



THE little THINGS

THAT RUN THE CITY

BY KATE CRANNEY, SARAH BEKESSY AND LUIS MATA

In partnership with City of Melbourne

**30 amazing
insects that live in
Melbourne!**

**THE LITTLE THINGS THAT RUN THE CITY
30 AMAZING INSECTS THAT LIVE IN MELBOURNE!**

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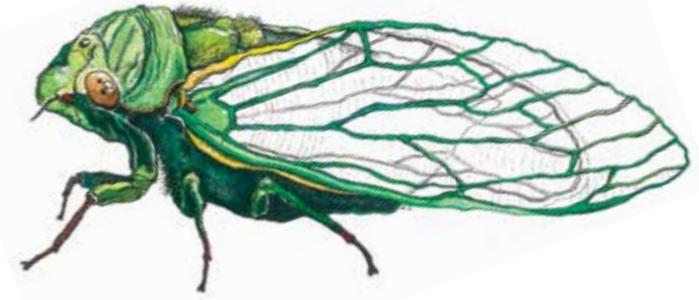
ABOUT THIS PROJECT

This book is an outreach educational resource prepared by Kate Cranney, Sarah Bekessy and Luis Mata for the City of Melbourne. Kate, Sarah and Luis work as part of the Interdisciplinary Conservation Science Research Group at RMIT University in Melbourne, Australia.

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**30 amazing
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Bright green cicadas. Tiny blue flies with patterned wings. Crickets that sing loudly on your lawn. Do you know that there are at least 1,000 different insect species living alongside you in the City of Melbourne?



YOU HAVE TO LOOK CLOSELY TO SEE INSECTS, THEY CAN BE VERY SMALL.

BUT, IF YOU PAY ATTENTION, YOU'LL START TO SEE AMAZING INSECTS EVERYWHERE!

There are at least one million species of insects in the world! And there are probably many more insect species yet to be discovered and named. Scientists guess that at any one time there are 10 quintillion, or 10,000,000,000,000,000,000 insects alive on Earth!

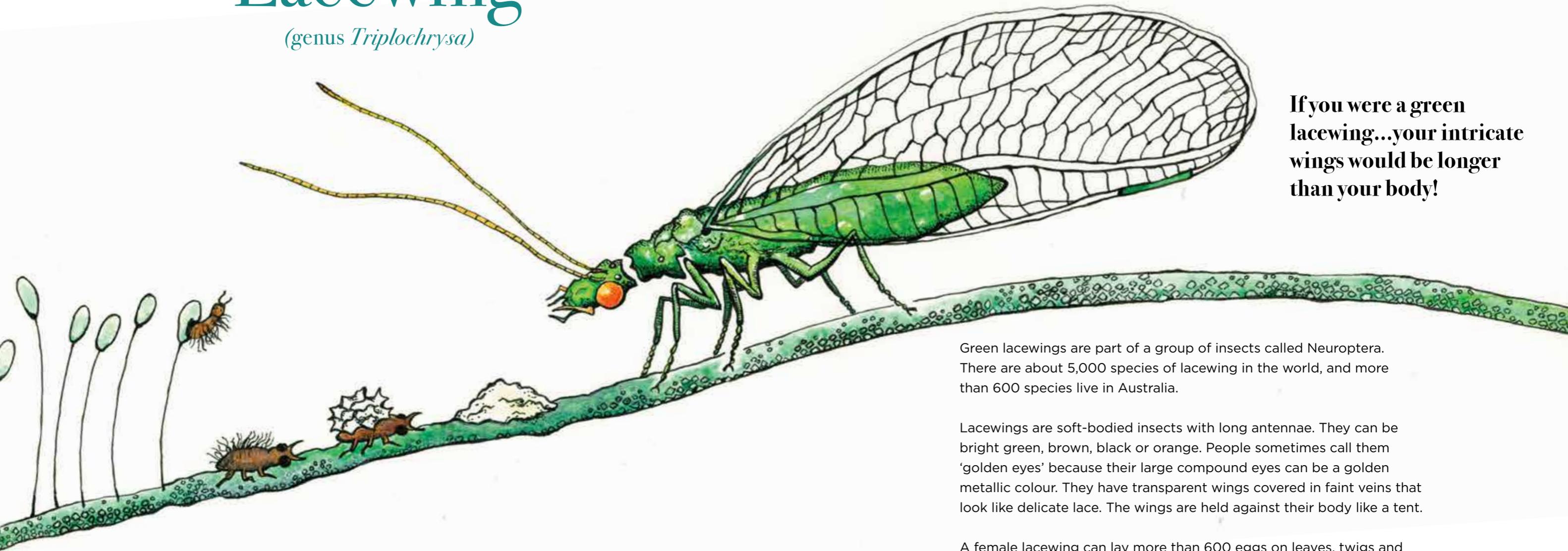
No matter their size or shape, insects are very important. They spread seeds, pollinate flowers, produce honey, keep soil healthy, help control weeds, and are also food for other animals like lizards and birds. You could say that insects are Melbourne's hardest workers!

In this book, you will get to imagine that you are an insect living in Melbourne's parks! Imagine drinking nectar from flowers, flying over the swings, or crawling on the ground in between blades of grass. You will also get to learn some words in the Boon wurrung Aboriginal language. Do you know that the Boon wurrung word for insect is 'kam-kam-koor'? Let's meet some of the amazing insects living with us in the City of Melbourne!

IF YOU WERE AN INSECT IN THE CITY OF MELBOURNE ... WHICH ONE WOULD YOU BE?

Green Lacewing

(genus *Triplochrysa*)



If you were a green lacewing...your intricate wings would be longer than your body!

Green lacewings are part of a group of insects called Neuroptera. There are about 5,000 species of lacewing in the world, and more than 600 species live in Australia.

Lacewings are soft-bodied insects with long antennae. They can be bright green, brown, black or orange. People sometimes call them 'golden eyes' because their large compound eyes can be a golden metallic colour. They have transparent wings covered in faint veins that look like delicate lace. The wings are held against their body like a tent.

A female lacewing can lay more than 600 eggs on leaves, twigs and even on your windows. She lays them on leaves, or on the ends of thin stalks so that they are out of reach of ants and other predators. Have you ever seen a lacewing or its distinctive eggs?

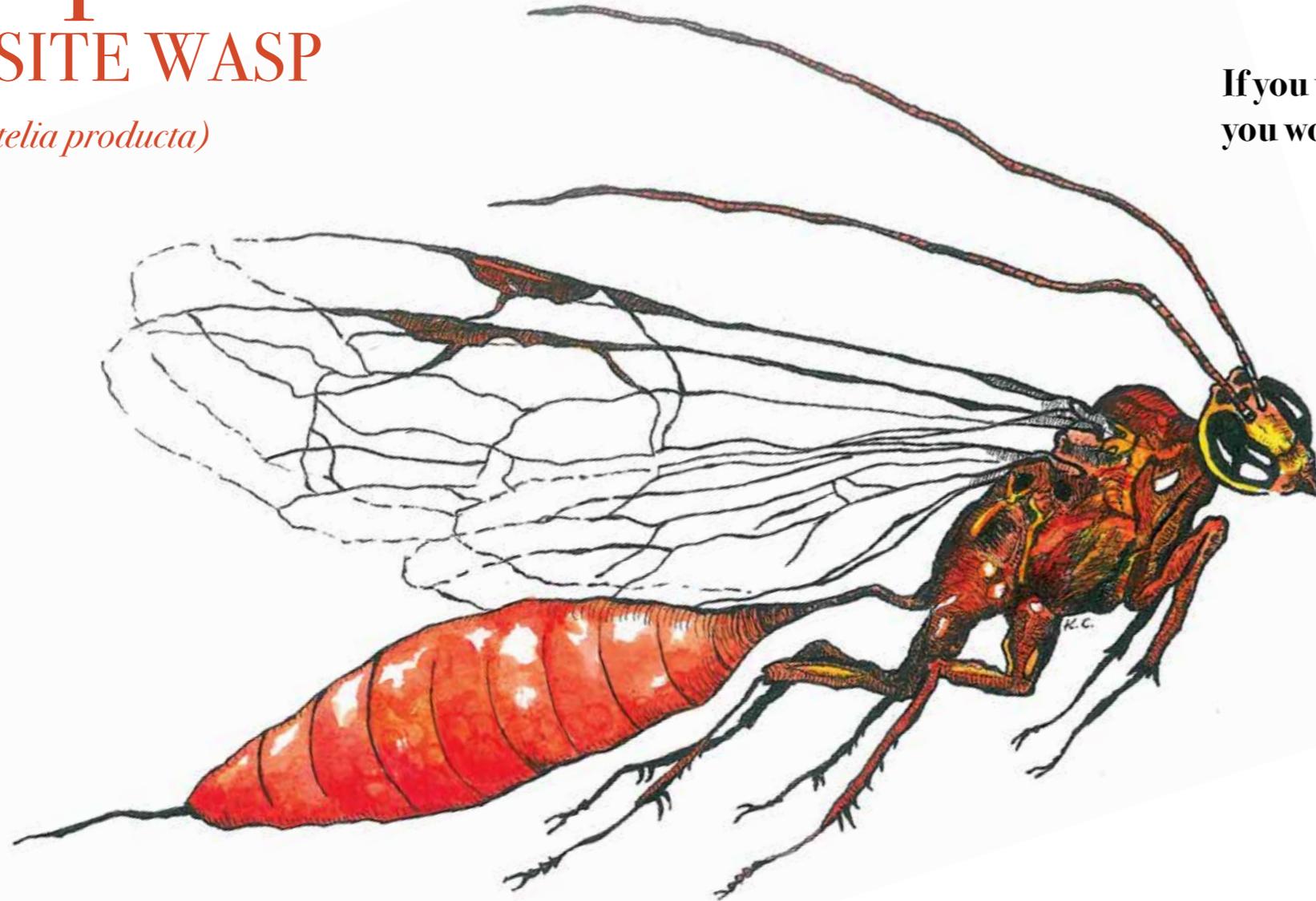
Cowboy Beetle

This is the cowboy beetle (*Chondropyga dorsalis*). When it was young, it liked to eat decomposing wood. Now, as an adult, it flies around from flower to flower in search of delicious nectar. It makes a loud buzzing noise when it flies and sounds like a wasp. This sound helps to keep predators away!



Orange caterpillar PARASITE WASP

(Netelia producta)



**If you were an orange caterpillar parasite wasp...
you would lay your eggs on a caterpillar's head!**

Some wasps are so small that our eyes can barely see them. Others are big enough to eat cicadas and spiders! Wasps normally have very skinny waists. And they can be many different colours, from metallic green to bright red.

There are more than 12,000 wasp species in Australia. Most Australian native wasps live by themselves. They make nests out of mud or leaves or by burrowing into the soil. Their nests can have many individual chambers — separate rooms for each wasp baby (larva).

Wasps are very important to the environment. Wasps pollinate plants, like the tiny fig wasp that pollinates gigantic fig trees. Wasp larvae also help to control pests by killing plant-eating caterpillars.

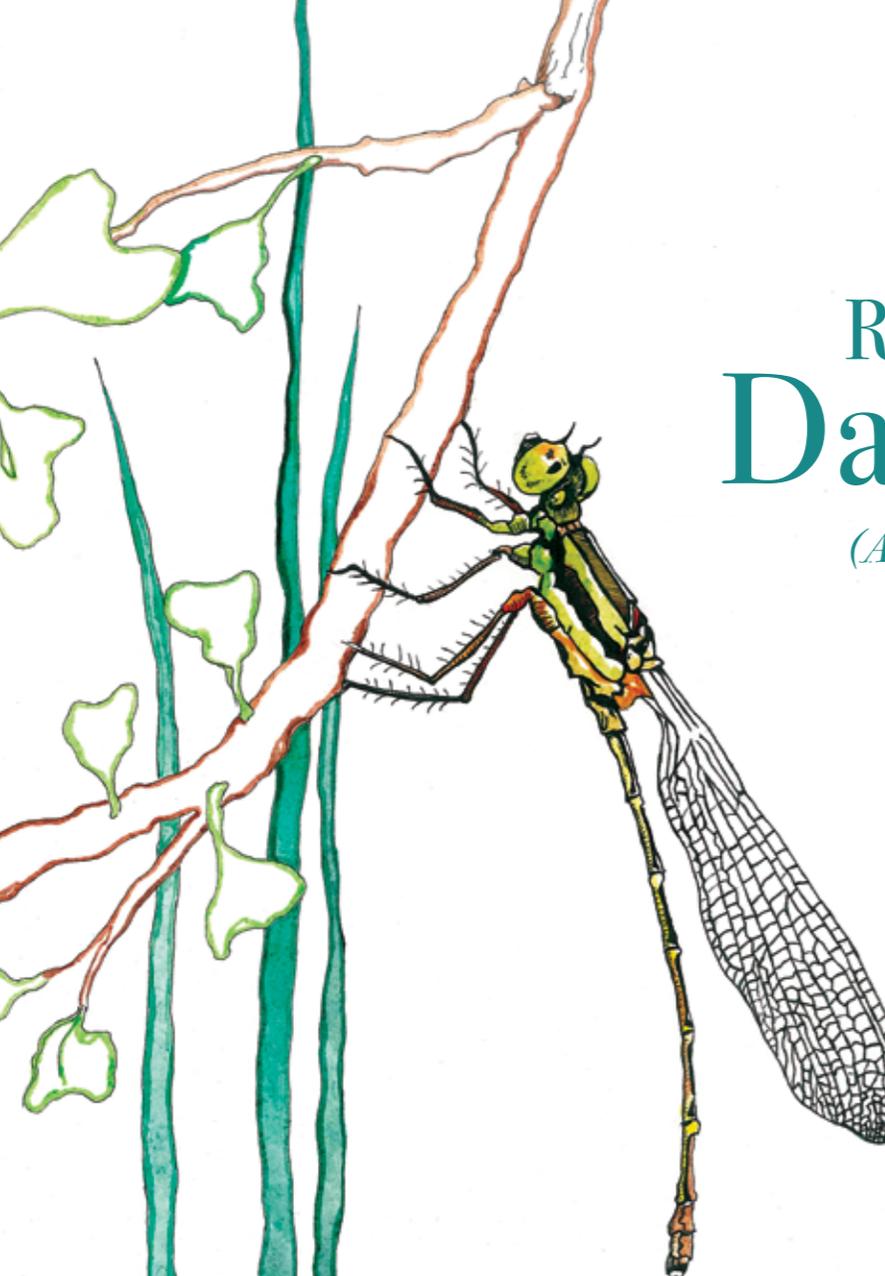
Even though people are often frightened of wasps, very few wasp species are aggressive. Most wasps couldn't sting you even if they wanted to because they don't have a stinger on their bodies. Only female wasps have a stinger, and she will only try to sting you if you disturb her.

The next time you are in your garden or local park try spotting the beautiful orange caterpillar parasite wasp!

Cabbage white BUTTERFLY

This beautiful butterfly is simply called cabbage white (*Pieris rapae*). The cabbage white butterfly lives all over Melbourne, but it isn't native to Australia. It was introduced from Europe about 80 years ago. When this butterfly is a caterpillar, it loves eating cabbage!





Slender RINGTAIL Damselfly

(Austrolestes analis)

If you were a slender ringtail damselfly ... you would be a super fast and scary predator, hunting insects in flight!

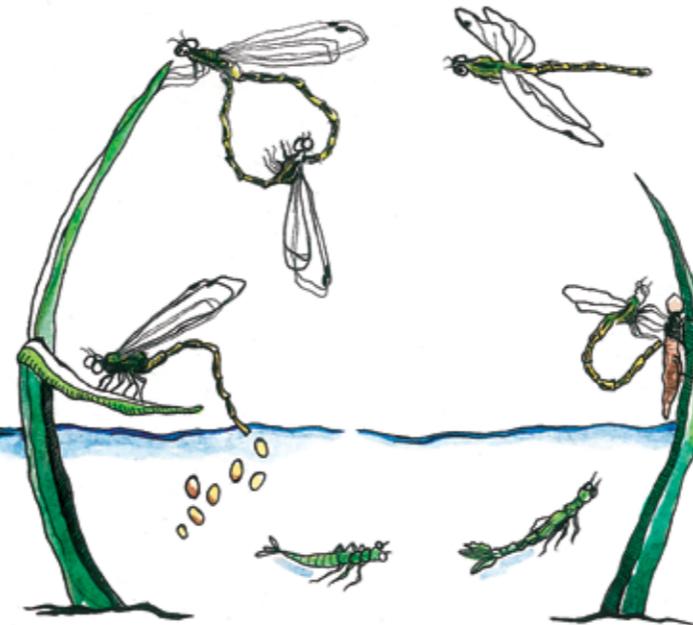
Damselflies, together with dragonflies, are part of an ancient insect group called Odonata. These insects evolved 250 million years ago, even before dinosaurs were around!

Damselflies lay their eggs in water. These eggs hatch into nymphs, which spend their lives under water. Then the nymphs crawl out of the water, shed their skin, and are able to fly.

Adult damselflies fly very fast! Their wings can move independently, like a helicopter. Damselflies are predators — they eat other insects, especially mosquitoes.

There are 320 species of dragonflies and damselflies in Australia with at least 15 species around the ponds and creeks of the City of Melbourne!

Have you used a net to catch a damselfly nymph in your local creek? If you find them, it means your creek is healthy because they don't like living in polluted water.





Brown darkling BEETLE

Look at the dazzling, metallic colours of this brown darkling beetle (*Ecnolagria grandis*)!

How many different colours can you see?

Beetles are called 'maimborogul' in Boon wurrung language.



Green grocer CICADA

(Cyclochila australasiae)

**If you were a green grocer cicada ...
you would be one of the world's loudest insects!**

How loud can you sing? Can you sing as loud as a green grocer cicada? It's one of the loudest insects in the world! Male cicadas make an impressive, fast clicking noise to attract a mate. They can be as loud as a chainsaw! Female cicadas respond by making a snapping noise with their wings. Cicadas rely on camouflage to hide from their predators. Other cicadas have learned that if they gather together and sing very loudly birds cannot come close enough to eat them because it hurts their ears!

Cicadas actually spend most of their life underground. Adults lay eggs into plant stems. The eggs hatch and the wingless nymphs fall to the ground and burrow into the soil. Some cicada nymphs live underground for seven years! Then on a spring or summer night, they emerge from the soil and climb up a tree trunk. They shed their skin for the last time and fly away as adult cicadas!

This spring and summer look out for empty cicada shells on tree trunks and branches. And on a hot summer afternoon listen out for a high-pitched sound...it might be green grocer cicadas singing in your neighbourhood!



Leafcutter BEES

This bee is part of one of the most fascinating bee groups in our city. It's the leafcutter bee (*Megachile* spp.). It uses its mouth to snip neat little circles from leaves, then it weaves these leaf circles into cradles for each of its eggs!

Bush Cockroach

(genus *Ellipsidion*)



If you were an Australian bush cockroach ...you would live, eat and sleep outside!

Native cockroaches are mainly nocturnal. During the day they hide under bark, logs or rocks. Only a few species are active in daylight, like this bush cockroach that basks in the sunshine on leaves and flowers. Our native cockroaches live outside. Only cockroaches introduced from outside of Australia live indoors, in our houses.

Cockroaches are scavengers, which means that they eat almost anything: honeydew, pollen, leaves, fungi, bark and even rotting wood. Native cockroaches play a special role as decomposers, returning nutrients and organic matter to the soil.

And Australian native cockroaches can be very beautiful! They can be bright and colourful, and some have yellow, red and white patterns on their wings.

The next time you're playing outside, think about where an Australian native bush cockroach could be hiding. If you were a cockroach, which gaps and holes would you use to hide from predators?

Lawn FLY

Lawn flies (*Hydrellia tritici*) are very common. In fact, they are the most common fly species in our city. And they love dancing! Have a close look at the flowers in your park. You might catch a glimpse of these dancing insects! Flies are known as 'garragarrak' in Boon wurrung language.



If you were a red gum jumping plant louse ... you would make a house out of wax and honeydew!

There are more than 300 species of jumping plant lice in Australia. They are about half a centimetre long and they look like tiny cicadas. Some have wings, but they're not good at flying. When they are resting they gently fold their wings over their body like a roof.

Many eucalypt species have their own unique species of jumping plant louse! Have you seen a group of white scaly dots on a eucalyptus leaf? You've found some plant lice! Jumping plant lice don't just jump on plants, they eat them, too! Their mouth has a pointy tube that they use to pierce leaves and shoots, so they can suck up the plant's sap.

As a nymph, the plant louse makes a small house to protect itself. This house is called a lerp. The nymph makes the lerp with wax and honeydew. This forms a hard structure that looks like a tiny seashell! Lerp protect jumping plant lice larvae from predators, and from drying out on hot, sunny days.

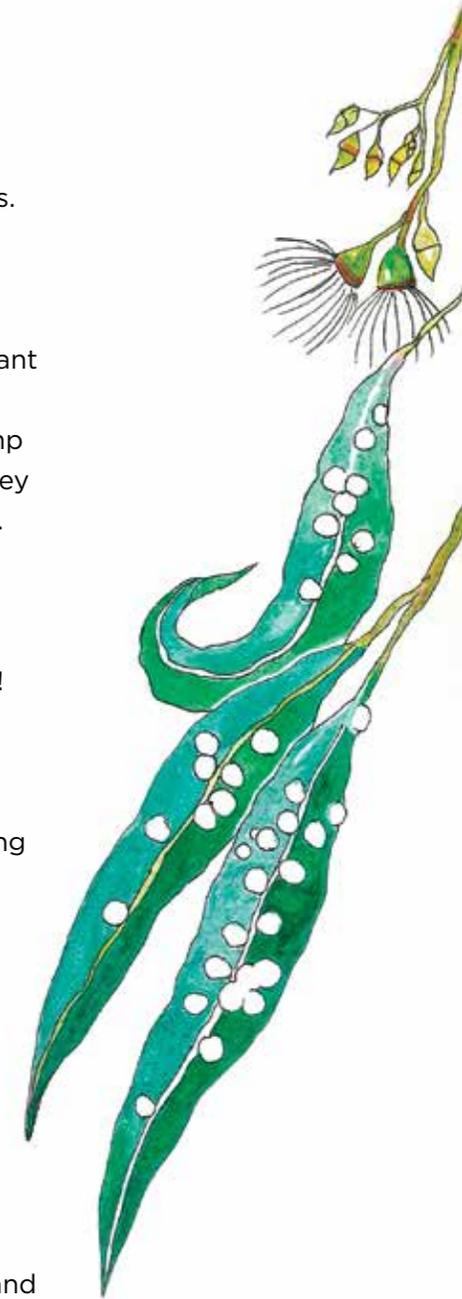
Birds love eating lerp ('murrub' in Boon wurrung language) — they are like a sugary snack. Ants love eating the honeydew produced by plant lice. They love honeydew so much that they protect plant lice from small predators!

Some jumping plant lice may become plant pests. There can be so many lerp on leaves that the leaves fall off the trees and the tree dies. If there are too many lerp, this means that something is not right in the environment.

The next time you see a *Eucalyptus* tree, look closely at the leaves and try to spot some lerp!

Red gum jumping PLANT LOUSE

(Glycaspis brimblecombei)



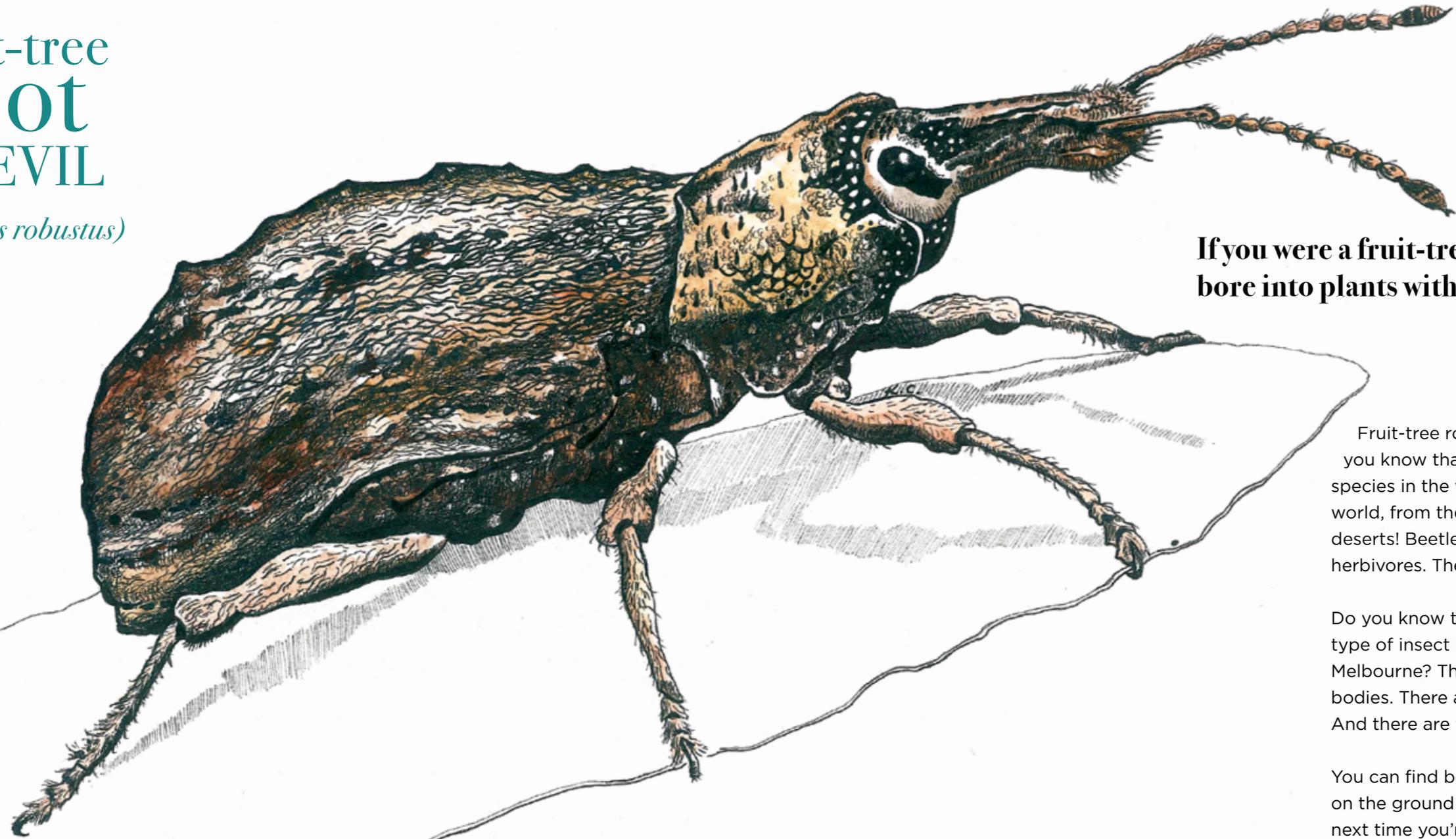


European HONEY BEE

The European honeybee (*Apis mellifera*) is the most common pollinator in our city. Have you seen honeybees busily collecting nectar and pollen from flowers?

Fruit-tree root WEEVIL

(Leptupius robustus)



If you were a fruit-tree root weevil ... you would bore into plants with your funky-looking snout!

Fruit-tree root weevils are a type of beetle. Do you know that there are more than 375,000 beetle species in the world? Beetles live all around the world, from the icy Arctic waters to the middle of deserts! Beetles can be predators, scavengers or herbivores. They also pollinate flowers, just like bees.

Do you know that beetles are the most common type of insect living alongside you, in the City of Melbourne? There are ladybirds with colourful spotty bodies. There are water beetles that can swim and fly. And there are weevils, like this species!

You can find beetles resting on flowers, under leaves, on the ground and hiding behind bits of bark. The next time you're in your favourite park or garden, see how many different beetles you can find!



Long-legged Stilt bug

This long-legged stilt bug (*Chinoneides tasmaniensis*) eats the animals that eat your plants! The next time you see a geranium, have a look out for this slender bug, walking on thin legs that look like stilts.

Signal FLY

(genus *Rivellia*)



If you were a signal fly ... you would have patterned wings and a metallic body!

Signal flies are part of a large group of insects called Diptera. The Order Diptera includes mosquitoes (known as 'gugak' in Boon wurrung language), sandflies, midges and all sorts of flies. There could be as many as 1,000,000 fly species in the world, and at least 7,000 in Australia.

Most insects have four wings, but flies only have two wings. Diptera means 'two wings'. Their hindwings have evolved into 'halteres', which are small club-like structures that help flies balance their bodies while flying.

Adult flies may eat flower nectar, decaying fruit or other insects. Many flies are useful to humans. Flies decompose waste material and help control insect pests. Flies may also pollinate plants, just like bees.

How many different types of flies can you name? Have you heard of robber flies, hoverflies, fruit flies, blowflies, or march flies? In the Boon wurrung language, the word for fly is 'garragarrak', a march fly is 'garrambarra', a blowfly is 'gamborr' and gnat is 'kokey'. The next time you're in a garden or park, have a look at the inside of flowers. There may be a fly there, drinking the nectar and pollinating the plant!

Passionvine PLANTHOPPER

Although I look like a moth, I'm not!
I'm the passionvine planthopper
(*Scolypopa australis*). My babies are
wingless and are known as 'fluffy bums'!



Soldier BEETLE

(Chauliognathus lugubris)



If you were a soldier beetle ... you would swarm with thousands of other beetles!

On a warm day in spring or summer you might be lucky enough to find a big swarm of soldier beetles, as thousands of them gather on trees and shrubs. They're not eating the plant — they are actually trying to find a mate!

Soldier beetles have a large black head and a bright yellow abdomen. This bright yellow is a warning sign for other insects and animals — it says, "Don't eat me! I will taste awful!" And, if a predator gets too close, the soldier beetle releases a foul white fluid from their glands.

Most gardeners love soldier beetles because they know that they will eat plant pests, including aphids and caterpillars. Keep a look out for our friends the soldier beetles in spring and summer. And if you want these colourful beetles in your garden (eating aphids and other garden pests) plant lots of native flowers for them!

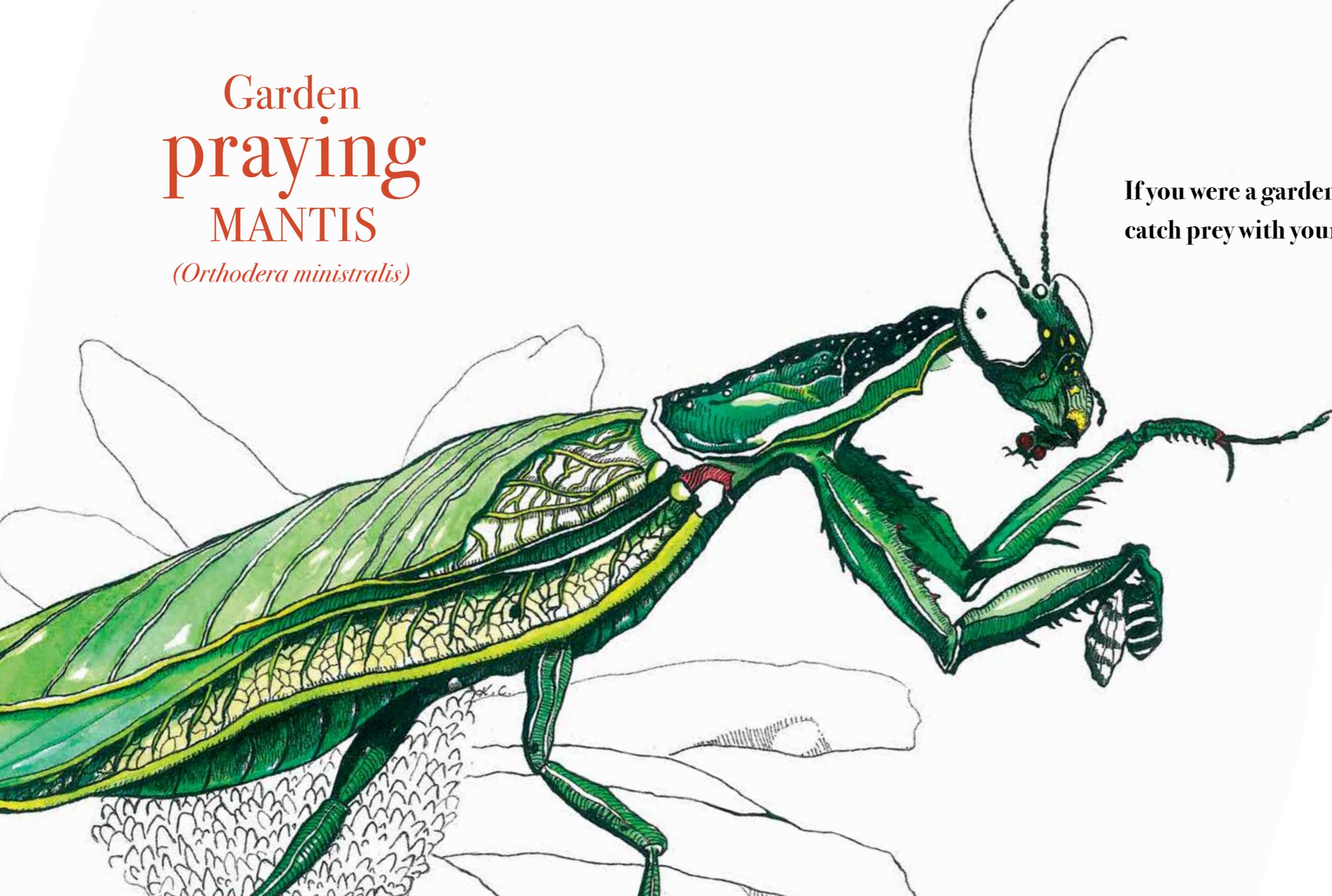


Hoverfly

The hoverfly (*Melangyna damastor*) looks like a bee and pollinates like a bee, but it isn't a bee...it's a fly! And it hovers in the air, just like a helicopter.

Garden praying MANTIS

(Orthodera ministralis)



If you were a garden praying mantis ... you would catch prey with your raptorial front legs!

Many praying mantises are stick-shaped, and green or brown in colour. This helps them to camouflage with their surroundings so that they're not noticed by their predators. It also means that they can sneak up on their prey!

The praying mantis is a predator that ambushes its prey. It stays very still and holds its front legs up in the air. When it sees something tasty, it moves towards it with a swaying movement. Then, when it is close, it attacks with lightning-fast speed. A praying mantis eats insects and other animals. They have been seen eating mice, bats and even small birds! Females sometimes eat their partners after mating.

If it feels threatened, the praying mantis may display warning colours on the inside of its wings, release noxious odours, and even 'box' with its front legs!

The next time you're in your favourite park, have a look on flowers, tree trunks and in tall grass for praying mantises! Can you observe their impressive hunting technique?

Crop plant BUG

Plant bugs are part of the most diverse group of heteropteran bugs on our planet.

In our city, the crop plant bug (*Sidnia kinbergii*) is often seen basking on daisies.





Brown grass BUG

(Mutusca brevicornis)



If you were a brown grass bug ... you would be a master of camouflage!

Brown grass bugs are part of a group of insects called heteropteran bugs. Heteropteran bugs live on land or water, and come in all shapes, sizes and colours. But they all have one thing in common: they have a mouth part that looks like a straw and they use it to pierce and suck their food.

Brown grass bugs are experts at camouflage. Many insects use camouflage to hide from predators that would eat them, or to hide from animals that they want to eat. Can you think of any other insects that use camouflage to blend in with their surroundings? Stick insects have evolved to look like twigs and branches. The orchid praying mantis looks like the orchid flowers that they live on. And spiny leaf insects even move backwards and forwards, so that they look like a leaf swaying in the breeze!

The next time you're in your garden or local park, have a look in the grass and under leaves for bugs. It's like playing hide and seek ... with insects!

Rutherglen BUG

The Rutherglen bug (*Nysius vinitor*) is the most common heteropteran bug in our city. If you look closely at a plant's stem, leaf or flower you're bound to find Rutherglen bugs.



Brown EARWIG

(Labidura truncata)



If you were a brown earwig ... you would carefully guard your eggs and babies!

People used to think that earwigs crawled into people's ears at night. But that's not true, it's just an old story. Earwigs actually live on the ground and eat plants.

Earwigs have slender, flat bodies, and a pair of pincers at the back of their bodies. They use these pincers to groom themselves, to defend their territory, and to attack and carry their prey.

Earwigs hide in dark corners during the day — you can find them under pot plants or in your letterbox. Once the sun sets, earwigs wake up and become active.

A female earwig lays her white, oval eggs in a nest burrow in the ground. She defends the eggs and cares for the nymphs once they have hatched. Very few insects look after their young as carefully as this!

If you want to find an earwig, look under the pot plants in your garden.

Spined
predatory
SHIELD BUG

Look at the pointy body of this spined predatory shield bug (*Oechalia schellenbergii*). You can find these bugs in the wildest parts of our city, and in our healthiest parks and gardens.



Long tailed SAWFLY

(Pterygophorus facielongus)



If you were a long-tailed sawfly ... your larvae would turn leaves into skeletons!

Even though they're called flies, sawflies are actually wasps. Sawfly larvae only eat plants. This is unusual because most other wasp larvae feed on animals. Sawfly larvae eat day and night! They eat so much that when they finish, the leaf is like a skeleton.

Sawfly larvae look a little like moth or butterfly caterpillars. They have six chubby legs and what looks like a long, pointed tail. You can easily spot them on leaves, feeding in groups. Some species form a cluster of wriggling larvae, all piled on top of each other. If you get too close, they will rear up and waggle their tails at you! Some species even squirt out a nasty, bad-smelling liquid to deter predators. This is why they are also called 'spit-fires'.

The next time you see a leaf skeleton, have a closer look. You might find some sawfly larvae, munching away.



Concealer MOTH

Moths ('tarr-ein' in Boon wurrung language) are mostly nocturnal creatures.

However, in our city's parks you can catch a glimpse of the concealer moth (*Olbonoma triptycha*) in broad daylight.



Dingy swallowtail BUTTERFLY

(Papilio anactus)

If you were a dingy swallowtail ... you would love lemon trees!

Butterflies are called 'balam balam' in Boon wurrung language. Both moths and butterflies, like the dingy swallowtail butterfly, are part of a group of insects called 'Lepidoptera'. Lepidoptera means 'scaly wing' because their wings are covered in tiny scales. Have you ever touched the wings of a dead butterfly or moth? Did you notice fine dust on your fingers? It's actually small scales.

Female butterflies lay their eggs on young leaves, picking the plant species that their caterpillars will eat after they have hatched. Dingy swallowtail caterpillars love to eat citrus plants, like oranges, lemons and limes.

Swallowtail butterflies search for mates with a slow, dainty flight. They rarely stop to rest and are constantly moving, flitting between flowers. But butterflies are not just beautiful to watch. They pollinate plants, and they are an important part of the food web.

Have you ever seen the dingy swallowtail butterfly in the City of Melbourne? If you would like to have dingy swallowtails in your garden, try planting some native citrus plants!



The hunchback FLY

This is the hunchback fly (genus *Ogcodes*). Like bees and hoverflies, it spends its adult life flying from flower to flower, collecting nectar. But when it was younger, it preferred to eat ...spiders!

Checkered cuckoo BEE

(Thyreus caeruleopunctatus)



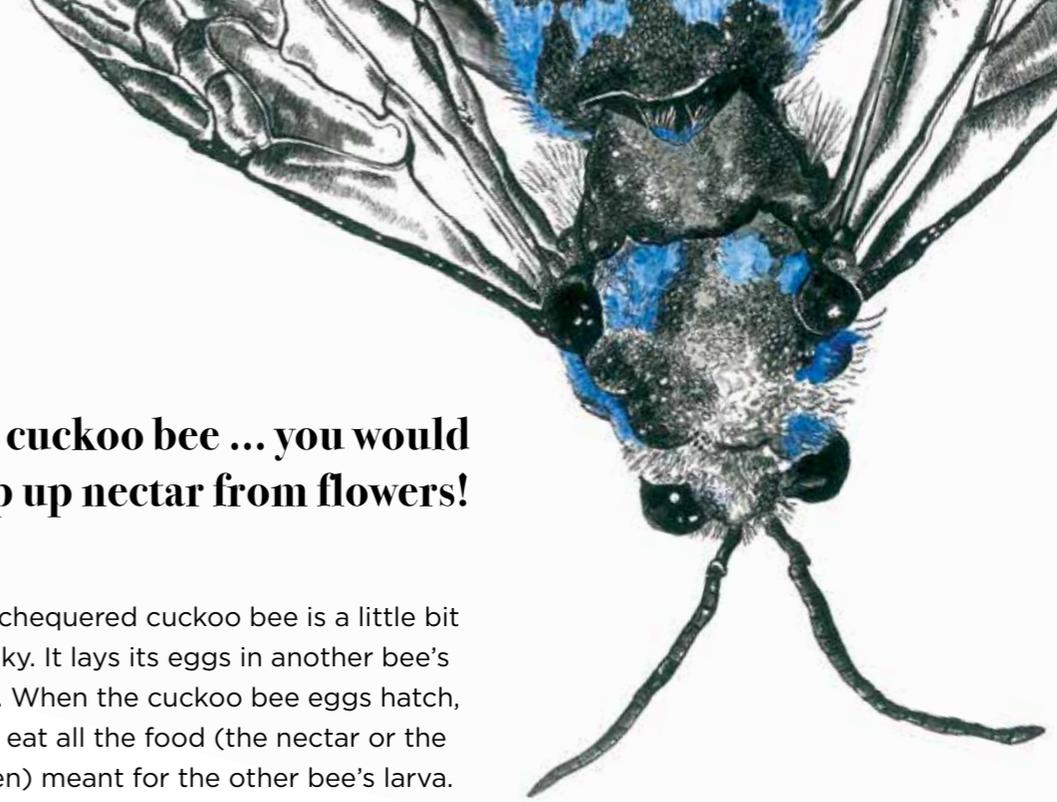
If you were a chequered cuckoo bee ... you would use your tongue to slurp up nectar from flowers!

The chequered cuckoo bee is a little bit sneaky. It lays its eggs in another bee's nest. When the cuckoo bee eggs hatch, they eat all the food (the nectar or the pollen) meant for the other bee's larva.

Most Australian native bees live by themselves. The female makes her own nest in the soil or in the hollows of a tree.

We need to look after our native bees by avoiding using insecticide and by planting lots of native, flowering plants. Most of our plants need native insects to pollinate them. Some wildflowers have long tubes that can only be pollinated by a native bee's long tongue.

Have you ever seen an Australian native bee? There might be some buzzing around the flowers in your park or garden right now!





Blue banded BEE

When a blue-banded bee (*Amegilla asserta*) visits flowers, it collects pollen by using a head-banging technique called 'buzz pollination'. It bangs its head on the flower, up to 350 times per second! This releases pollen, a bit like shaking a salt and pepper shaker! This native bee species loves buzz pollinating native flowers and some vegetables. Bees are called 'murnalong' in Boon wurrung language.



THIS IS THE CITY OF
MELBOURNE. CAN YOU SEE
WHERE THE PARKS AND
GARDENS ARE?

Do you want to know even more about our amazing insects?!

To learn more about Melbourne's biodiversity, visit our handy interactive website: biodiversity.melbourne.vic.gov.au

To learn more about nature in the city, visit: melbourne.vic.gov.au/urbannature

To learn about what plants native bees like, visit: abc.net.au/gardening/stories/s3220491.htm

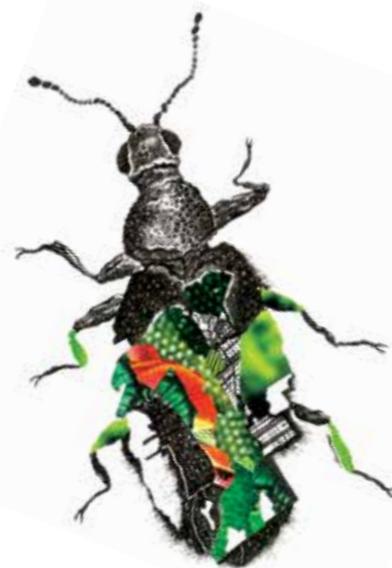
To learn about what plants butterflies like, visit: abc.net.au/gardening/stories/s3805878.htm

To learn how to look for waterbugs in Melbourne, visit: vic.waterwatch.org.au/education-resources/235/

To learn about insect hotels and how to make one, visit: permaculturenews.org/2013/10/08/building-insect-hotel/

To learn how to plant an insect-friendly garden, visit: permaculturenews.org/2014/10/04/plants-attract-beneficial-insects/

For our full scientific report on 'The Little Things That Run the City', visit: luismataresearch.files.wordpress.com/2016/02/the-little-things-that-run-the-city-201115-lowres.pdf





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