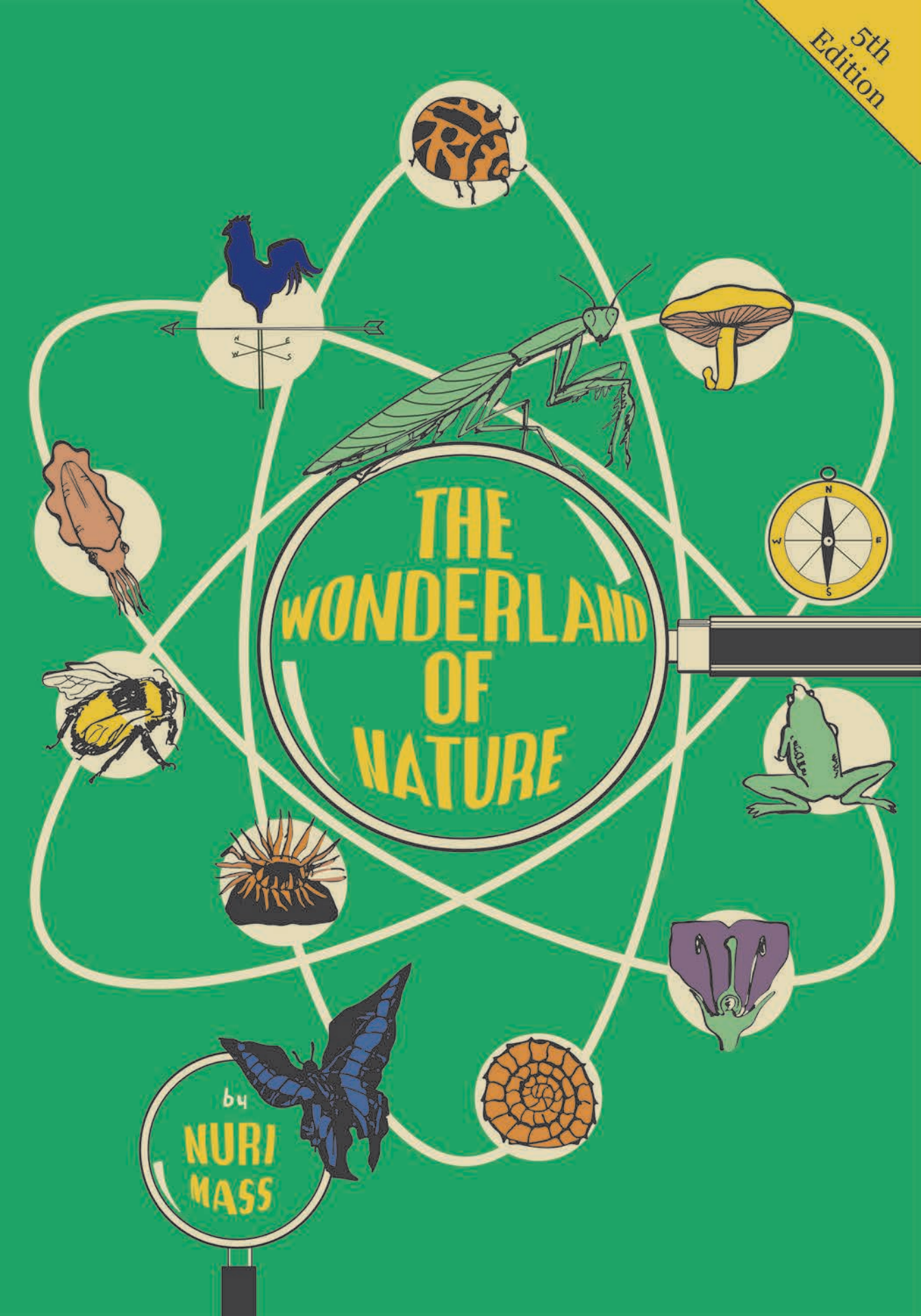
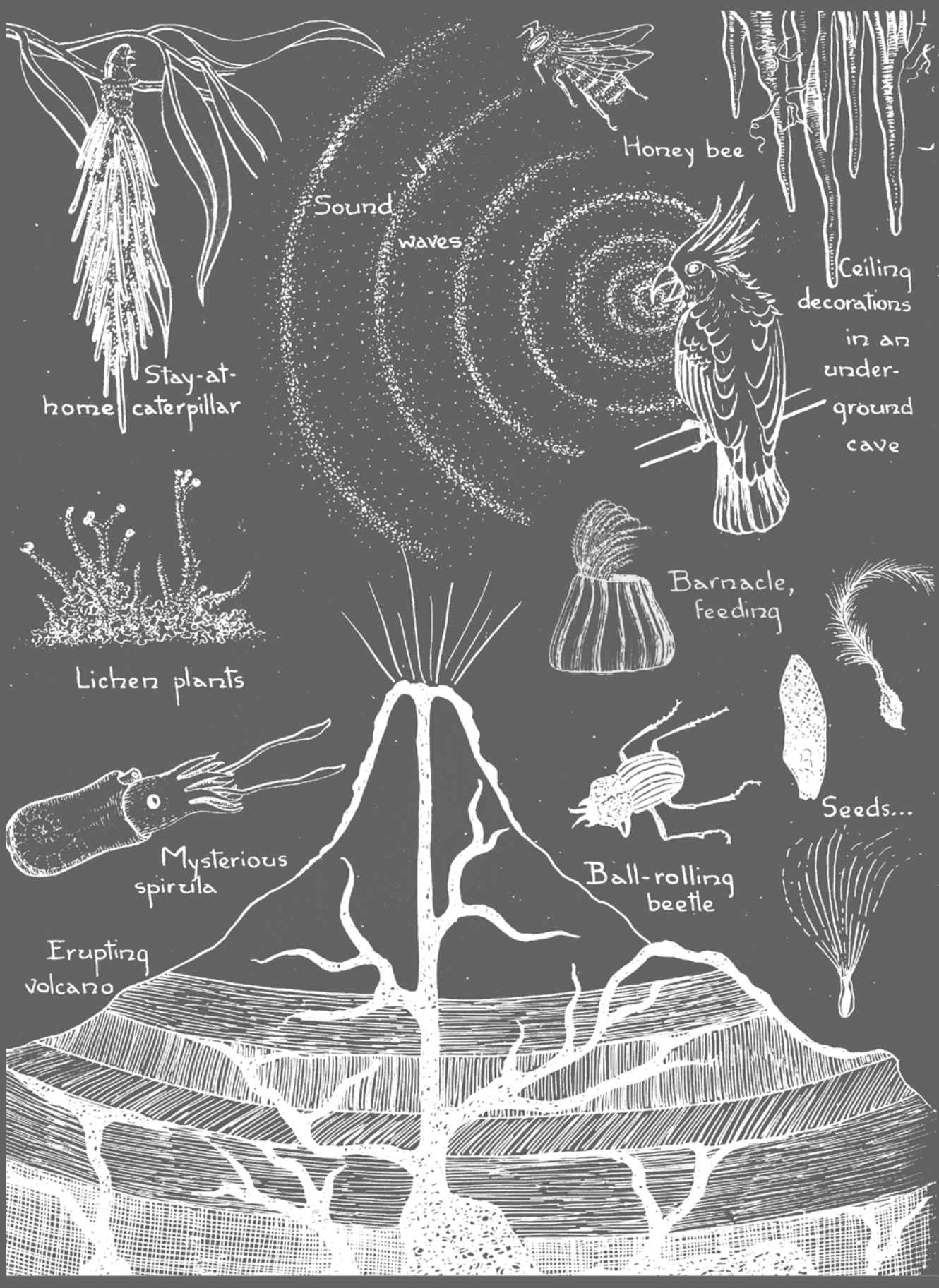
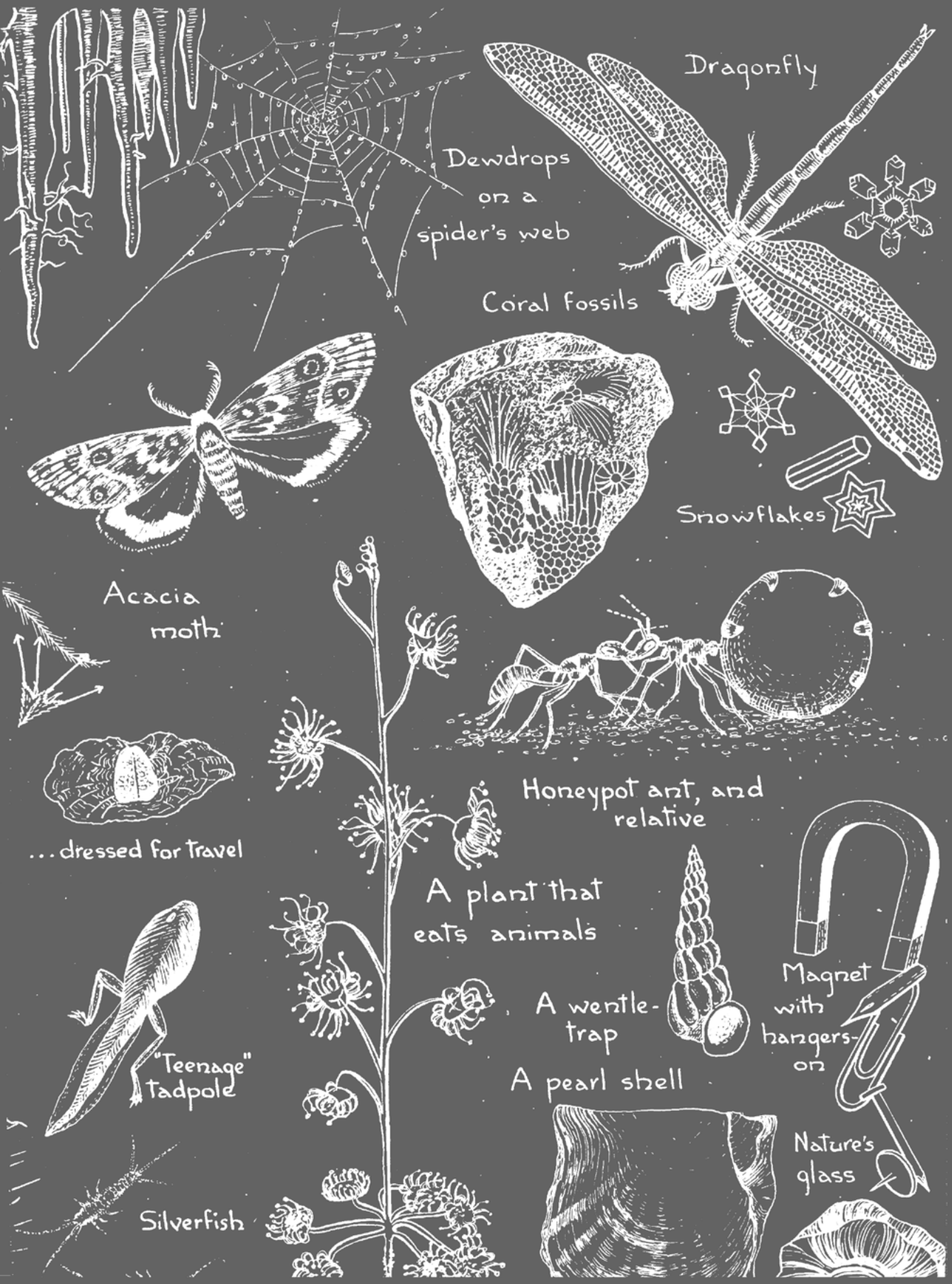
5th Edition

THE WONDERLAND OF NATURE



by NURI MASS


Stay-at-home caterpillar
Sound waves
Honey bee
Ceiling decorations in an underground cave
Lichen plants
Barnacle, feeding
Seeds...
Mysterious spirula
Ball-rolling beetle
Erupting volcano


Dragonfly
Dewdrops on a spider's web
Coral fossils
Snowflakes
Acacia moth
Honeypot ant, and relative
...dressed for travel
A plant that eats animals
A wentle-trap
Magnet with hangers-on
"Teenage" tadpole
A pearl shell
Nature's glass
Silverfish

OTHER BOOKS BY THE SAME AUTHOR:

The Little Grammar People
The Wizard of Jenolan
Magic Australia
The Silver Candlestick
Where the Incas Trod
Randy Blair
Australian Wildflower Fairies
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Just Give Us Time

Virginia Woolf, The Novelist (M.A. Thesis, Sydney Univ. 1942)

Magazine Features, published under Tina Banks nom-de-plume;

Magic Circle
Babe in the Woods
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Foxy and I
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The Reason Why
There Was, Once Upon a Time...

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To

dearest Gray,

with all our love —

Jess

Chris

A NOTE FROM TESS HORWITZ AND CHRIS HORWITZ

- the two children featured in this book.

Our mother Nuri Mass spent many months researching, writing and drawing for this book. We loved helping her find the specimens that decorated our house in Sydney, all in jars with mesh tops, with favourite foods for the insects inside.

When a moth or butterfly was about to come out of its case, we all gathered around to watch while our mother drew the event so expertly. Investigating nature with our mother was an important part of the happiness of our childhood and we are thrilled that so many others have shared in these experiences, through all the editions of this book over the years.

Today we remain in awe of the amazing powers of nature, and in this edition have expanded several sections to show newly discovered features of the complex world around us. We continue to delight in nature, and hope that this delight will keep expanding and deepening in all of our young—and not so young—readers.

December 2018.

. . . Long ago, a little girl named Alice fell asleep — and, in her magical dream, she walked through a looking-glass into Wonderland. Today, we know that Wonderland is all around us every moment of our lives, and that we can pass into it, wide awake, whenever we like — through a magnifying glass.

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A Few Other Small Animals

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Remarkable Everyday Things—and Rocks

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Before we begin, I should like you to meet . . .

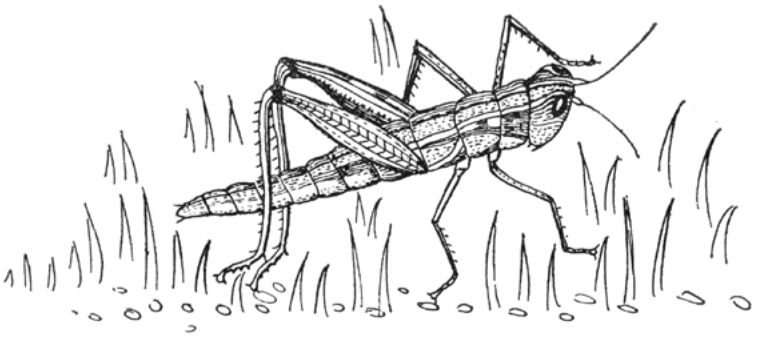
CHRIS and TESS . . .

who have explored the Wonderland of Nature with me, and found new treasures in it day by day.

They have enjoyed every exciting moment of it. They have searched, and observed, and asked all of the questions that most other children would ask.

In short, I couldn't have done without them in the writing of this book.

Insects

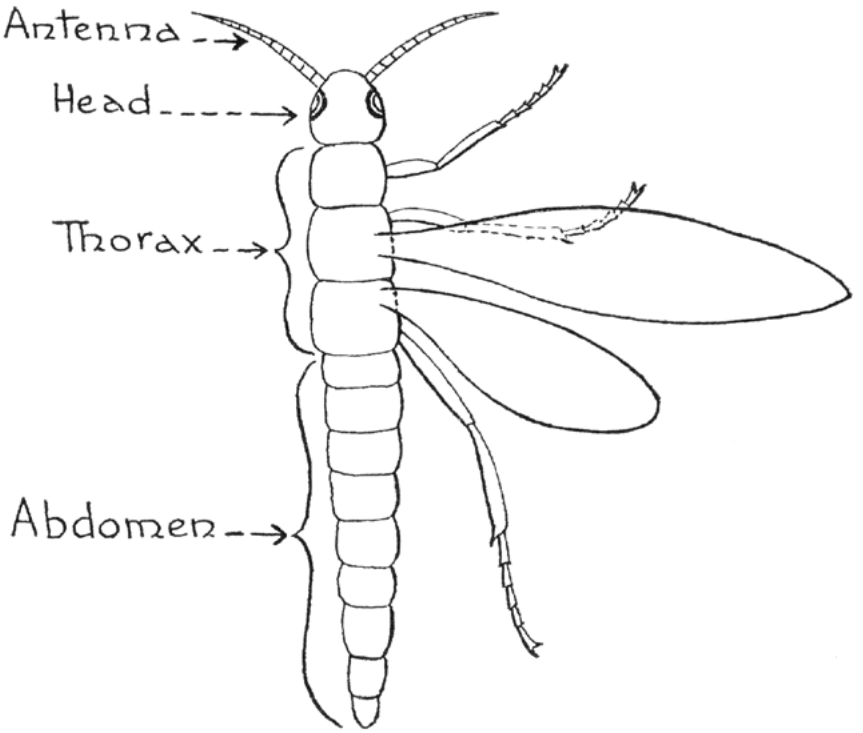


What Makes an Insect an Insect?

IT is possible that there are more insects on this Earth than all the other animals put together, so we really should know something about them, shouldn't we? And the first thing to know is, what makes them insects instead of something else?

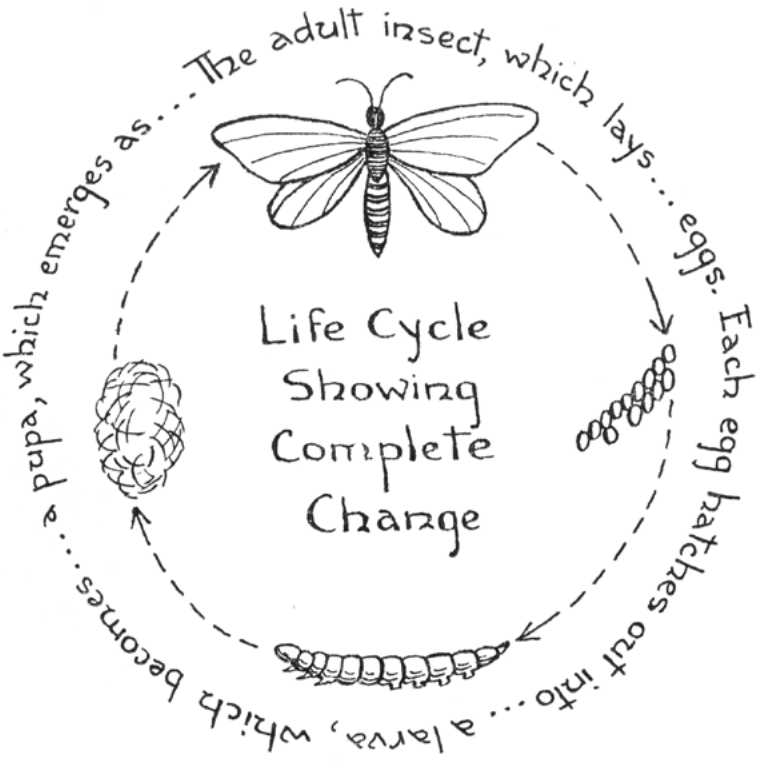
First, an insect always has six legs.

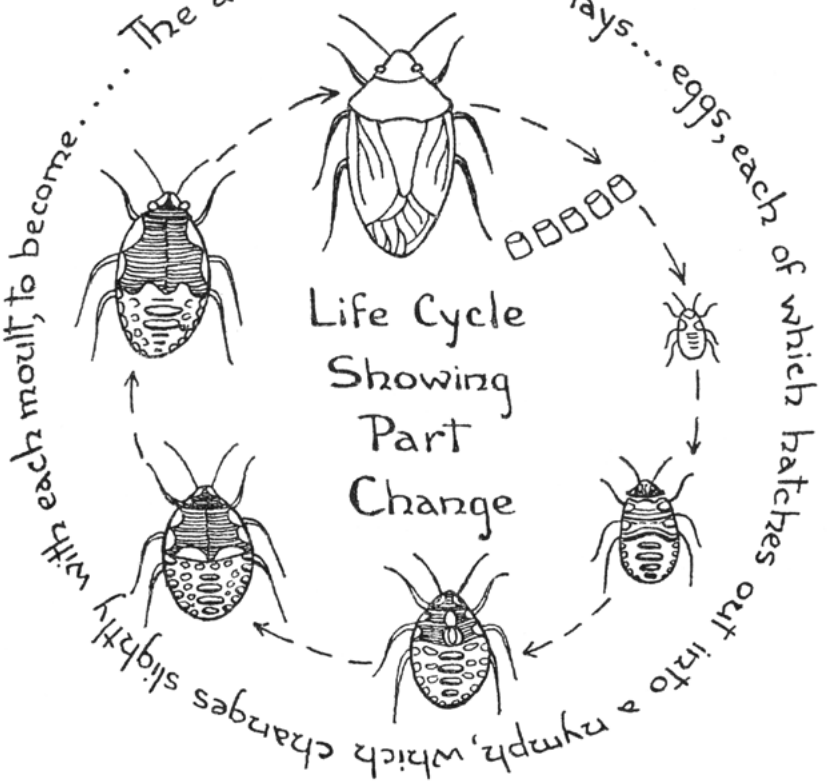
Next, an insect's body has three parts to it—head, chest (or thorax) and abdomen. Mostly these three parts show out quite clearly, but sometimes there doesn't seem to be much difference between them at all.



Next, an insect has two feelers (or antennae) on its head—very sensitive, like the antenna of your TV set. Also, most insects have wings at some stage during their life histories. These are always attached to the thorax—the same as the legs. Mostly there are four wings, but the large fly family have only two.

Some groups of insects have wings that are smooth, papery and transparent, with lovely patterns of veins showing clearly. But the


Life Cycle Showing Complete Change
The adult insect, which lays... eggs. Each egg hatches out into... a larva, which becomes... a pupa, which emerges as... The adult insect, which lays...


Life Cycle Showing Part Change
The adult insect, which lays... eggs, each of which hatches out into a nymph, which changes slightly with each moult, to become... The adult insect, which lays...

wings of moths and butterflies are covered with tiny scales, and sometimes they have soft silky hairs on them, too.

Then, there is something funny about an insect's skin. Even though it may seem to be soft, it isn't. It is quite hard, and cannot grow as the animal inside it does. So of course, there keeps coming a time when it is too small. Then it splits open, and the insect wedges out of it, in a new, larger skin. This is called moulting, and insects moult their skins quite a number of times before they are fully grown.

Another thing about an insect's growth is that it often brings about great changes—and all of these, taken together, are called its life cycle. Insects like moths, butterflies and beetles change completely during their lives. They start off as eggs. Each of these hatches out into a caterpillar (which is called the larva). When the caterpillar has had enough to eat, it folds itself away out of sight and nobody sees what it is up to for a while. Sometimes it makes a little case for itself, called a cocoon or chrysalis—other times it just curls up under the ground somewhere, without any covering—and at this stage, it is called a pupa.

A pupa does not eat, and many people think that it is resting. Well it is, too, in a way, but *while* it rests, Nature is busy making great changes in it, so that when it wakens again at last, and comes out into the open, it is a moth, butterfly, beetle, fly, wasp, or some such, which lays eggs to begin the life cycle all over again.

But insects do not always change completely in this way. Some—like bugs, mantids and grasshoppers—change only partly. Again, they start off as eggs, but out of each egg that hatches comes a tiny creature that looks *rather* like what it will be when it grows up. As it grows and moults, it often changes the colour or pattern of its skin, until at last it is full grown—and all the time it is doing this, it is called a nymph.

Then of course, there are a few insects, like the silverfish, that do not change at all. They come out of their eggs as tiny versions of what they will be like when they are grown up. Look at a baby silverfish under a magnifying glass, and you will see a grown-up silverfish.

Now, if you read on, you will learn about some of the insects that you meet most often in bush and gardens.

Ladybird, Ladybird, Don't Fly Away!

WHEN Chris and Tess first saw a certain kind of little grub running around on a plant covered with aphids, and stopping to eat a few now and then, they didn't think for a moment that it had anything to do with ladybirds or beetles.

But then, on the back of a leaf, they found another of these grubs, looking the same as the first one, but behaving differently. Its little brown-and-orange body was bent over into a hoop, and it was so still that it reminded us of caterpillars when they turn into pupae. And that's exactly what was happening—it was becoming a pupa.

We decided to watch this one, and see what would happen.

Soon it had become a perfect little dome, with dark spots arranged in a pretty pattern—and so it remained for a few days quite still, on the back of its leaf.

Then, one morning, its outer skin broke open, and out walked a very shiny, pale-yellow ladybird beetle, with no markings at all. But gradually its colour changed to bright orange, and the tiny black patches appeared that we all know so well.

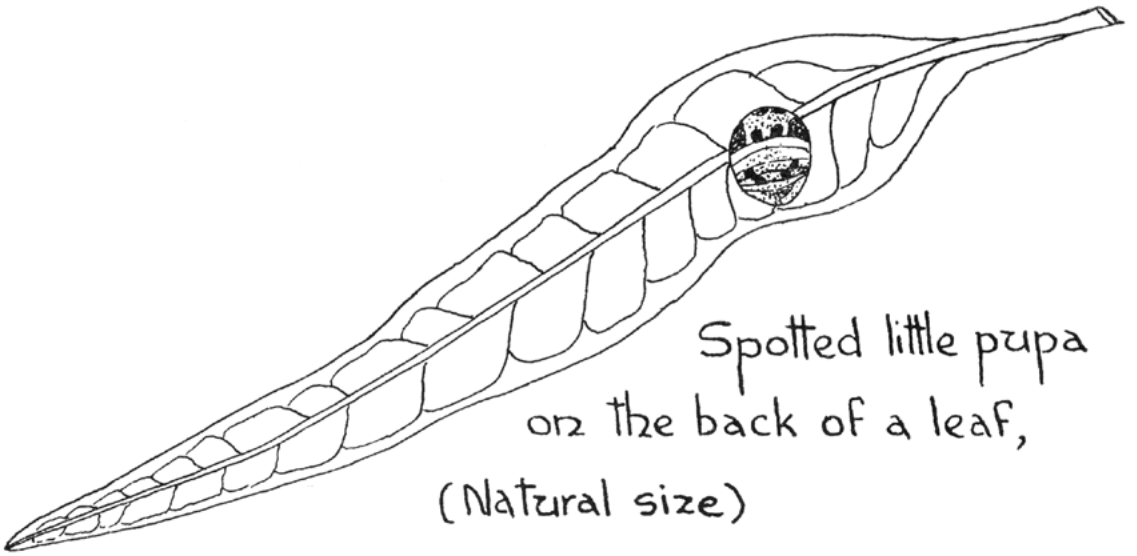
Chris touched it gently, and it rose up in a little flight, showing the pretty gauzy wings that lay protected underneath its black-and-orange ones. It didn't go far, though, because—the same as the little grub that it used to be—it was very interested in a branch covered with aphids. So it soon came back and got really busy amongst them, for an aphid is a ladybird's favourite dish.

People often destroy ladybirds, thinking that they are eating their plants—but in reality, they are one of the best friends a garden could have. Only one of their many different kinds is a plant eater—the one with twenty-eight spots on its back. The others eat only those bad little creatures known as "blight", which ruin plants by swarming all over them and sucking out their juices.

So, instead of reciting that old rhyme, "Ladybird, ladybird, fly away home, Your house is on fire and your children are gone," we should sing,

> Ladybird, ladybird, don't fly away!
> Our plants need a friend, and would like you to stay.
> And we like you, too, with your colours so bright.
> Welcome, dear ladybird—gay little mite!

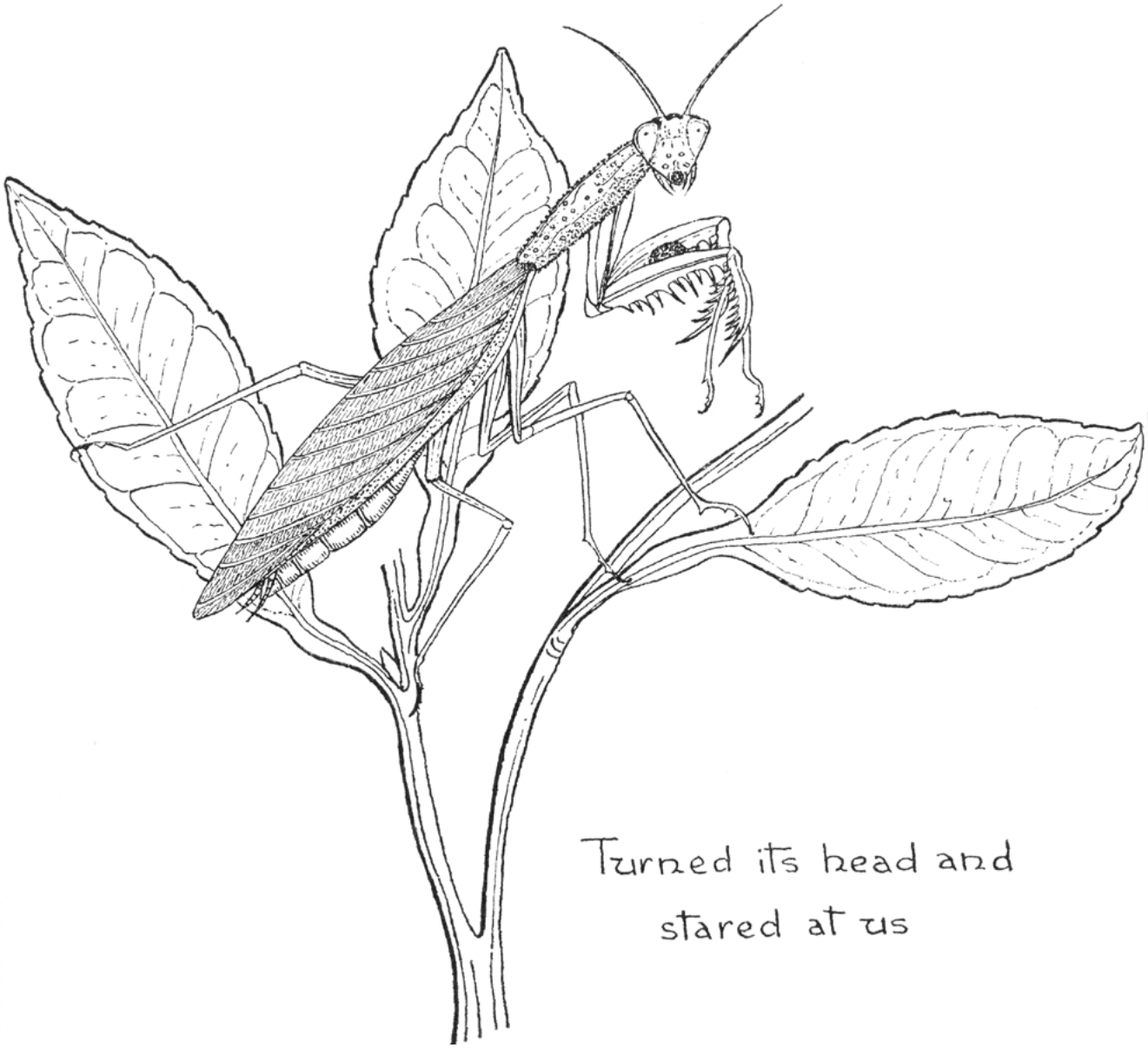
Greedy little aphid-
eater, dark brown and orange



Spotted little pupa
on the back of a leaf,
(Natural size)

A few hours after it emerged
from its pupal "sleep" — flame-
coloured, with black marks

A little "visitor" —
yellow and black


Turned its head and
stared at us

The Mantis—A Very Special Insect

IF ever you should find a praying mantis in your garden, stop and have a good look at it, because it's one of the most entertaining insects in the world.

We found one in our orange-tree the other day, and it was rather a wonder that we did find it, because it was exactly the same colour as the leaves, and standing perfectly still, and if you looked away for a minute it was difficult to find again.

Then, as we watched, it did all kinds of funny things. First, it changed leaves, swaying and balancing on its four back legs while stretching forward and "pawing" at the air with its two front ones, very prettily, like a dog begging. Then it drew one of its back legs forward and ran its tiny mouth up and down, cleaning it. Next, it rubbed one of its front legs over its face and right round the back of its head, just like a cat washing *its* face.

When this was over, suddenly it swivelled its head around and stared at us.

Tess said, "Oh, look, Mummie, what a darling!"

Chris said, "That's funny! I don't remember any other insect doing that."

And he was right. That's one of the queerest things about the whole family of mantids. They can twist their heads around the way we do—and no other insect can.

Tess was also right, about its looking a darling, with its funny little head shaped like a triangle, and its big bulging eyes, and endless antics. But if she had been a fly, she wouldn't have been so pleased, because the mantis would probably have eaten her.

You see those fierce-looking front legs with all their spines? Those are to catch flies and other small insects with, and to hold them tightly while the mantis eats them. But lady mantids don't stop at other kinds of insects. They quite often eat their own husbands, as well.

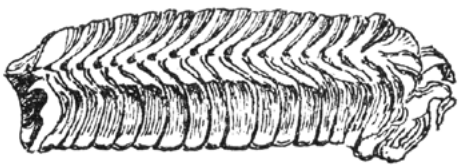
The one on our orange-tree was rather small—about 50mm long—but there are other kinds much bigger, and sometimes they are brown instead of green.

You'll be delighted if you ever find one of the little cases in which mother mantis lays her eggs. It's very delicate-looking-brown or pale green—and *so* pretty. But even prettier are the baby mantids themselves when they are first "born".

Each of them has to struggle out of a tight skin sheath before it can take its first look at the world—and then, you can't help loving this tiny creature which looks and behaves so exactly the same as the big grown-ups.

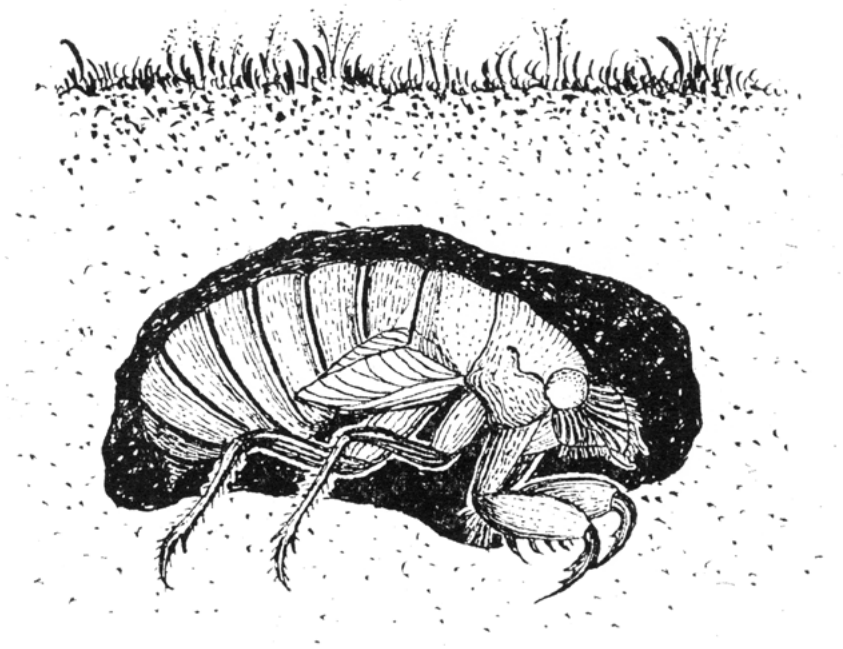
Do you know why it is called a praying mantis? Just watch it and see how often it folds its front legs up against itself in an attitude of prayer! Of course, considering the way it hunts and eats insects, it should be called *preying* mantis, shouldn't it? But we shouldn't think of it too unkindly for this, since it relieves us of so many flies and other insect pests.

Actually, a praying mantis is as useful to us as it is entertaining.



A little brown egg-case,
papery thin

The Kindly Cicada



THIS looks like the kind of thing you wouldn't like to meet in the dark. Perhaps you wouldn't like to meet it at all. Yet it is quite harmless in spite of its looks—and when grown-up, it is actually very handsome. Strange as it may seem—this youngster (or nymph) will one day be a long-winged, loudly-singing, summer-loving cicada.

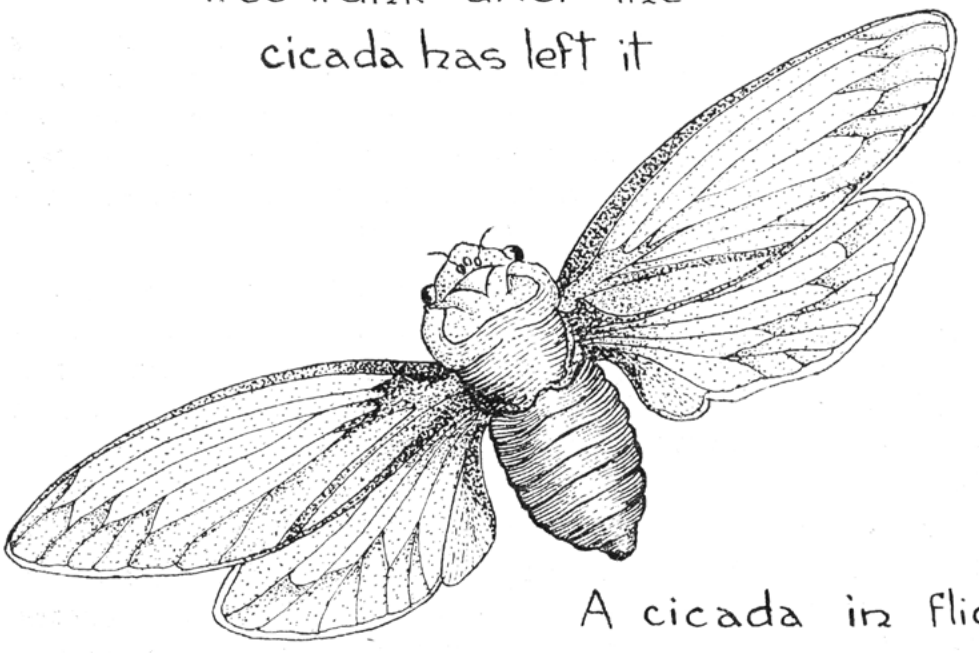
You do not often see a cicada at this stage, for while it is like this, it lives under the ground, as though it didn't want to be seen looking so ugly. Sometimes it goes to extremes, and lives very far under the ground indeed—about 6m—and it stays there for several years, in the dark, with nothing to eat except a bit of sugary sap out of the roots of plants.

Then, one night, after it has had enough of this kind of life, it makes its way up to the surface of the soil, climbs on to something and clings there waiting for its skin to split open. When it does split open, wedging and pushing movements can be seen, and at last a beautiful creature comes out of it, with long transparent wings.

It doesn't look very beautiful at first—just pale, soft, and rather shapeless. But by morning it is already straightening out, and a few hours later—with darkened colour and strengthened wings—it is a full-grown cicada bug. And you know what fine creatures they are.

A branch in which a cicada has laid eggs

A nymph's empty shell, still clinging to a tree-trunk after the cicada has left it



A cicada in flight

You also know how noisy they can be, on summer days and evenings. And, considering how long they have been living here, it is possible that their singing was the first sound made by any animal on Earth. Why, there are fossils of our Australian cicadas which prove that they were here 200 million years ago—looking just the same as they do today.

There are many strange things about a cicada's singing. First, the lady is quite silent—it is only the male who sings. The next strange thing is that the whole idea of the song is to attract the lady's attention—yet cicadas have no ears, so you may think that they are quite deaf. The third is that the sound is made with a sort of little drum on the cicada's abdomen. But instead of being tapped, this drum is crinkled in and out by movements of the cicada's muscles—and as it crinkles, it makes a surprisingly loud noise.

Although the lady cicada doesn't hear this "song" with ears like ours, she feels it. She feels the vibrations it makes, and she likes them so much that she agrees to marry the clever "singer". Then, after a while, when she has eggs to lay, she chooses a suitable branch on a gumtree, and cuts a lot of little slits in its bark, until it looks quite fuzzy. Into each of these slits she places a few eggs, and when the baby cicadas hatch out, you would never guess what they were going to be, for they are black and very small, like fleas.

Also, you would be really lucky to see them at all, for as soon as they come out of their eggs, they can think of only one thing—getting underground as fast as possible. They do not even waste time climbing down the tree. They just let themselves drop to the ground—and the next moment they have disappeared, to begin their long life as nymphs in the little dark and silent room they dig for themselves below the earth's surface.

Slowly, as the years go by, they grow bigger, and moult their skins, and grow bigger again, until at last they come up for a few weeks of summer sunshine in the glory of their final, winged form.

But now, as well as sunshine, they find danger, for birds and other animals go after them hungrily, and children are always catching them—quite often hurting them, also, I am sorry to say. Yet of all

insects, cicadas least deserve to be hurt, for they themselves do no harm to anything, and cannot even defend themselves against their enemies. They do not bite or sting, they do not burrow in the branches of plants or eat their leaves—and the small amount of plant juice that they suck, does no damage at all.

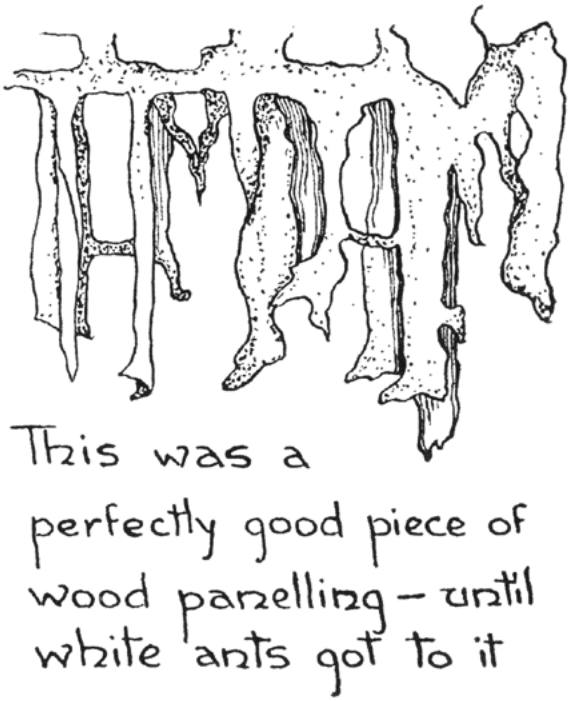
Since cicadas have no defences against being eaten, they come out of the ground in huge numbers all at once so that it is hard for other animals to eat all of them, so some will survive to lay eggs for the next generation.

If you have ever hurt a cicada in the past, you never would again, would you? Knowing how good-natured it is, and how long it has lived underground in the darkness, I am sure that you would never wish to rob it of one precious moment in the light and warmth and joy of the sun. You might gently lift it off a branch to admire it, of course, but then, quickly, you would let it go again, marvelling at this strange, bright insect who lives peacefully amongst its enemies, and whose song has resounded on our Earth through almost endless time.

Ah, welcome, dear cicada,
To the summer and the sun!
When you shrill your deafening music,
You are always lots of fun—
and you never do the slightest
Bit of harm to anyone.

Tiny Mischief-Makers

NEARLY everyone in Australia knows about white ants, because—although they are blind and very small, they are one of our greatest pests. They live in huge communities, and when they go out looking for food, people are in trouble. White ants eat all sorts of important things like furniture, houses, paper, and telegraph poles—which goes to show how much damage even the tiniest of creatures can do, if there are enough of them.

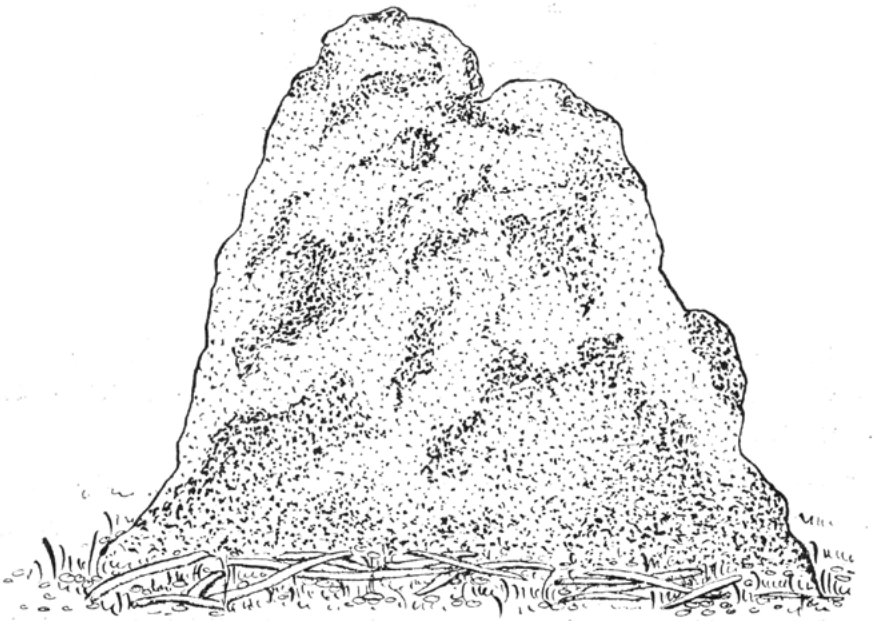


They work silently in dark places, so that, unless you are on the watch for them, they can go right ahead without your even knowing that they are there.

Strange to say, white ants are not really ants at all. They are quite different in almost everything except the way they live in groups.

Insects that live alone do everything for themselves, but those that live in groups spend their whole lives doing one special job. The biggest section of the white ant population is the workers, another important section is the soldiers, and at the centre of the whole group is the queen. Her job is to lay eggs—and she lays thousands of them a day—while her ladies-in-waiting fuss around doing everything for her.

Another name for white ants is termites. That's why their large community nest is called a termitarium. In the north of Australia, these homes may be great towering brown masses of clay after they have taken over a tree, six metres high. Some of them are like half of a disk poking out of the ground, about 1 or 2m high, with flattened sides and with their sharp ends pointing north and south. That's rather wonderful, isn't it? Then, there are white ants whose homes are down under the ground, so that you don't see them at all. Sometimes a termitarium is a knobbly mound way up in the fork of a tree. Other times it is one of those brown or reddish "anthills" that you often see in the bush.



A termitarium of red clay

But wherever it is or whatever it looks like, an enormous amount of work has been put into it. Inside, it is a whole maze of passageways leading to the nursery, store-houses, cemeteries, the queen's chamber, and so on. This is all made of tiny pieces of wood which the workers have chewed thoroughly before building with them. Then, the thick clay covering, outside, is put together grain by grain from the earth round about. Just think of that!

As you can imagine, the workers are very important members of the white ant community. But the termitarium also has to be defended

against enemies, and this is the job of the soldiers, with their hard-plated heads and strong pincers.

Man, of course, is their chief enemy, and the fierce little soldiers can't do anything against *him*. But they do wage battles against true ants quite often, which, strange to say, are another of their deadliest enemies.

Sometimes, though, the ants invade a nest so secretly that, by the time the white ants wake up to what is happening, the invaders have outnumbered them and are killing them off right and left—between one and two million of them.

Another occasion on which they are killed off in great numbers starts off as the most exciting day of their lives. This is how it happens:

There is a section of the white ant colony, quite different from where the workers and soldiers live. This is made up of males and females which actually have eyes, whilst the others are all blind. Also, to begin with, they have pretty little wings, and on a certain hot day in the year, the attention of the whole colony is upon them, for this is *their* day.

The workers get busy cutting holes right through the thick clay walls of the nest, while the soldiers stand around keeping close guard. Then at last the great moment arrives, and streams of the little winged creatures come pouring out through the openings prepared for them.

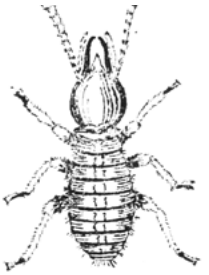
It's all very exciting, but for most of the adventurers it doesn't have a happy ending, for there are swarms of enemies lying in wait for them, and only a very few escape being eaten. These divide up into pairs, then do what seems like a strange thing. They shake their fragile wings right off—as a sign that the flighty part of their life is over, and that they are ready to settle down to the serious business of starting a new colony.

At first, of course, there is no nest or termitarium, but soon the new mother (or queen) starts laying eggs. These hatch out into baby white ants, which are soon old enough to take up their duties as workers and soldiers. First, the workers build a dome-shaped room around their queen. Then they get busy with the other parts of the nest. It's a huge job, as we have seen—but the queen keeps laying more eggs, which hatch out into helpers by the thousand, and the work goes steadily on until the nest is full-size and its population about two million.

Now, here is a very strange thing. People had lived on earth for many centuries before they began to grow crops and live a settled home life, yet there are some kinds of white ants which actually cultivate crops of “mushrooms” in special little garden plots near the nursery. These are not real mushrooms, but the soft masses of thread which would grow into toadstools. By constantly pruning these, the workers keep them down to just the right size for the nest’s tiny inhabitants.

So you see, even though white ants are such a nuisance to us, many of the things they do are really interesting and wonderful.

A worker



A soldier

With wings open . . . . and closed

White ant queen