



INSECTS

With more than 62,000 identified species of insects in Australia only someone as blind as a slab of granite could fail to come face to face with one or more of these tiny creatures every now and then. There are many insects that most people would prefer not to meet, including flies, mosquitos, and termites, but each species, however despised it might be by humans, has an important role to play in maintaining a healthy and balanced ecosystem.

Many insects are justifiably regarded as household, garden, or agricultural pests, but anyone who takes the time to look at the wonders of each and every minute creature that they discover will see that there's a lot more to even the most common of insects than initially meets the eye.

Most provide nutritious food for other insects or for birds, amphibians, and reptiles, but others seek out their insect relatives with a gruesome purpose in mind. Around 10 per cent of all insects are parasites, and some of these, including many species of wasps, lay their eggs in the bodies of caterpillars or other soft bodied insects to ensure that when their larvae hatch they'll have a supply of food right on the doorstep, for they feast on the flesh of their living hosts and devour each hapless creature from the inside. Using this method, they earn their place as valued warriors that control populations of other species that many people would prefer not have in their home, in their garden, or on their farm. And when insects effectively control the populations of less welcome species, the use of toxic insecticides can be reduced or eliminated altogether.

Bugs and beetles, they're all the same many people may assume, but that's a far from correct assumption. Australia is home to approximately 23,000 named species of beetles, and we share our country with countless bugs too, and although both groups may initially appear to have some similar physical characteristics, beetles and bugs belong to completely different groups of insects and have dramatically different lifestyles.

Bugs have mouth parts that are uniquely designed to allow them to pierce their prey with a needle-sharp proboscis and suck up their body fluids, while beetles simply chew their food.

The juvenile forms of bugs, which are known as nymphs, closely resemble adults, although they are smaller and lack the wings of a mature bug, but that's not the case with beetles. As juvenile beetles grow something almost magical happens, for it's then that Mother Nature stages one of her most astounding performances. They undergo the miraculous process of metamorphosis, during which they're transformed from grub-like larvae into adults that often bear no physical resemblance to the young of their species.

There are twice as many species of insects in the world as there are all other animal species combined. They were the first creatures to fly through the skies more than 100 million years ago, and have colonised almost every environment on the planet. Their population in little more than two square kilometres of rural land exceeds that of the entire human population of the earth, and they owe their astounding success

to a range of highly refined senses that humans can only dream of with envy.

Some insects have unique chemoreceptors on their mouth parts or, as with butterflies, on their feet to enable them to recognise the most desirable food plants, while others, including bees and wasps, utilise their highly sensitive antennae to locate food.

An insect's antennae are often erroneously referred to as 'feelers', but the chemoreceptors they contain allow insects to do more than simply touch the world around them, for they can also smell with their antennae and detect the flavours of the pollen or nectar of flowers, and of fruit, dung, or decaying vegetation, and they also utilise their acute sense of smell to hunt their prey or to locate a mate.

Most predatory insects have additional receptors, minute hairs with extremely sensitive nerves at their base, which allow them to feel the slightest movements in the air around them and thus detect their prey, but for other species the main component of their success is their amazing eyesight.

Insects have compound eyes that are comprised of thousands of minute six sided lenses that fit together like the cells of a honeycomb. This allows them to have an almost 360° view of their world and to detect and catch fast flying insects that use speed as their primary weapon of defence, and when it comes to speed, dragonflies,

Opposite page: A winged cicada emerging from the shell of its larva on the trunk of a tree in the author's garden.



which can travel at up to 80km/h, are the champions of the insect world.

Anyone who takes a close look at the insects that are right on their doorstep will discover countless examples of the astounding diversity and the unquestionable beauty of these diminutive creatures that, despite their size, play a vital role in the health of the natural environment.

ACACIA LEAF BEETLE

Dicranosterna picea

It's probably no surprise to learn that the acacia leaf beetle feeds on the

leaves of acacia trees. With its gleaming chestnut brown body it's an attractive insect, but it's outshone by its distinctive orange and black spotted larvae that add a speck of vibrant colour to the shadows of the woodlands in which they're found.

The larva shown here (on the right) is almost ready to pupate, and after approximately eight days in its cocoon, it will complete the final stage of its metamorphosis and emerge as an adult beetle. And eventually, when two beetles mate and the female lays her eggs, the cycle of life of this colourful insect will begin all over again.

In the wild world of insects, life is dominated by the desires for food and for a mate, but it's a world fraught with danger for many of nature's smallest

creatures, and despite the fact that it's often well hidden from view beneath one of the leaves on which it's feeding, the acacia leaf beetle frequently becomes food for hungry birds, and is part of an environment where every creature, large and small, has an important role to play.

DOUBLE DRUMMER CICADA

Thopha saccata

Danish zoologist Johan Christian Fabricius described the double drummer cicada in 1803, and it became the first of the estimated 800 species of Australian cicadas to be officially recognised.

The insect's common name relates



to the sound that it produces and that's created as the cicada contracts a pair of ribbed membranes, known as timbals, which are on the sides of its abdomen, with the clicking sound that this action makes amplified in drum-like air sacs in the abdomen. The resultant sound, which is used to attract a mate and that is reputedly the loudest noise created by any insect in the world, can reach a level of 100 decibels, which is the same level of noise as that produced by an angle grinder, a chainsaw, or a personal stereo system that's turned up to full blast. Prolonged exposure to noise in excess of 85 decibels can lead to permanent hearing loss, and when a large population of cicadas 'sing' in unison, the commotion is truly deafening.

The double drummer, the largest and noisiest of all Australian cicadas, is found in the forests and woodlands of much of eastern Australia, and also in urban areas that have suitable trees for the continuation of the cicada's unusual lifestyle.

Its a lifecycle that no one could envy, for these curious insects spend the majority of their lives as nymphs that live underground where they feed on the sap of tree roots. The exact duration of the subterranean phase of their lives is unknown, but after several years, when they've finally reached maturity and the climatic conditions are right, they emerge from the darkness and climb onto the nearest tree trunk or stump to undergo their astounding transformation into winged adults.

The clusters of exuviae, the abandoned skins of the nymphs, which adorn tree trunks and fence posts during summer months, are conspicuous evidence that, from November to March, cicadas are on the move

The adults eventually fly up into the canopy of the trees where they spend the final 4-5 weeks of their lives. They feed on the sap of trees that they suck up using specialised mouth parts, and finally get down to the main reason for their arboreal existence, which is to

Opposite page: An acacia leaf beetle in woodlands in Queensland.

Above: The larva of an acacia leaf beetle in woodlands in Queensland.



A cicada larva climbing up a tree trunk after emerging from the soil.



A winged adult emerged from the shell of the cicada larva.





produce the next generation of their species.

Shortly after mating, female cicadas settle down on a branch or on the trunk of a tree and lay their tiny eggs in a slit that they cut into the bark, and once their major role in life has been completed, the females die. When the eggs finally hatch, the nymphs tumble to the ground and burrow into the soil, and the weird and wonderful lifecycle of the cicada begins all over again.



DRAGONFLY

The dragonflies illustrated on the following pages are merely two of the more than 320 species that have been identified in Australia. The colourful Water Prince, (*Hydrobasileus brevistylus*), is a large dragonfly with a black and yellow spotted abdomen and wings that are much longer than its body. The Fiery Skimmer, (*Orthetrum villosiovittatum*), which is also known as the 'Bog Skimmer', is an attractive insect too, with the female having a golden brown body, and the vivid red male being an even more eye-catching creature.

Dragonflies existed long before dinosaurs strode across the world's diverse landscapes, with one species that lived around 250 million years ago and that had a wing span of more than 70cms, being the largest insect that has ever flown through the skies. The survival of dragonflies is primarily due to their large and highly developed eyes, the largest of any insect, and to their mastery of flight, for these graceful creatures, which can fly at astounding speed, have the ability not only to hover in mid-air, but also to make rapid sideways movements and to fly backwards. These abilities enable them to be highly efficient predators, and as they hunt for flying insects, they stretch their front legs forward and effortlessly

Left: An adult cicada emerging from the shell of a larva during metamorphosis.





scoop up their prey in mid-air.

Dragonflies generally live in close proximity to a source of freshwater and, with males spending much of their time resting on a log or a branch with their wings spread out from the sides of their bodies, they're relatively easy to spot.

When a female dragonfly is ready to lay her eggs, she hovers above the water and repetitively dips the tip of her abdomen into the calm surface to release the eggs.

The larvae and the adult forms of many insect species differ dramatically in their appearance and lifestyles, and the variation between adults and their young is rarely more extreme than that demonstrated by dragonflies. The winged adults are masters of the skies, but their larvae are tiny aquatic creatures that feed on other aquatic insects, including the larvae of mosquitoes, in addition to tadpoles. The larvae themselves are often food for larger predators, such as fish, but those that survive and progress through approximately twelve larval stages eventually leave the water, and as their skins split open during the miracle of metamorphosis, the adult dragonflies emerge in all their glory.

Dragonfly larvae are extremely sensitive to water quality and require unpolluted water for their successful development and survival. The presence of a substantial population of dragonflies is an indication that all is well in the environment, but with some wetlands degraded, primarily by human activities, some species of these elegant creatures, which play an important role in controlling other insect populations, are teetering on the brink of extinction.



EUCALYPTUS PLANT HOPPER

Platybrachys species

These attractive insects, with their highly decorative brown bodies and wings, are found on the trunks of

Left: A Fiery Skimmer dragonfly in the author's garden.



A Water Prince dragonfly
in the author's garden.



A eucalyptus plant hopper on the trunk of a tree in bushland in south-eastern Queensland.



eucalyptus and acacia trees where, using their specialised mouth parts, they suck the sap from their host plants.

With their bodies and wings and even their legs and eyes daubed with a mottled array of streaks and spots in a range of colours from light to dark brown and black, they're not easy to distinguish from the bark of a tree, and are extremely well camouflaged for protection from predators, particularly when the trees of their woodland habitat are freckled with the diverse hues created by both light and shade.

When disturbed, eucalyptus plant hoppers simply rush away by walking

either up or down the trunk or even scurrying sideways, but if the threat of discovery persists, they'll make a panicked dash for safety and fly into the air.

Female plant hoppers usually lay their eggs on the trunk of their host tree or on its leaves and cover them with a white waxy secretion from which tiny nymphs eventually emerge and quickly vanish into the safety of their natural habitat to once again become as invisible as a single grain of sand on a desert dune.



ASSASSIN BUG

Pristhesancus plagipennis

Assassin bugs are among the good guys of the insect world for they play a vital role in controlling populations of less welcome insect species, including those that cause serious damage to ornamental plants and to valuable agricultural crops. And they'll feast on any insects that come within their reach, including grasshoppers, caterpillars, and bees, and will also devour spiders.

Above: An adult assassin bug in woodlands in Queensland.



Their common name relates to the fact that these stealthy predators silently approach an unsuspecting victim from behind and stab it with their powerful proboscis. They then inject their prey with an enzyme that liquefies the victim's internal organs, which the assassin bug can then suck up like a gruesome cocktail.

Each mature female assassin bug lays a large number of eggs that eventually hatch to produce a swarm of tiny nymphs, which are around 5mm in length and appear, in the early stages of their lives, like a swarm of ants. The nymphs, which have bright

orange and black bodies and legs and long antennae, pass through five phases of growth, which are known as instars, before becoming adults. They bear a similar physical resemblance to adults, but are considerably smaller and do not have wings. At each stage of their transition to adulthood the colour of the nymphs intensifies and their size increases, and in the later stages they develop wing buds, but with their wings not fully formed, flight is not an option for these young insects. Adult assassin bugs have brown bodies, the same long legs and antennae that are conspicuous features of nymphs, and transparent

wings that allow them to enjoy the freedom of the skies.

With their great appetite for insects, these are creatures that are welcome in any garden or agricultural area, and they're most active and thus easier to see in summer months when there's an increase in the population of the insect species on which they feed.

These savage little assassins are not aggressive towards humans, but should be treated with caution and respect, for they may attack when threatened, and

Above: An assassin bug nymph on a zinnia flower in the author's garden.



when they bite the fingers of a hand that comes too close for comfort, they inject the same substance that they use to convert the innards of each victim into a tasty soup, and such a bite, although not fatal, can be very painful indeed, if those who are unfortunate enough to have experienced it are to be believed.



COCKROACH

Ellipsidion australe

Many people shudder at the mere thought of cockroaches that hide in dark and forgotten corners of homes and sheds, but there's no reason to fear *Ellipsidion australe* for this is an Australian native cockroach that prefers to lead an outdoor life and that

comes with none of the unpleasant connotations that are attached to its despised and more familiar relatives, which are an introduced species.

Few people would consider 'beautiful' to be an apt description of a cockroach, but this species sets that idea on its head, for it's unquestionably a very attractive insect. The nymph illustrated here is similar, in many respects, to the adult of the species. Its body, which is extremely flat to enable it to squeeze into the smallest of spaces, is a rich reddish brown colour with ornate white patterns, and it has a small head with antennae that are approximately twice as long as its body.

Nymphs, unlike adults, do not have wings and must rely on their ability to run quickly and to hide in minute

crevices to enable them to elude predators.

This Australian native cockroach is most active during daylight hours, and although little study has been undertaken into its lifestyle, it is thought that it forages among flowers and shrubs where it feeds on pollen, the honeydew secreted by some insects, and on fungi.



Above: A native cockroach nymph on a leaf in the author's garden.

Opposite page: A eucalyptus tip wilter bug in woodlands in Queensland.







EUCALYPTUS TIP WILTER BUG

Amorbus rhombifer

There's a very obvious reason behind the common name of this reddish brown insect, and it relates directly to its voracious appetite. Like all bugs it feeds by sucking up its food, and when it has sucked the sap from just below the tip of a new shoot of a eucalyptus tree, the foliage eventually wilts and dies.

The tip wilter bug is usually found on the underside of gum tree leaves, close to the foliage that has succumbed to the affects of its feeding, and at a quick glance this well camouflaged insect appears to be nothing more than a small dead leaf.

It's a relatively slow moving creature that, in addition to camouflage, has another option to protect itself from predators, for the tip wilter bug emits a strong and unpleasant odour that's guaranteed to repel any birds and reptiles that, believing that this sedentary insect might be a scrumptious meal, venture too close for their own good.

After mating, the female bugs lay their tiny eggs in neat rows along the surface of one of the leaves of their host tree. The nymphs that eventually hatch are far smaller than adults and their bodies are decorated in a variety of colours and ornate patterns that make them most attractive creatures. And while they're part of a complex web of life in the woodlands and forests of their natural habitat, they're regarded as an unwelcome pest species when they take up residence in home gardens and among the foliage of commercial crops of vegetables where they happily adapt to sucking the sap of many plant species other than eucalypts.



HAIRY FLOWER WASP

Campsomeris tasmaniensis

Anyone who thinks that the words 'wasp' and 'sting' are synonymous, and who has a fear of all wasps should reassess their concerns, for some,

including the aptly named hairy flower wasp, are among the most beneficial of all insect species.

They can be found in most regions of Australia, and while their natural habitat, prior to the arrival of Europeans, was in native woodlands and forests, they're now regular residents in urban parks and gardens, and every gardener should be thrilled to see them.

Hairy flower wasps, which have orange to yellow bodies with black stripes, and opaque yellowish brown wings, are solitary creatures that, unlike many other species of wasps, do not make a nest or live in colonies. They have the ability to sting, but with no nest or colony to defend they have no need for aggression, and thus pose no threat to humans.

They feed on the energy-rich nectar of flowers, and as the dense covering of hairs on their bodies becomes dusted with golden pollen, these large wasps play a valuable role as pollinators as they move from one delicate bloom to another.

Humans certainly have no reason to fear the hairy flower wasp, but if beetles were aware of what the future had in store for them they'd be quaking in terror the moment one of these winged creatures fluttered onto the scene. The female of the species, when ready to lay her eggs, searches for the fat and juicy larvae of beetles, such as rhinoceros and Christmas beetles that are often found in farmyard manure, in a garden compost heap, or in rotting wood, and she also hunts for grubs that thrive in the soil of sugar cane plantations. And when she's located her victim, the wasp stings it, lays an egg in its fleshy body, and buries her victim in the ground or in the rotting wood where she discovered it, leaving it to die a slow and lingering death. The wasp's sting merely paralyses her victim, and as the egg laid within it hatches, the emerging larva feasts on living flesh.

Left: A eucalyptus tip wilter bug on the leaf of a tree in south-eastern Queensland.

A hairy flower wasp on a rose
bud in the author's garden.





Nature has endowed some insect species with savage techniques with which to ensure the survival of their offspring, but the gruesome reproductive methods of the hairy flower wasp ensure that, by effectively controlling populations of other insect species, this tiny creature is one of Mother Nature's most invaluable little helpers.



YELLOW BROWN PAPER WASP

Ropalidia romandi

The yellow brown paper wasp, which is found in northern and eastern regions of the Australian mainland, is an insect that many people have been introduced to in a way that they'd rather forget, for despite the fact that it's only about 12mm in length, this colourful little creature can inflict a very painful sting.

These relatively common wasps are highly social insects that live in colonies within nests that are created from a tough material that the wasps make by chewing bits of decaying wood and blending it with their saliva. Their nests, which consist of numerous individual cells enclosed within a paper-like covering, are often attached to the underside of the branch of a tree, and at times they hang from a fence or are suspended under the eaves of a building.

The colony's queen dutifully lays an egg in each cell within the nest, and when the larvae eventually hatch, they're fed with pre-digested caterpillars that other members of the colony have laboriously collected. When the larvae are fully grown, the diligent workers of the group seal them into their individual cells where they pupate and finally emerge as adult wasps, and thus expand the colony.

In hot summer months adult wasps congregate on the edges of garden birdbaths and pools or on the muddy banks of streams to sip at the water, and

Right: A yellow brown paper wasp on a rose in the author's garden.









they dine on the nectar of flowers, but in winter, when their favoured source of food may be in short supply, they occasionally feed on the honeydew secreted by scale insects.

Yellow brown paper wasps are valuable members of the wildlife community, for they offer gardeners and farmers a helping hand in the ongoing battle to control ravenous caterpillars. They're best left alone to go about their lives unhindered, unless they've built their nest a little too close to the doorstep of a house, for although they rarely sting, other than when aggressively defending their nest from a perceived threat, a close encounter with one of these tiny creatures is not the most pleasurable of experiences.



BLOW FLY

Calliphora species

Blow flies are unlikely to be on anyone's list of interesting and beautiful wild creatures, but despite the fact that most people would rather kill them than take a moment to look at them in detail, they're fascinating insects that have an important function within a balanced ecosystem.

These are the familiar flies that are seen, often in large numbers, around rubbish bins, animal faeces, and rotting meat or carcasses, and it's probably no surprise to hear that insects that feed and dabble about in such revolting places are implicated in the spread of diseases.

The blow fly, which is larger than a common house fly is, on close inspection, a surprisingly attractive creature, with several species, like the one shown here, having spectacular and gleaming metallic blue-green colouring, and it's this that gives the fly its other colloquial name of 'blue bottle'.

The blow fly's reddish brown eyes are its most amazing feature however, for like all flies, it has large compound eyes that are made up of thousands

Left: A blow fly in the author's garden.

of tiny eyes that enable it to have an astounding range of vision and an almost 360 degree view of the world around it. And that's why, when you try to stalk one from behind with a fly swatter at the ready, it sees you coming and takes evasive action.

Blow flies live anywhere where they can find the putrid and decomposing stuff on which they feed. The search for all things with a foul smell often leads them to plants, such as stapelias, that emit an odour like rotting flesh. Grains of pollen adhere to the hairs on the bodies of visiting flies, and as they move from one flower to another, they do the plants a favour by pollinating them. Blow flies are also lured to several species of fungi, such as the decorative stinkhorns that also have a pungent odour, and the flies unwittingly become carriers of minute spores and give the fungi some assistance in colonising new areas.

Other aspects of the blow fly's lifestyle are far less pleasant, including the fact that the female, after mating, lays her eggs in the same place where she has been feeding, usually in the decomposing flesh of a dead animal. The white larvae, known as maggots, which eventually emerge from the eggs, are born with a ravenous appetite and tear at the stinking flesh of their nursery, with ingredients of their saliva able to soften their food so that it can easily be digested. After around 10 days of feasting, the larvae burrow into the nearby soil where they pupate in cocoons, from which another generation of blow flies will eventually emerge.

Despite the dislike that most people demonstrate for these wild creatures that are on everyone's doorstep at some time or another, blow flies work, often unseen, to clean up nature's detritus of birds and animals that have come to the end of their relatively brief lives, and for many of which flies and their maggots had provided an abundance of nutritious food.

GREY STRIPED FLESH FLY

Sarcophaga aurifrons

Few people take the time to look closely at a fly. It's simply an annoying and unwelcome creature that, as it buzzes into view, elicits little more than annoyance and an instant urge to reach for a can of spray to annihilate it, or for something with which to swat it and thus obliterate the pesky thing. But those who take the time to look at these delicate winged insects will see, on close inspection, that most flies are surprisingly attractive creatures, and the grey striped flesh fly, with its grey to brown striped body, immense reddish brown eyes, and fragile wings is no exception.

Flies have some habits that humans find quite disgusting however, and the common name of this species says it all, for these are flies that feed on and breed in decaying flesh and rotting vegetation. And how revolting is that?

The lifecycle of the grey striped flesh fly is not an appealing story in many respects, but they are important residents within a balanced ecosystem in which they play diverse and essential roles.

The females of the species give birth to live young, and lay their wriggling maggots directly onto putrid flesh or dung that will provide them with a supply of food as they grow towards adulthood. Both adults and their maggots help to break down organic waste matter, which can then be incorporated into the soil to provide nutrients for plants. And in addition to this, they provide a source of food for many other wild creatures, including birds, frogs, and reptiles.

It might initially seem that the world would be a better place without the presence of the grey striped flesh fly, but for the many species of wildlife that consider each fly to be a tasty and nutritious morsel, life would be far from easy if the environment was devoid of such tiny creatures.





A grey striped flesh fly on a leaf in the author's garden.





HOVER FLY

Episyrphus species

There are few people other than entomologists who can honestly say that they like flies, but although some are unwelcome creatures that spread diseases, others are particularly valuable members of the community of insects that reside within a garden or agricultural environment, and the hover fly is definitely one of the good guys.

It's easy to mistake this colourful fly for a wasp, and that's its intention, but although its appearance mimics that of a wasp, its huge eyes are the most conspicuous clue to its true identity. Like all flies it has compound eyes that are comprised of many thousands of individual lenses and that give flies the ability to see light and colours that are invisible to the human eye, and also enable them to see fast moving small objects, such as other insects.

The hover fly has small and almost inconspicuous antennae, transparent wings, a slender orange body with black stripes, and a waist that's narrow like that of a wasp. But gaudy hover flies, which are found throughout Australia and are most commonly seen in the warmer months of the year, do not sting and are quite harmless, at least to humans.

They frequently hover in the air and regularly visit gardens to feed on the nectar of flowers, and with pollen dusting their bodies, they're valuable pollinators of many species of plants, but there's another reason why these attractive insects are always welcome. They usually lay their eggs on leaves that are close to a colony of aphids, and the tiny larvae that eventually hatch play a vital role in controlling garden pests, for they are voracious predators that feed primarily on aphids, and also on other unwelcome insects such as scale insects and thrips.



Left: A hover fly on a portulaca flower in the author's garden.





GRASSHOPPER

There are hundreds of species of grasshoppers in Australia and these are insects that are despised for the significant damage that they routinely cause to agricultural crops and to plants in home gardens. At times, with nothing more than a leaf nibbled here and there, there's little reason to complain about their presence, but when these ravenous creatures arrive in plague proportions no one throws them a welcome party.

It's not all bad news as far as grasshoppers are concerned however, for like other insect species they play an invaluable role in a balanced ecosystem in which they are one of the major food sources for many birds, reptiles, spiders, and bats, in addition to being the hosts for the larvae of hordes of parasitic insects.

A close look at a grasshopper reveals that this is definitely not an ugly creature, in fact, these agile insects, with their large eyes, powerful hind legs that are lined with spines, and ornate and lacy wings are not only attractive to those who see beauty in almost every aspect of the natural world, but are superbly designed to suit their specific niche in the environment.

No one can answer the eternal riddle of which came first, the grasshopper or the egg, but whatever the answer may be, the grasshopper's lifecycle begins with the eggs that females lay in the soil, although some species deposit their eggs, which can number up to 500, in rotting wood or animal dung.

The tiny nymphs that hatch from the eggs transition through five developmental stages, and in each of these the nymph differs in its colour and size to some degree. It sheds its skin as it grows, and eventually, after 4-5 weeks, it undergoes the final phase of its metamorphosis and changes from a generally green wingless nymph to a normally brown winged adult.

Left: A grasshopper on a zinnia flower in the author's garden.



One of the most recognisable features of grasshoppers is their ability to produce sounds by rubbing the row of spikes on their back legs against the hard edges of their wings, and although the females of some species have the ability to produce sound, it's usually only the males that do so in order to attract a mate. They have antennae that, depending on the species, may be either long or short, but all have chewing mouth parts to feed on vegetation. Some feast on a wide range of plants, consuming leaves, soft stems, buds, and flowers, but others are more selective and dine only on seeds or grasses, and a

few, with cannibalistic tendencies, will even eat their own kind.

Large populations of grasshoppers can cause severe damage to plants, but small numbers of these insects are a vital part of the wildlife community in any garden or agricultural landscape and are essential for the survival of many other wild creatures. Several species of flies and wasps parasitise grasshopper nymphs by laying their eggs within the unfortunate creatures' bodies, while for other predatory insects, such as robber flies, grasshoppers are a major ingredient of a nutritious diet. And with birds and

animals also routinely feasting on large numbers of grasshoppers, there are few other insects that are as unwelcome by humans, yet in such great demand by so many of the residents of wild Australia.



Above: A young grasshopper with its wing buds developing.

Opposite page: A young grasshopper, with its wings developing, feeding on an ixora flower in the author's garden.







HARLEQUIN BUG

Tectocoris diophthalmus

The colourful harlequin bug, which is also commonly known as a 'jewel bug', has another less attractive nom-de-plume, and anyone who has smelt the pungent aroma that it emits when threatened will agree that 'stink bug' is a most appropriate name.

It's found in northern and eastern Australia where it's most frequently seen during summer months, and the best place to look for this attractive creature is on the foliage of a hibiscus plant where, with its gaudy colouring, it's not hard to find.

The colours exhibited by harlequin bugs are extremely variable, although adult females, which are approximately 25mm in length, are generally orange with smudges of blue to black and have blue and metallic green legs, while males, which are slightly smaller, are usually red with larger blue patches on their bodies.

They feed on many species of hibiscus, plants within the *Malvaceae* family that includes commercially cultivated cotton, and are occasionally found on Australian native plants including Illawarra flame trees (*Brachychiton acerifolius*), and on grevilleas and callistemons. They pierce the delicate young shoots of the plants with their sharp proboscis and suck out the sugar-rich sap, causing nearby leaves to wilt and die and flower buds to drop before opening.

Female harlequin bugs lay their clusters of pale pink to white eggs around the stem of a plant and, with maternal instinct, they guard them until a horde of tiny nymphs hatches and these minute creatures, like their parents, set off in search of the sweet taste of another delicious and irresistible plant.



Left: A harlequin bug on the leaf of a hibiscus at the coastal Town of 1770 in Queensland.



ORCHID BEETLE

Stethopachys formosa

Not everyone would welcome this brightly coloured insect if it should arrive in their garden, particularly if orchids are growing there, for as its common name suggests, this small and attractive beetle has a passion for these exotic plants.

The orchid beetle is found in

the northern parts of the Northern Territory, in Queensland, and in northern New South Wales, and will survive further south in a protected area such as the interior of a glasshouse or fernery.

With its vivid orange body with black spots, an orange head, and long antennae, it's little more than 12mm in length, but for a small creature it can inflict some serious damage. Although

its favoured host plants are dendrobium orchids, it will also attack other genera of orchids by eating the plant's leaves, flowers, buds, and seed pods. It lays its eggs on the plant's new growth, and on its buds and flowers, and the tiny larvae that ultimately hatch tunnel into the plant's stems causing them to wilt and eventually die.

In the next phase of its lifecycle, the orchid beetle's larvae pupate

in a white mass at the base of the plant and eventually complete their metamorphosis and the cycle of life and death begins all over again.

Although the beetles can fly, if they're threatened they simply drop to the ground and secrete themselves among leaf litter or other plant material until the danger has passed.

They provide a source of food for other insects and birds, but for lovers of orchids that fact is little consolation when a prized plant comes under a sustained attack.



PRAYING MANTID

There are approximately 120 species of praying mantids in Australia, the majority of which live in sub-tropical and tropical regions, and there's perennial confusion regarding the common name of these fascinating insects. 'Praying mantid' is the most frequently used colloquial name as the insect's stance, in the opinion of those with some imagination, resembles that of a person praying, while 'preying mantid' is an equally appropriate name for this skilful predator that preys on a wide range of other insects.

A praying mantid has a long slender body that's either brown or green, a triangular head that can swivel round for almost 360 degrees, large and prominent eyes, long thin antennae, and long legs with rows of savage spines on the forelegs. Its wings lie flat on its body when not in use, and although males can fly, the females of some species either have smaller wings that provide only a limited ability to fly or have no wings at all. Females are usually considerably larger than males, but despite their relatively large size, praying mantids are often difficult to discover in their natural habitat where they are well camouflaged and often resemble twigs or leaves.

A praying mantid, in its iconic pose and waiting patiently among vegetation, may appear to be appealing for a potential victim to wander its way,



and when its prayers are answered, it attacks with amazing speed, grabs its prey with its powerful forelegs, and quickly devours it.

When these curious insects themselves are threatened, speed is not a factor in their survival technique, for although they can fly, they do so only rather slowly and awkwardly. They are the favoured prey of many other predators and rely heavily on their camouflage to avoid becoming a snack for a hungry bird or reptile.

They are usually solitary creatures that come together only when mating, and making the acquaintance of a female is bad news for a male of the species, for the female has a reputation as a savage beast that will eat her suitor

after mating, a gruesome fact that's true for some species that have cannibalistic tendencies. Females lay their eggs in a spongy case called an ootheca, which is usually attached to the branch of a tree or to foliage. Large numbers of tiny mantids eventually hatch and set off into the wide world where they, like their parents, will play a valuable role in the natural environment, in agricultural regions, and in gardens as the welcome predators of many insect pest species.



Opposite page: An orchid beetle in the author's garden.

Above: A praying mantid in the author's garden.



A close-up view of a preying mantid in the author's garden.







RHINOCEROS BEETLE

Xylotrupes ulysses

The rhinoceros beetle, which is also often referred to as an 'elephant beetle', is the largest of all the beetles found in Australia. It's an insect that inhabits warm and humid sub-tropical and tropical regions of the continent, primarily in Queensland, the Northern Territory, and northern New South Wales, and it's also found in south-east Asia and Indonesia.

Like many flying insects, it's attracted to lights and is often seen under suburban street lights, but the other place where it's regularly found is on or close to the sprawling poinciana trees (*Delonix regia*) that are grown in streets, parklands, and gardens within the beetle's extensive range.

The rhinoceros beetle, which can be up to 50mm in length, is completely black, and males are easily recognised by the large and distinctive horns that are their primary weapons in seasonal battles for a mate. When disturbed, they make an agitated hissing noise by rubbing their wing covers against their abdomen, and although this may sound threatening, these giants of the insect world pose no danger to humans.

Adults feed on the leaves, soft bark, and new shoots of trees, with large populations gathering on a tree when they're ready to mate. Each female emits a pheromone that attracts a group of males that, all eager for her attentions, engage in vigorous combat, with the strongest using its horns to push its weaker rivals from the tree.

Villagers in Thailand, where rhinoceros beetles are also common, have taken advantage of the insect's fighting instincts to indulge their passion for gambling. After a female beetle has been sealed inside a bamboo tube, males are placed on the outside and the owners of individual beetles place their bets on which insect will push the other off the bamboo in a

Left: A praying mantid in the author's garden.





game that's only a minor improvement on betting on two flies climbing up a wall.

Female beetles lay their eggs in decomposing vegetable matter on which the newly hatched larvae feed. These fat white grubs are often found in heaps of compost, and when they're ready to begin the next phase of their lifecycle, they pupate in the soil, and after metamorphosis a new rhinoceros beetle emerges, digs its way out of the ground, and heads to the nearest poinciana tree or another favoured plant species.

They cause minimal damage to trees and, thanks to their hard shells

and horns, are not the preferred prey of many other creatures, but the larvae, which play a useful role in breaking down decaying plant material, are more vulnerable and are a major source of food for many species of birds, including kookaburras and magpies that will snatch them from the soil the moment they dare to peer above the surface.



FIDDLER BEETLE

Eupocila australasiae

It must have been someone with an eye for detail and a hint of imagination

who coined this decorative beetle's common name, for he or she saw, in the ornate lime green or yellow pattern on the insect's dark brown to black body, the outline of a fiddle.

A member of the scarab group of beetles, the fiddler beetle, which is approximately 20mm in length, is found in heathlands, eucalypt woodlands, and urban parks and gardens in eastern Australia, from northern Queensland to Victoria and south-eastern South

Opposite page: A rhinoceros beetle in the author's garden.

Above: A fiddler beetle in the author's garden.

Australia, and spends much of its time searching for its favourite food, the nectar produced by flowers, and it feeds primarily on the prolific blossoms of eucalypts, acacias, and melaleucas.

The female fiddler beetle lays her eggs in decomposing logs, in other rotting forest debris, or in the damp soil. And the larvae that ultimately hatch make themselves at home in the decaying wood or other material that their mother selected as a prospective nursery and remain there until they reach maturity and eventually pupate in a cocoon that each larva creates within the soil or decomposing material.

When the miracle of nature sees adult fiddler beetles emerge from their cocoons in early summer, they instinctively dig their way out through the debris that concealed their existence and fly off in search of flowers to enjoy their first taste of the nectar that Mother Nature has provided for their health and survival.



GIANT WATER BUG

Lethocerus insulanus

This highly efficient predator, which is found in the Northern Territory and north-eastern Australia, with its range extending as far south as northern New South Wales, is a true giant of the insect world, for it can grow up to 70mms in length.

It enjoys a semi-aquatic lifestyle, and spends much of its time in freshwater lakes and in the tranquil waters of wetlands where it catches its prey with a minimum of effort. Using the two tubes at its abdomen as a built-in snorkel, it can breathe while underwater where it actively hunts for prey, or simply hangs upside down on the submerged stem of a plant and waits for a prospective victim to come within reach of its strong forelegs.

Tadpoles, small fish, frogs, aquatic insects, and yabbies are all on its menu, and once the hapless creature has been captured, the giant water bug pierces its victim's body with its sucking mouth parts, and with air stored between



its wings and its abdomen, there's no hurry for the bug to finish its meal and return to the surface to breathe.

Winged adults can fly for considerable distances to reach suitable feeding areas, and while they vanish from sight when they dive into water to hunt for food, they're also attracted

to bright lights, and are frequently seen on the ground beneath street lights and in other well lit areas. This has led to them being referred to as 'electric light bugs', and although they don't give their victims a zap of energy, it's advisable to remember that this large insect may bite if handled, and those who have



experienced the wrath of the giant water bug know all too well that a nip from this wild creature is not a pleasant experience.



GUM TREE STINK BUG

Pentatomidae family

There are more than 400 species of stink and shield bugs in Australia, most of which are in the *Pentatomidae* family. The name 'shield bug' relates to the body shape of the adult insect, while its other colloquial name of 'stink

bug' is derived from its ability to eject an obnoxious smelling substance from the pores in its thorax when threatened. And it's a smell that's guaranteed to deter most predators.

The insect shown above is a young stink bug, known as a nymph, which hatched from the eggs that a female bug had laid on the underneath of a leaf of a native eucalyptus tree.

After growing through around five stages, known as instars, nymphs eventually become winged adults that are about 15mm long and that have typically shield shaped bodies. Nymphs

spend much of their time under the loose bark of eucalyptus trees, but adults are more adventurous and venture onto the outer surface of a tree's trunk where they feed on its sap and hope that their camouflage will hide them from the eyes of hungry predators.



Above: A gum tree stink bug in the author's garden.

Opposite page: A giant water bug at Hervey Bay in Queensland.



ZEBRA SHIELD BUG

Bathrus variegatus

The zebra shield bug is also known by the less appealing name of 'stink bug' due to its habit of emitting a pungent and unpleasant odour when threatened, but despite its defensive tactics, it still occasionally falls victim to predators, including birds and reptiles that are fortunate enough to be able to ignore the insect's unpalatable smell.

The zebra shield bug's lifecycle, in common with that of other bugs, begins with an egg from which tiny nymphs emerge. These, during five stages, gradually increase in size until they become adults which are approximately 15mm in length and that, unlike the nymphs, have wings.

The nymphs of this species generally live beneath the bark of eucalyptus trees, but adults venture out into the open where they are usually found on the trunks of eucalyptus trees from which they suck the sweet sap.





Opposite page top: The eggs of a gum tree stink bug on the underside of a leaf, with an ant nearby.

Opposite page bottom: Gum tree stink bug nymphs emerging from their eggs that had been laid on a piece of hessian in a garden shed.

Above: A zebra shield bug 5th instar nymph.

Right: A zebra shield bug adult.

These insects were all found near Bundaberg in Queensland.







SPINED PREDATORY SHIELD BUG

Oechalia schellenbergii

The spined predatory shield bug is one of the most common predatory insects in Australia, yet despite the fact that it lives almost on the doorstep of millions of people, it's far from easy to see.

Its method of feeding might sound rather gruesome to squeamish people, for it destroys its victims by piercing their soft bodies and sucking out their body fluids. It's prey, however, are the larvae of moths, sawflies, weevils, and beetles, including some leaf-eating species that cause considerable damage to grape vines and other commercially

valuable plants, and that makes the spiny predatory shield bug one of the most valuable allies of farmers and gardeners in the continual battle to control insect pests without resorting to the use of toxic chemicals.

The adult of the species, which is only about 15mm in length, is rather drab, with its body being primarily a mottled brown colour with a distinctive spine on each shoulder, but its young, which are known as nymphs, are very attractive little critters.

Females lay clutches of up to 50 tiny black eggs on or under a leaf, and the nymphs that ultimately hatch progress towards adulthood in five stages. The bug shown here is in the last phase of its life as a nymph before moulting for

the final time and becoming an adult.

Adult bugs can be found from spring to autumn when their food supply of caterpillars and other insect larvae is most abundant. The nymphs, with their glossy red and blue-black metallic bodies, bright red eyes, and long antennae can also be spotted by those who are in the right place at the right time, and who have an eagle eye for the small and beautiful creatures of wild Australia.



Opposite page and above: The nymph of a spined predatory shield bug in the author's garden.



STICK INSECT

Stick insects, which are more correctly known as phasmids, are among the largest of all insects in the world, and the Titan stick insect, with a length of approximately 26cms, is the longest of all Australian insects.

These generally brown insects have evolved to become perfectly

camouflaged in their woodland and forest habitats, with many so accurately resembling sticks or leaves that they have developed features on their bodies that imitate thorns, buds, or tattered leaves. Male and female stick insects have very conspicuous physical differences, with males usually having wings and being capable of elegant but slow flight, while females have far larger

bodies and have a limited ability to fly.

They are herbivores and feed entirely on leaves, and although some species will feast on the foliage of a wide range of trees and shrubs, others have a more selective diet and eat only the leaves of a specific group of plants, such as eucalypts.

Stick insects use their camouflage as their first weapon of defence against



predators, and if disturbed they sway slowly from side to side, imitating a twig blowing in a gentle breeze, and it's only as a last resort that they take to the air in an attempt to escape. Despite their varied survival tactics, they fall prey to many species of birds, with spangled drongos and kookaburras particularly eager to gorge themselves on a banquet of these large insects.

A female typically lays many hundreds of tiny eggs during her relatively short life, and as she lays each egg it drops to the ground where it lies among the leaf litter until it either hatches or is carried away by an ant. The eggs have a small cap at one end, and when ants convey the eggs back to their nest, they're unwittingly giving Mother Nature a helping hand.

They eat the nutritious cap but discard the otherwise undamaged egg, thus ensuring that phasmid eggs are widely dispersed across the landscape.

Young phasmids, which are called nymphs, usually appear very similar

Above: Stick insects mating in the author's garden.





to adult stick insects, although they do not have wings, but as they grow they moult their skins at various stages until they reach adulthood and flutter among vegetation in the hope that their unique disguise will keep them safe from the army of ravenous predators that are never far away.



EUCALYPTUS WEEVIL

Gonipterus species

Any mention of weevils may trigger thoughts of wriggling maggots in flour, rice, or other grains, and while the larvae of the rice weevil and some related species are far from welcome, the eucalyptus weevil knows its place and has no intention of exchanging its natural habitat for a domestic environment.

This grey and light brown beetle, which is approximately 15mm in length, is a relatively attractive insect, and eucalyptus trees are all it demands for its survival, for it feeds exclusively on the leaves and the soft bark of young twigs of these native trees.

After mating, the female, over a period of around three months, lays several batches of eggs that she attaches to a tree's leaves. For the larvae that eventually hatch, life also revolves entirely around eucalyptus trees, for they eat nothing other than the leaves and young shoots of these native trees. In time, the larvae drop to the ground where they pupate among leaf litter or just below the surface of the soil, and as a new adult weevil eventually emerges, the cycle of life begins all over again.

Eucalyptus weevils, which provide a valuable source of food for many species of birds, reptiles, and other insect species, cause no significant damage to the trees that are their hosts, but in other countries where eucalyptus trees have been introduced into the environment things aren't quite so rosy. Australian eucalyptus weevils have, by various means, found their way to new

Left: A eucalyptus weevil in the author's garden.



territories where there are few natural predators to keep their populations in check, and when trees become heavily infested with these insects that are seen, in a foreign land, as a pest species, the damage to their foliage can be so severe that many trees struggle to survive the onslaught.



Above: A centipede in the author's garden.

CENTIPEDE

Scolopendra morsitans

With this wriggling creature's common name stemming from the Latin prefix 'centi', meaning a hundred, and the word 'pedis', which means 'feet', it's a logical presumption that a centipede would have 100 legs, but that's not always the case. Some have far more than 100 legs, but the species illustrated above, which has a large head, a distinctive black stripe on each

segment of its golden brown body, and can grow to a length of 130mms, has one pair of legs for each of the 21 segments of its body, and a simple mathematical calculation reveals that it has a total of merely 42 legs.

The centipede is an ancient lifeform, with fossil records revealing that it evolved into its current form more than 400 million years ago, and today an estimated 3,000 species of centipedes have been officially documented, with 128 of those found in Australia.



These curious creatures, which are not insects, are part of a group known as chilopods, and although they're not an aquatic species, they're more closely related to shrimps, lobsters, and crabs than they are to bugs and beetles.

Centipedes thrive in many diverse environments, with most preferring moist habitats and often found under rocks and decaying logs or among the leaf litter on the floor of a forest or woodland.

This carnivorous animal is a

voracious predator that hunts its prey with skill and speed, generally at night. It feeds primarily on insects, earthworms, and other small invertebrates that it grasps with the claws on the first section of its body, but these are not merely claws for restraining a struggling victim. They enable the centipede to bite and kill its prey with lethal venom, and that means that caution should be a priority whenever one of these creatures is around. They're not aggressive towards humans unless

threatened, but their bite is something to be avoided, and although it will not prove fatal, a nip from a centipede is said to be excruciatingly painful.

Females each lay a clutch of around 60 eggs that they bury in the soil, and when these eventually hatch, a new brood of centipedes wriggles off to play their allotted and important role in the environment.





BUTTERFLIES AND MOTHS

Australia is home to approximately 400 known species of butterflies and an estimated 10,000 species of moths, and with many more still to be officially described, the chance of seeing one of these beautiful creatures fluttering across the landscape at some time of the year is guaranteed.

It's not always easy to distinguish butterflies from moths with merely a cursory glance, but there are some general observations that can provide the answer to the perennial question of which is which. The first simple fact is that butterflies are usually only out and about during daylight, while most moths are creatures of the night. The shape of their antennae offers another conspicuous clue to their identities, for all butterflies have antennae with club-shaped ends, while those of most moths are very thin and do not have an enlarged tip, and although there are a few exceptions to another rule, moths hold their wings out flat when resting, while butterflies fold their wings together above their bodies.

Many butterflies and moths feed on the nectar produced by flowers or on the juices of decaying fruit. Some delicately sip moisture from wet sand or mud beside waterways and pools, but others survive, for the entirety of their relatively short lives, on nothing more than the reserves that they stored in their bodies during the phase of their lives in which they were caterpillars.

It's sex, rather than food, that dominates the lives of butterflies and moths however, and they don't rely entirely on their good looks to attract a mate. Female moths produce pheromones that have an odour that's readily detected by males, and when a male flutters close to a female, the pheromones that he too emits are enough to persuade her to mate with him. Butterflies also produce pheromones to attract prospective mates, but only males have this ability.

After mating, which often occurs while both partners are in flight,

a female butterfly or moth has an important decision to make. She has to choose the right plant on which to lay her eggs, for her larvae, the tiny caterpillars that will eventually hatch from the eggs, are extremely fussy eaters and will only feed on very specific plant species. Using highly sensitive receptors in her antennae, her legs, and the tip of her abdomen, each female 'tastes' the foliage to ensure that it will be a suitable food plant for her caterpillars, and when satisfied that she's made the appropriate choice, she silently deposits her eggs.

Some of the plants utilised by butterflies and moths contain toxins that would prove harmful, even fatal, to humans who might consume the foliage, but they have no detrimental affects on the caterpillars that devour them. Some, on the contrary, gain positive benefits from plant toxins that they store in their bodies to be used as chemical weapons, which are merely one of the varied defence strategies that caterpillars employ to deter predators.

Brown caterpillars become almost invisible on the bark of trees; green ones are well camouflaged among foliage; others wear an array of gaudy colours that warn predators that they're unpalatable; and some, when threatened, exude a foul smell that's guaranteed to repel any creature that might initially regard the caterpillar as a potential meal. Several species have a covering of fine stinging hairs that, if touched, can cause severe pain, and while humans and many species of birds have learned to keep their distance from these furry creatures, some birds have developed a natural immunity to the caterpillar's sting and enthusiastically feast on them with no ill effects.

For other caterpillars, the only option when faced with danger is to make a hasty escape, and to do this they need to take a leap of faith. By spinning a thread of silk from their bodies, they abseil down from the foliage on which

they were feeding and, when the coast is clear, they clamber back up and resume their meal.

Ravenous caterpillars are not always welcome by farmers and gardeners, but the larval phase of their lives eventually reaches its inevitable conclusion and they pupate and, like the Cinderellas of the insect world, they are finally transformed into glamorous butterflies and moths. And these amazing winged creatures employ an array of subtle tricks to ensure their survival.

Many use camouflage as their primary defence tactic, while others rely on vivid colours that might be seen as an invitation to predators. Most, however, are well aware that red, orange, and yellow can indicate danger, and the plant toxins that are ingested by caterpillars and retained during their metamorphosis into adults ensure that most predators that ignore the conspicuous warning signs displayed by butterflies and moths find them far from palatable. And although close contact with most species poses little if any risk to humans, caution should never be thrown to the wind.



BLUE TRIANGLE BUTTERFLY

Graphium sarpedon

The blue triangle butterfly, which is one of the most beautiful and easily recognisable of all Australian butterflies, can be spotted fluttering silently through the air in eastern Australia, from Cape York in Queensland to southern New South Wales, and although its favoured habitat is among damp forests and woodlands, it's also commonly seen in urban parks and gardens.

Its wings are black to dark brown with a large vivid blue triangular area dominating each wing, and the pattern on the underside of its wings is similar, with the exception of a few bright red

Left: An orchard swallowtail butterfly in the author's garden.

This beautiful blue triangle butterfly would ultimately become a victim of a yellow flower spider that was hunting for prey on a daylily flower in the author's garden.









spots near the top and bottom edges of the wings.

The caterpillar of the blue triangle butterfly is a far less attractive character, for its bright green body is decorated with nothing more than a white stripe near the head.

When disturbed or threatened, the caterpillar brings out its most potent weapon that comes in the form of a yellow horn-shaped feature, known as an osmeterium, that emerges from behind the caterpillar's head. The strong and unpleasant odour that it emits is enough to keep all but the most determined of predators at bay, and anyone in the vicinity of one of these wriggling creatures is likely to smell it well before they see it, for this is a caterpillar that's well camouflaged among the verdant foliage on which it feeds.

The aromatic leaves of the introduced camphor laurel tree (*Cinnamomum camphora*) and other closely related species are the main ingredients of the diet of the larvae of the blue triangle butterfly, and with the tree regarded as an invasive weed species in New South Wales and other areas of eastern Australia, both the caterpillar and the stunning butterfly that it will eventually become are a welcome sight.



BLUE TIGER BUTTERFLY

Tirumala hamata

As Captain James Cook sailed along the coast of Queensland in 1770 he was awestruck by the clouds of blue tiger butterflies that fluttered through the skies, and such a sight, or even a fleeting glimpse of a single one of these fragile creatures drifting on a gentle breeze still elicits a gasp of awe from both modern day visitors to Australia and those who have spent their lives on this amazing continent.

The blue tiger butterfly, which is also referred to as the 'blue wanderer', is found in coastal regions of the Northern Territory and in eastern Australia, from the northern tip of Queensland to

Victoria, but when cool weather arrives it abandons the southern extremity of its range and migrates north to a warmer and more hospitable climate.

With black wings adorned with light blue blotches and streaks, it's a very distinctive butterfly that's frequently seen in urban parks and gardens, and also in rainforests and humid woodlands.

Blue tiger butterflies feed on the nectar of flowers, with those of *Buckinghamia celsissima*, the native ivory curl tree, being among their favourite food plants, but their larvae, their less attractive grey, black, and white striped caterpillars, have other foods on their menu. They focus on feeding on the leaves of plants that have a milky white sap, including milkweed and rainforest vines, and although these are species that are poisonous to most creatures, the caterpillars have the ability to absorb the toxins without suffering any harmful affects.

Each caterpillar, as it comes to the end of the larval phase of its lifecycle, pupates in a green and shiny chrysalis that's suspended from the underside of a leaf where it glitters in the sunshine like a dazzling jewel.

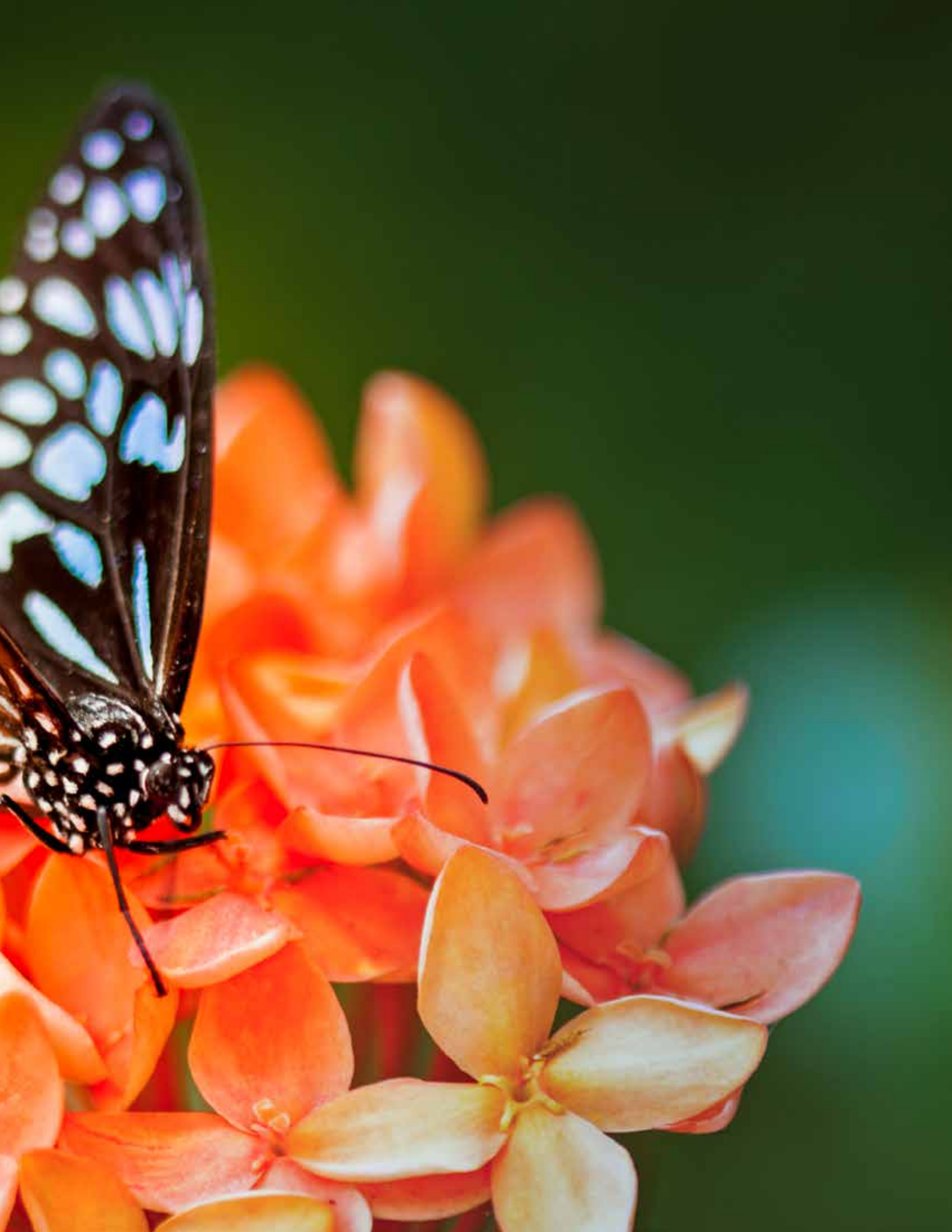
Both the elegant blue tiger butterfly and its drab caterpillars are prey for many species of birds and reptiles, but the toxins that the caterpillars absorb from their food make them highly unpalatable to most predators, and with the poisons contained in their bodies passed on to the butterflies, these too have a valuable weapon in their arsenal to improve their chances of survival.



Left: Blue triangle butterflies mating on an Australian native callistemon / bottlebrush tree in the author's garden.

A close-up photograph of a blue tiger butterfly (Greta oto) feeding on a cluster of bright orange ixora flowers. The butterfly's wings are dark brown with prominent white spots and blue markings. The flowers are in sharp focus, showing their vibrant orange petals. The background is a soft, out-of-focus green, suggesting a garden setting.

A blue tiger butterfly feeding on
the nectar of ixora flowers in the
author's garden.





A meadow argus butterfly feeding on the nectar of melaleuca flowers on the doorstep of a bush camping area in central Queensland.



MEADOW ARGUS BUTTERFLY

Junonia villida

With the meadow argus butterfly found throughout Australia, no one needs the luck of a lottery winner to catch a glimpse of this spectacular creature, for although it's at home in forests and woodlands, it will also flutter through any urban areas where suitable food is available.

Like most butterflies, it feeds on the nectar of flowers, but its caterpillars are less particular about what they eat, for a wide range of foliage, including that of garden plants and many species of invasive weeds, is on their daily menu.

The black and spiny caterpillars of the meadow argus butterfly are not the most attractive of insects, but thanks to the miracle of metamorphosis they eventually abandon their drab attire and don regal garb as they become winged creatures that draw a gasp of wonder from all who see them. This is a butterfly with a brown hairy body, and with wings that have both brown and vivid orange patches, and dark and light brown stripes at their edges. The most prominent feature of the meadow argus butterfly however is the array of large dark blue to black eye spots on each of its wings. And although they add to its beauty, their main purpose is to fool predators that see this fragile creature as an easy meal. They bite at the butterfly's false 'eyes', and, although an attack may damage its wings, the butterfly's body remains unharmed and it survives to fly another day.

During October and November meadow argus butterflies usually leave southern areas and flutter north where they gather in large numbers, often in the company of painted lady butterflies, and sip on the nectar of flowers. Their lifecycle, through the varied stages of egg, caterpillar, pupa, and butterfly, lasts a mere 53 days, but these are creatures that, in the final adult phase of their lives, leave a lasting memory of the wonders of nature on all who are privileged to see them.





A painted lady butterfly feeding on the nectar of melaleuca flowers on the doorstep of a bush camping area in central Queensland.





AUSTRALIAN PAINTED LADY BUTTERFLY

Vanessa kershawi

In 1849, when William Kershaw first stepped onto Australia's shores, he was just another British immigrant who was eager to seek his fortune at the goldfields of Ballarat. Within a few years he'd moved to the big smoke of Melbourne where, when he wasn't working for a crust, he sought out other treasures and, as a passionate amateur entomologist, he spent his spare time collecting moths and butterflies. He eventually became a taxidermist at the National Museum of Victoria where his greatest challenge was to prepare a dead blue whale for public display, but it's one of nature's smallest creatures that brought him eternal fame, for the Australian painted lady butterfly was christened in his honour with the scientific name of *Vanessa kershawi*.

The painted lady, which is most commonly found in southern Australia, begins its life as a brown and spiny caterpillar that has a pale yellow stripe along each side of its body, and that feeds on a wide range of plants, including lavender, Scotch thistles, and several species of native daisies.

The inconspicuous caterpillar finally pupates, and the butterfly that eventually flutters into life has a hairy brown body, and wings that, in addition to being adorned with fiery orange and chocolate brown patterns, also have small but prominent eye spots that are part of nature's survival strategy for this beautiful species. Predators that see the painted lady as a meal in waiting are easily fooled and see the butterflies 'eyes' as the focus of their attack, but all they get is a mouthful of wing as the butterfly flutters on its way relatively unharmed.

They're often seen in the company of equally attractive meadow argus butterflies, and together both species feed on floral nectar, with that provided by melaleuca trees proving irresistible.

Painted ladies frequently rest on the ground, with their wings spread wide as

they warm themselves in the sun, and at dusk they retreat to the shelter of trees and shrubs where they doze with their brightly coloured wings folded, and with only the dull brown undersides visible, they're perfectly camouflaged in the dappled shadows of the foliage.

When spring arrives, the painted lady butterflies that frequent eastern coastal areas of Australia set off on a migratory trek to inland regions. In vast numbers, flying close to the ground, they drift across the landscape for hundreds of kilometres, and although it's not unusual to see hordes of these glorious creatures feasting on a single tree or shrub, the numbers seen on mass migrations in recent years fail to rival those of the past.

In 1889 they were on the move in such immense flocks that they blackened the sky, and the vast populations that, during their exhaustive journey, settled temporarily on railway lines caused chaos as locomotives were unable to get traction and ground to a halt among the bodies of thousands of butterflies.

A congregation of Australian painted ladies feeding on the delicate flowers of a native shrub is a mesmerizing sight, but even a moment's glimpse of a single one of these spectacular butterflies is enough to illicit a gasp of awe and a murmur of thanks to Mother Nature for the wonders she has created.



Left: A painted lady butterfly feeding on the nectar of melaleuca flowers on the doorstep of a bush camping area in central Queensland.





WANDERER BUTTERFLY

Danaus plexippus

Wanderer butterflies, a species that's not unique to Australia, are famous for their extraordinary seasonal migrations during which they travel vast distances across North America and congregate in populations of many hundreds of thousands. It was in the 19th century that these beautiful creatures, which are also known as 'monarch butterflies', completed what must have been one of their greatest journeys and crossed the Pacific Ocean to Australia, with a wanderer butterfly first seen here in the summer of 1871.

It's a trek that these colourful butterflies, which have vivid orange wings with prominent black veins and black borders freckled with white spots, might have been undertaking for millennia, but it was only after Europeans arrived in Australia and introduced a range of exotic plants to the continent that wanderer butterflies could truly make themselves at home down under.

Today, they're a relatively common sight in eastern coastal regions, and are also occasionally found in Victoria and eastern South Australia.

The caterpillars of the wanderer butterfly have bodies that are adorned with yellow, black, and white bands, and in the 19th century, when female butterflies discovered the plants that their larvae would need for food, they laid their eggs, and the first caterpillars of this exotic species eventually wriggled onto the scene.

The most important plant in the lifecycle of the wanderer butterfly, the species on which females lay their eggs and on which ravenous caterpillars feast, is *Asclepias curassavica*, a plant that's commonly referred to as 'tropical milkweed', and that, like the wanderer, had its origins in North America. With its clusters of vivid red and orange flowers, it's a weed that's not

Left: A wanderer butterfly on a forest log in Queensland.



out of place in a garden designed to attract butterflies but, in common with other species of milkweeds, it has a treacherous secret.

Its white sap is poisonous, but the caterpillars that eat its foliage are unaffected by its toxins and use them to their own advantage. With the plant's poison in their system, both the caterpillars and the butterflies that they finally become are poisonous to most predatory birds. But Mother Nature ensures that the wild creatures of Australia continually evolve and adapt to the changing world around them, and some birds, including pied

currawongs and black-faced cuckoo shrikes, occasionally feed on the caterpillars of the wanderer butterfly with no ill effects.



MAGPIE MOTH

Nyctemera secundiana

Magpie moths enjoy the daylight as much as the night, and although they're often seen fluttering through sunlit gardens, they're also attracted to illuminated windows long after the sun has vanished from the sky.

They have drab dark brown wings

with a broad creamy white band across their forewings, and several large spots of the same colour on their rear wings. The abdomen is the moth's most distinctive and colourful feature, and its black and bright orange stripes have led to the magpie moth often being referred to as a wasp or tiger moth.

The caterpillars of magpie moths have bodies with orange and dark grey bands that are covered with long dark hairs, and with a cluster of much longer hairs on the head they initially appear to have waving antennae.

The moths sip on the nectar of flowers, and their caterpillars know



exactly what they like too. They feast on garden plants and weeds in the *Asteraceae* or daisy family, and *Crassocephalum crepidioides*, a widespread weed with the colloquial names of 'Fireweed' and 'Thickhead', is at the top of the menu.

The magpie moth, in many situations,

Above: A magpie moth feeding on a coreopsis flower in the author's garden.

Opposite page: A wanderer butterfly on the flowers of a rain bush, *Murraya paniculata*, in the author's garden.

is extremely well camouflaged, and although its caterpillars may be hard to see among the foliage of their favoured food plants, they take evasive action if threatened and, using a silken thread spun from their bodies, they abseil down to the ground and make a hasty retreat to a safer location until any danger has passed.

HAWK MOTH

Hippotion celerio

Acosmeryx anceus

Australia is home to around 65 species of hawk moths, and these fast

flying creatures are most likely to be encountered at dusk or during the night when, like many species of moths, they are drawn to lights.

Hawk moths are also out and about feeding at night, and recent research has revealed that they're partial to the sweet nectar produced by the flowers of pawpaw trees, and that's good news for those who grow this tropical fruit. While hovering in front of a flower, the moth uses its long proboscis to feast on the nectar, and as it does so, golden pollen dusts its wings and its body, and as the moth enthusiastically flutters from one flower to another, it completes





the task of pollination that enables the flowers to develop fruit. Neither bees nor wind play any significant role in the pollination of pawpaws, for it's a task that's accomplished almost entirely by hawk moths, which fortunately are found in every region of Australia where the fruit is grown.

Neither the fruit, the flowers, nor the leaves of pawpaw trees are of any interest to the hawk moth's caterpillars, for they feed on a variety of other introduced and native plant species, including grape vines, sweet potatoes, cunjevoi, impatiens, and gardenias, and with their green, black, or brown colouring, and lateral or diagonal stripes, the caterpillars are well camouflaged among the vegetation of the plants that are the focus of their attentions.

Their colouring and patterns can vary within a single species, but most have bright eye spots and a long, often curved 'horn' near the tail end of the body that gives them a somewhat formidable appearance and thus ensures that predators think twice when they're tempted to feast on these large and succulent caterpillars.

As winter approaches, the caterpillars pupate, usually among leaf litter or in the soil, and a new generation of moths emerges as warm weather returns.

Hawk moths might not be the most colourful of wild creatures, but they're worthy of admiration, not only for their subtle beauty, but also for the vital role that they play as Mother Nature's quiet, inconspicuous, and invaluable little workers.



*Left: A grape vine hawk moth, *Hippotion celerio* on a filing cabinet in the author's office.*

The caterpillar of a hawk moth, *Acosmeryx anceus*,
in the author's garden.







TRANSVERSE MOTH

Xanthodes transversa

The transverse moth, which can be found in Queensland and New South Wales, is a relatively bland creature with yellowish brown wings decorated with arrow-shaped markings, but its caterpillars are far more ornate. The youngest of these are light green with two rows of pale yellow spots along the body, which has a sparse covering of long hairs. As they mature, they

develop bright yellow lateral stripes and black bands around their bodies, with some having a red spot at the tail end, a feature that may be intended to confront predators with some confusion over which end of their intended prey is which.

When it comes to food, the caterpillars of the transverse moth know exactly what they like, and their diet consists entirely of members of the *Malvaceae* or hibiscus family of plants, with the Australian native hibiscus,

Hibiscus heterophyllus, and ornamental garden species being at the top of this perpetually ravenous caterpillar's menu.



GEOMETRID MOTH

Hyposidra talaca

The geometrid moth, which is found in the sub-tropical and tropical regions of Queensland, is a rather drab brown species that's far from being



one of the great beauties of the natural world, but its caterpillars are far more distinctive and attractive characters. They're known, for reasons that become blatantly obvious when they get into their unhurried pace of life, as 'black loopers', for they move along with a slow and looping action.

Young caterpillars are black with small and random white patches on their bodies. Those that are older and that are almost ready to pupate are a muddy shade of brown, but in the

intervening period they're dressed in their most decorative attire, with patches of white, bright yellow, and pale yellow daubed across their ebony black bodies.

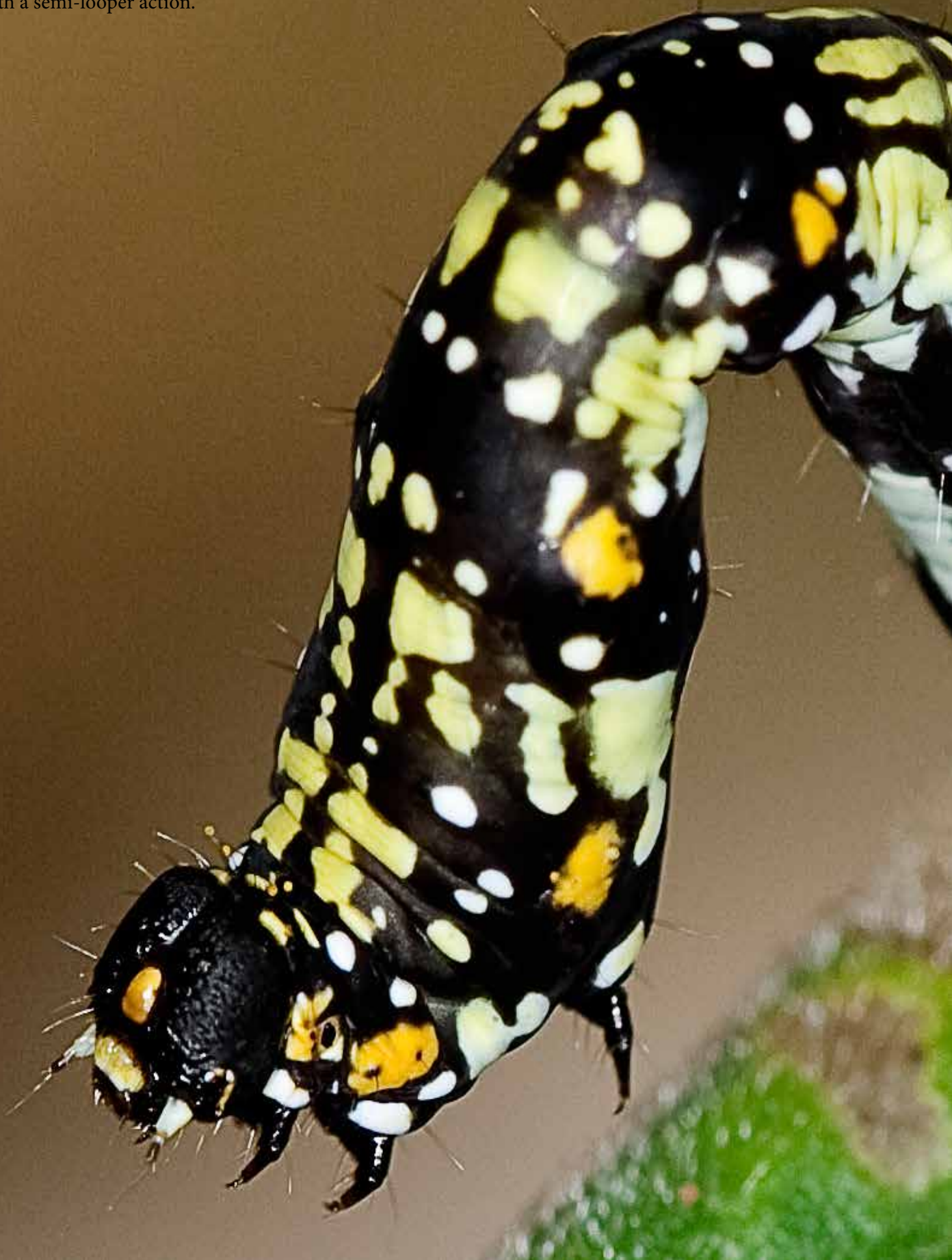
They're happy to dine on the foliage of a relatively wide range of plants, and when small numbers of these colourful caterpillars nibble on little more than a leaf here and a leaf there, gardeners and farmers have no reason to complain about their presence. It's only when they home in on their favoured food

plants in the tea and coffee plantations of northern Queensland that they make themselves unwelcome, and the time when they pupate and eventually reach their adult phase as moths can't come quickly enough for farmers.



Opposite page and above: The two forms of the caterpillar of the transverse moth, both of which were found in the author's garden.

The caterpillar of a geometrid moth moves with a semi-looper action.





SAUNDER'S CASE MOTH

Metura elongatus

The Saunder's case moth, which is found in eastern Australia, including Tasmania, has a very unconventional way of life and a unique method of protecting itself from potential predators. It's the curious home of the moth's caterpillar that's most frequently seen, and anyone with a little patience might be treated to a glimpse of the bright orange and black caterpillar as it peers cautiously from the doorway of its camouflaged retreat. After creating a cylindrical silken sac that's covered with fragments of leaves, this ingenious caterpillar then adds a layer of twigs to create a mobile home that it carries with it as it moves around like a hermit crab in a recycled ocean shell.

The case moth caterpillar feeds on the foliage of a wide range of native plants, including cypress pine trees, native heath (*Epacris* species), flax lily (*Dianella brevipedunculata*), and some acacia, eucalyptus, melaleuca, and leptospermum trees, in addition to several exotic species. With its head and part of its body protruding from its case, it also feeds on the grasses of lawns, but will retreat to the safety of its home the moment it feels threatened by the approach of human footsteps or by a glimpse of a predatory bird or reptile.

Each caterpillar remains in its case for 1-2 years, and when it's ready to pupate, it attaches the open end of its case to the trunk or branch of a tree or to the wall of a building, positions itself head downwards, and waits for the miracle of metamorphosis to take place.

When a small male moth, with black wings, an orange furry head, and a black and orange striped furry body, finally emerges, he flies off in search of a mate. Females, which have no wings, remain in the case for the entirety of their lives and, after mating, they lay their eggs within the security of their

Right: A Saunder's case moth caterpillar in the author's garden.







well camouflaged home. When the eggs ultimately hatch, the tiny caterpillars emerge from a hole at the rear of the case, and lower themselves, via silken threads, onto the nearest branch or foliage where each begins to create its own retreat that it will continually enlarge as it grows.

When additional space is required, the caterpillar, using its strong jaws, snips off a fragment of a twig that it attaches to the mouth of the case with a strand of silk. It then pulls its head back inside the case and slowly cuts a slot through the tough silken wall. This tiny construction worker then pokes its head out through the hole, grabs the newly cut piece of twig, severs the silk that held it in place, pulls the twig over the hole, and secures it firmly to the body of the case. With this one task taking more than an hour to complete, the construction of an entire case, which can be up to 150mm long, is no mean feat for the Saunder's case moth caterpillar.



TAILED EMPEROR BUTTERFLY

Polyura sempronius

Although the tailed emperor butterfly prefers to live in sub-tropical and tropical regions it can also be found in areas with cooler climates, although it never ventures as far south as Tasmania. It's not the most colourful of butterflies, but with wings that are predominantly black and creamy white on the upper side and that have pointed 'tails', it's still an attractive creature that can be seen feeding on flowers or on the juices of decaying fruit.

When it comes to glamour, the caterpillar of the tailed emperor butterfly is in a different league altogether, for it's a creature that some people may find repulsive, while others may see it in a more positive light. In its earliest stages, it's a yellowish brown colour with a black head, but as it grows it becomes emerald green and develops a succession of wide yellow bands around its body and a narrow yellow stripe along the lower section of each

side. Its most curious physical feature is the strange shield and the array of yellow edged green horns that rise from its head, and this strange caterpillar gives its presence away by emitting a foul smell whenever it considers that a threat is imminent.

It's a far from fussy creature when food is on its tiny mind, and will feast on the foliage of many native and exotic plants including cordylines, and acacia, poinciana, and camphor laurel trees.



LILY BORER MOTH

Brithys crini

Few people would give the inconspicuous brown lily borer moth a second glance, for it's a small and drab creature that flutters silently through the night, but its caterpillars are impossible to ignore. Found in the Northern Territory, Queensland, and New South Wales, they have ebony black bodies ringed by white spots, and orange to brown heads and rear ends, but it's the damage they cause to plants, rather than their physical appearance, that draws both the attention and the ire of gardeners.

Female moths lay clusters of eggs on the foliage of host plants and the tiny caterpillars that eventually emerge begin a feeding frenzy, and it's plants within the *Amaryllidaceae* or lily family, including crinum lilies, hippeastrums, and rain lilies (*Zephyranthes* species) that come under sustained attack.

Some caterpillars, as their colloquial name suggests, bore into the stems of the plant's large and fleshy leaves, while others feast on the leaves themselves, eating the most succulent parts and remaining beneath the leaf's translucent outer layer, its epidermis. As the onslaught progresses, every leaf turns a sickly yellow, the stems wilt, and the plant appears to be in its

Opposite page: The caterpillar of a tailed emperor butterfly.

Right: The caterpillar of a lily borer moth.



death throes, but with the caterpillars' food plants being bulbous species, they survive the rampaging hordes and live to flower another day

A single caterpillar is believed to consume around 2.4 square metres of plant material during its short lifetime, and with their insatiable appetites for plants that contain toxins, the caterpillars are unpalatable to most predators, and that means that gardeners can expect little if any help from Mother Nature in their attempts to limit the damage caused by these unwelcome residents of wild Australia.



CUP MOTH

Doratifera quadriguttata

Doratifera vulnerans

Cup moths are small, often brown, and rather unimpressive creatures, but the same can't be said about their larvae, which are among the most brightly coloured and unusual of all caterpillars. They're also among the most dangerous, as botanist Joseph Banks discovered during his adventurous journey with Captain James Cook in 1770. He was the first to record the presence of cup moths in Australia, and was left with a painful memory of his encounter. While meandering among the mangroves that fringe the coast beside the present day Town of 1770 in Queensland he had the dubious honour of being the first European to be stung by a cup moth caterpillar, and the sting, according to others who have shared his experience, is not something to be forgotten in a hurry.

The bodies of the caterpillars of most species of cup moths have numerous short spines, each of which is hollow and contains venom produced by a gland at its base. When an unwary human or predator touches the needle-sharp spines, the tips break and the venom, which produces a pain similar to that inflicted by contact with stinging

Right: The caterpillar of a four-spotted cup moth in the author's garden.









nettles, is injected into the flesh.

Cup moths owe their collective name to the cup-shaped cocoons that their caterpillars create when preparing to pupate. These are usually attached to the twigs of the caterpillars' food plants, which include eucalyptus, melaleuca, and acacia trees, and resemble the distinctive seed capsules of eucalypts.

The caterpillars of the cup moth are often referred to as 'slug caterpillars' due to the fact that, with some of their legs having evolved to become little more than suckers, they move along with a motion similar to that of slugs, with the aid of a type of liquefied silk that allows them to slide effortlessly across the rough surfaces of twigs and branches.

Female cup moths lay their clusters of eggs on the leaves of the plants that will involuntarily provide their larvae with food, and then cover the eggs with hairs from their bodies. This camouflage improves the chances that the eggs will survive, but the caterpillars that eventually hatch are not always so lucky, for despite their savage armoury of spines, many come under attack by birds and by parasitic insects that lay their eggs in the soft flesh of the caterpillars' bodies.

The caterpillar of the four-spotted cup moth, *Doratifera quadriguttata*, which is illustrated on the previous page, is found in all states other than Western Australia, while the caterpillar of the mottled cup moth, *Doratifera vulnerans*, (left), is found only in eastern coastal regions of the continent. Both species feed on the leaves of mangrove trees and several species of fruiting trees, including apricots and guavas, in addition to those of their favoured native plants, and despite their ornate patterns, they're surprisingly well camouflaged in their natural habitat.

The four-spotted cup moth's caterpillar, with its rows of fleshy spines, looks convincingly threatening, but the caterpillar of the mottled cup moth

Left: The caterpillar of a mottled cup moth in the author's garden.

often appears completely harmless, for it retracts its red spines and gives no hint of the weapons that it has at its disposal. It's a different matter when it feels threatened however, for an array of ferocious spines suddenly appears as the caterpillar reinforces the message that it's neither a creature that will make a tasty snack for a predator, nor one that should be handled carelessly by humans. And anyone who ignores that message is sure to regret the fact that they failed to heed Mother Nature's warning to look but not touch.



TUSSOCK MOTH

Lymantriidae family

Tussock moths are relatively small moths with hairy bodies. They are a primarily nocturnal group, but females, being wingless creatures, are far less active than males, and there's little reason for them to be jumping about with energetic excitement, for their lifestyle is not one that you'd wish on your worst enemy. With only primitive mouth parts they don't feed at all, and the main activity in their very brief lives is to mate and thus ensure the survival of their species.

The caterpillars of tussock moths are far more attractive than the often bland moths however, with many species having a dense covering of long hair and four distinct clumps of hair on their back. Any contact with these hairs can result in skin irritations, and that means that anyone discovering one of these attractive caterpillars should exercise caution and keep their hands and other areas of exposed skin well away from these prickly characters.

They pupate in silken cocoons that are concealed beneath loose bark or foliage, and with the pupa also covered in hairs, most birds and other predators have the common sense to steer well clear of the larvae of tussock moths.



Right: The caterpillar of a tussock moth in the author's garden.





PAINTED VINE MOTH

Agarista agricola

The painted vine moth is one of the most colourful of all Australian moths, and with its black wings daubed with patches of red, orange, and blue it's earned the name of the 'Joseph's coat moth'. Females are slightly larger than males and can be distinguished by the white area at the base of each forewing, and being out and about during daylight hours, it's often erroneously assumed that these attractive creatures are butterflies.

They're found in the Northern Territory, Queensland, New South Wales, and Victoria, and while the colourful adult moths are hard to miss, the vivid hues of their caterpillars often lead to some confusion. With their large bodies having wide and alternating black and white bands with an orange band towards the head, and with an orange head and feet and prominent black hairs with club-shaped tips they're readily recognisable. But as they approach the time when they'll pupate, the caterpillars don a different garb, and although they retain many of their distinctive physical characteristics, the white bands on their bodies change to orange.

It's the food plants of painted vine moth caterpillars that gave the species its common name, for they feast almost exclusively on the foliage of plants in the *Vitaceae* or vine family, with a preference for the leaves of the Australian native grape (*Cissus opaca*) and cultivated grape vines. When they've changed into their most gaudy dress, the caterpillars pupate on a branch of a tree, shrub, or woody vine, and conceal themselves in a silken cocoon that, covered with tiny pieces of bark, offers protection from predators as metamorphosis takes place and a glamorous moth, adorned with the hues of Joseph's coat of many colours, eventually emerges to dazzle all who see it.



Right: The caterpillar of a painted vine moth in the author's garden.







The caterpillar of a painted vine moth in its final phase.



CASTOR OIL MOTH

Achaea janata

Although the castor oil moth inhabits many areas of Australia, the largest populations are found on the eastern side of the continent. With its forewings patterned in varied hues of brown, which are a dramatic contrast to its rear wings that are primarily black and white, it's not a beautiful creature by any stretch of the imagination, and although the moth's caterpillars are not brightly coloured either, the complex patterns on their bodies ensure that they're very attractive characters.

Each highly distinctive caterpillar, which moves in a looping fashion, has a brown and cream freckled body with narrow white and orange lateral stripes, black spots along its back, a white underside, a black and white head, and a small vivid red knob at its tail end. And as the caterpillar ages, the red knob changes to black, and its underside becomes orange.

The moth feeds on soft fruits, but its caterpillars have far less singular tastes. They dine on an extensive range of plants, but their preference is for the foliage of the castor oil plant (*Ricinus communis*), a prolific weed in many parts of the continent. The castor oil moth is also often referred to as the 'Croton moth', a reference to another of its caterpillars' favoured food plants. And when they're not scoffing the leaves of either crotons or castor oil plants, the caterpillars home in on bauhinia, mangrove, acacia, eucalyptus, and macadamia trees, and on roses, hoop pine seedlings, and soybeans - to name just a few of the many species that they find irresistible.

The seeds of the castor oil plant contain ricin, a highly potent toxin, with the ingestion of only a small number of seeds sufficient to kill an adult human. The plant's leaves contain lesser, but still substantial amounts of ricin, yet the caterpillars of the castor oil moth are able to gorge themselves on the foliage with no ill effects.



The caterpillar of the castor oil moth in the author's garden.





SPIDERS

A fear of spiders has been instilled in most people since birth, yet spiders are the environment's good guys. Approximately 2,000 species of spiders call Australia home but, unlike some insect species, they don't carry or spread diseases, they cause no damage to crops or native vegetation, nor to buildings or fabrics, and they're not parasitic. These heroic and often secretive little creatures are one of the most essential and beneficial creatures within every healthy and balanced ecosystem, and play a crucial role as regulators of insect populations.

From their origins as simple ground dwelling hunters some 360 million years ago, spiders have evolved in ways that enable them to survive in diverse climatic conditions and environments, including caves, swamps, forests, deserts, and mountains. Some thrive among coastal rocks where they hunt in saline pools for small marine creatures, utilise discarded seashells for the protection of their eggs and young, and cover their waterfront retreats with a sheet of silk to retain a bubble of air. Others live underground in burrows with hinged lids, and some have been found on Mount Everest at an altitude of 6,700 metres.

Spiders shared the lives of early cave dwelling humans and dined on the insects that infested primitive homes, and as insects developed the ability to fly and proliferated in man's continually changing and often artificial environments, spiders developed new and innovative ways to catch their prey. And silk became the primary weapon in their arsenal.

All spiders excrete silk, and most have three pairs of spinnerets at their abdomen, each with 100 or more minute spinning tubes from which the silk is drawn, with the coarsest of the several types of silk produced being five times finer than the thread spun by silk worms. Spider silk is reputedly the world's strongest natural fibre. Its strength exceeds that of steel wire of

similar dimensions, and its elasticity allows it to be stretched more than 20 percent beyond its original length. And believe it or not, researchers at the U.S. industrial chemical company Dupont claim that a heavy rope made from spiders' silk would have the strength to halt a jet aircraft at take off.

More than a third of Australia's spider species are web builders with their creations, in intricate geometric designs, visible in their hundreds in bushland when lavishly decorated with early morning dew or raindrops. Moonlight, temperature, seasons, and wind all influence the flight patterns of insects, and spiders, taking these factors into account, construct their webs where the majority of insects will pass or congregate.

They wait patiently and silently, and have developed a range of amazing strategies to snare their prey. Net casting spiders trap their victims with a sticky net. Leaf curling spiders hide in leafy tubes glued together with silk, and whenever the thread of silk that's attached to it vibrates, they leap out to attack an unsuspecting insect. Freshwater spiders hunt in streams and swamps where they dive in pursuit of tadpoles or aquatic insects while breathing air from bubbles trapped in hairs around their lungs. Yellow and white flower spiders silently snatch butterflies, bees, or other insects from petals or leaves that offer perfect camouflage. Stick spiders lay trip wires, and when an insect stumbles across them, the spider releases the tension and a sticky trap is sprung, leaving the victim helplessly entangled. Fishing spiders catch their prey by twirling a line of silk with a sticky blob at its end; spitting spiders spit out a sticky fluid to immobilise their victims; and jumping spiders leap onto the insects that will become their feast.

Most spiders have at least eight eyes, which gives them the ability to see in all directions simultaneously. With such keen eyesight, those that don't construct

webs or other traps have become highly efficient hunters that chase their prey and pounce with lightning speed. And the largest huntsman spiders, with outstretched legs that measure up to 170mm across and bodies up to 50mm in length, are the most proficient of them all.

Food is seldom on the minds of mature male spiders when their hunger for a mate becomes insatiable, but females are always ravenous and may attack a prospective mate with speed and ferocity and ultimately devour him. Some males have developed cunning survival strategies however. They perform a mating dance to signal their amorous intentions; wrap the female in silk before she realises what's happening; or present her with a gift, a dead fly or other appealing delicacy, and get down to the business of mating while she's eating it instead of him.

Most spiderlings, when they emerge from their silken egg sac, are on their own, but some receive a helping hand from a parent. Female huntsman spiders share their prey with their offspring by regurgitating food and feeding individual spiderlings, and if threatened, they gather the tiny spiderlings beneath their large bodies until danger has passed. Wolf spiders fasten their egg sacs to their bodies and carry them with them until two hundred or more minute spiderlings ultimately emerge and scramble onto their mother's back. Those with young may become extremely aggressive towards one another, even fighting to the death, but the spiderlings, having abandoned their mothers as the duel began, surge onto the back of the victor who then carries both broods for several months.

When the time comes for spiderlings to launch themselves into the big wide world, they emit silken threads that,

Opposite page: A female huntsman spider guarding her silken egg sac in the author's kitchen.

when caught on even a feeble breeze, form parachutes that carry their tiny passengers to diverse locations, with some having been found attached to aircraft more than 4,300 metres above the surface of the earth. Using this unique method of dispersal, spiders can rapidly recolonise areas devastated by floods or bushfires, and are one of the first life forms to reappear after an environmental disaster

The toxin of the daddy-long-legs is the most potent of any spider, but fortunately its fangs are too small to bite humans, and its poison sac holds only enough to kill minute prey. The Sydney funnel web spider, which has occasionally caused fatalities, the mouse spider, the red-back, which can inflict a painful, although rarely lethal bite, and wolf and white-tailed spiders that are suspected of causing slow healing skin sores are undoubtedly creatures to be avoided, but most spiders pose no danger to humans

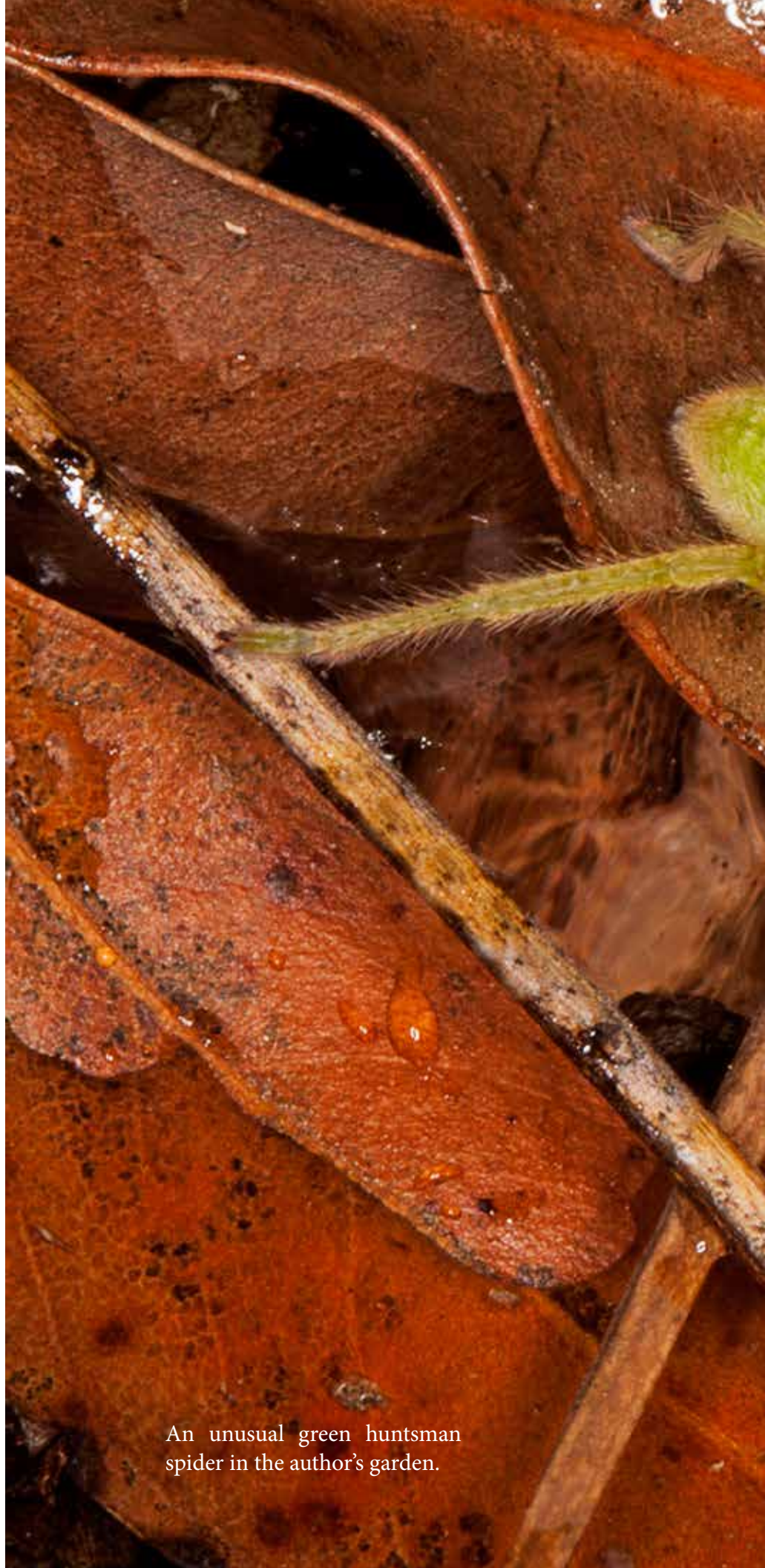
An ability to identify various species is the key to knowing which may pose a threat, and armed with a little knowledge, and with irrational fear and loathing replaced by respect and understanding, there's no necessity to reach for the Mortein, or to bring some harmless spider's life to a premature end with a stomp of a boot. Long after the human race has passed into extinction spiders will inevitably continue their evolutionary progression, oblivious to our absence. But we, reliant on their continuing existence for the preservation of our modern lifestyle, cannot afford to ignore or undervalue the critical role they play within our fragile environment.



GREEN HUNTSMAN

Neosparassus species

The green huntsman, which can be found under the loose bark of trees, in crevices among rocks, and on foliage, catches its prey by waiting in ambush for a prospective victim to pass by, rather than by constructing a web, and with its two front pairs of legs



An unusual green huntsman spider in the author's garden.



considerably longer than those at the rear of its body it's well designed to be an efficient predator.

The female of the species creates a silken egg sac and guards it until the newly hatched spiderlings emerge. Like any caring mother, she'll attempt to defend her young from danger and may become aggressive if approached while watching over her eggs, and with her bite causing humans severe pain, as well as nausea and vomiting, she's not a creature that should be provoked.



HUNTSMAN SPIDER

Heteropoda species

It's extremely difficult, even for scientific experts, to distinguish one *Heteropoda* species of spider from another without the use of a microscope, but all are known colloquially as 'huntsman spiders', and are found in most regions of Australia, other than some south-eastern areas. As their common name suggests, these large predominately brown spiders are hunters rather than web builders, and will wander into any environment that's inhabited by the tiny creatures that are their prey.

They're most active at night and are routinely seen on the interior and exterior walls and ceilings of houses, garages, and sheds, as well as in woodlands and gardens where they're well camouflaged on the bark of trees, on wooden structures, and on the ground where they hunt for their prey. And it's their lightning fast speed, together with their mottled brown or grey colouring that enables them to blend into their surroundings that are the major factors in their success as formidable predators.

They're not too fastidious when it comes to food, and a wide range of insects and other invertebrates are on their menu, and that means that these often very large spiders should be admired more than despised, for they play an invaluable role in controlling the populations of many unwelcome insects with which they share a great

diversity of habitats.

Many huntsman spiders have flattened bodies that enable them to crawl under loose bark and into narrow crevices among rocks and brickwork, and legs that, instead of bending downwards in relation to the spider's body, have joints that enable the legs to stretch forward and laterally in a crab-like fashion. It's this physical feature that has seen many huntsman spiders, some of which have a leg span of 15cms, christened with the alternative name of 'giant crab spider'.

After mating, a female huntsman spider creates a flat, white, silken egg sac in which she lays around 200 minute eggs. She carefully places it in a concealed location, which may be under the bark of a tree, on the side of a plant pot in a dark and shaded corner of a fernery, or even behind the curtain in a house, and she settles down to her maternal duties. She guards her egg sac, without taking any respite to eat, for around three weeks, and it's when the tiny spiderlings hatch and crawl from their nursery that some species of huntsman spiders provide an astounding demonstration of their strong maternal instinct.

A doting mother will often feed her young with a regurgitated slurry of her prey, and, if they're threatened, even by a human momentarily moving too close for comfort, she'll raise herself up on her long legs to enable her vast brood to shelter beneath her huge body, like a mother hen protecting her chicks. She devotedly guards her minute pale spiderlings for several weeks until the time comes for each of the new generation of these amazing creatures to set off on its own adventure in the world beyond the security of its nursery.

The young spiders, like their parents, are an important source of food for birds, reptiles, and predatory wasps, and humans who have no hesitation in eradicating a spider by stomping on it

Right: A huntsman spider camouflaged on the bark of a gum tree in the author's garden.







This female huntsman spider was guarding the egg sac that she had attached to the outside of a colourful flower pot.



A huntsman spider on the leaf of a bromeliad in the author's garden.

This giant grey huntsman spider cautiously examined a man's finger as he moved a fallen palm frond on which the spider had been hiding.







or obliterating it with a blast of poison from a can of insecticide are also their enemy. Anyone who suffers from arachnophobia can be forgiven for their fear of these gargantuan arachnids, but other members of the human race have no justifiable reason to fear these eight legged creatures that, in the scheme of things, are definitely friend not foe.

It's an undeniable fact that some species of huntsman spiders will bite if threatened, and the results, although not fatal, can include unpleasant symptoms, such as sweating, nausea, and even vomiting, and that's one very good reason to treat these amazing creatures with great respect.



Above: The face of a giant grey huntsman spider.

Opposite page: A garden orb weaver spider in the author's garden.

GIANT GREY HUNTSMAN

Holconia immanis

Large and hairy spiders can be the stuff of nightmares, and the mere thought of a close encounter with this spider, one of the largest huntsman spiders in Australia, is enough to make many people tremble in their shoes. The giant grey huntsman, which has a body length of around 50mm and legs that, when outstretched, are some 170mm across, can give a painful bite if provoked, but there's no genuine reason to fear this imposing creature. Its presence should, in fact, be welcomed, for it's a skilful predator that helps to control many insect pests.

Spiders of the genus *Holconia* inhabit most areas of mainland Australia, but *Holconia immanis*, the giant grey huntsman, is found only in eastern Australia, from Queensland to

Victoria.

With its relatively flattened body, it can hide under loose bark or shelter among the leaf litter on a forest floor or the mulch of a garden bed, and it makes itself at home in the dark corners of sheds and occasionally in houses.

With its grey to brown hairy body and legs, a dark brown to black streak on its abdomen, and eight eyes in two rows of four, the giant grey huntsman is very distinctive, and although it generally searches for prey under cover of darkness, it's often seen out and about during the day or discovered in some secluded retreat as it waits silently for a prospective victim to dawdle past.

With a similar maternal instinct to that of other huntsman spiders, the female of the species guards her white silken egg sac and protects her myriads of tiny spiderlings until the day arrives when, at the whims of a subtle breeze



and with the aid of threads of silk that act as delicate parachutes, they're carried across the landscape to begin their lives in a world where insects, the good, the bad, and the decidedly ugly, vastly outnumber the human species.



GARDEN ORB WEAVER

Eriophora species

Various species of garden orb weaver spiders can be found in forests, woodlands, and gardens throughout Australia. They're stocky brown spiders with hairy bodies and legs, with each having a decorative leaf-shaped pattern

on its triangular abdomen. And the best place to spot one of these attractive arachnids is in its large wheel-shaped web, which is usually constructed among shrubs.

During daylight hours, the garden orb weaver retreats to a sheltered area among the foliage near the top of its web, but at night it's on full alert, sitting quietly in the centre of the web, with its head facing down, waiting for its prey to fly into its sticky trap. The slightest vibration on one of the strands of the web triggers the spider into action, and its victim is quickly wrapped in a cocoon of silken threads to prevent it from escaping. And with one venomous

bite the spider finishes the job and carries its meal to the centre of its web to dine at its leisure.

Few people would add the hairy garden orb weaver spider to any list of the world's most appealing and beautiful creatures, but beauty is all in the eye of the beholder, and despite its formidable appearance, this spider is not aggressive towards humans, and its bite, in the rare case of it being inflicted on a human, causes only minor pain that acts as a sharp reminder that all spiders should be approached not with fear, but with some degree of caution.



FLAT ROCK SPIDER

Hemicloea species

The flat rock spider may not be one of the most colourful or attractive of arachnids, but when it comes to being slim there are none that can beat it.

Its colloquial name comes from its ability to be able to creep into spaces that are so small that it's hard to consider that even a drop of water could trickle in. The flat rock spider makes itself comfortable under bark, logs, and rocks in woodlands and gardens, and can often be found under bricks on a building site, and being dark grey to black in colour, it's always well camouflaged in its shaded retreats.

Its long legs are covered in fine hairs, with those at the front curving forward in readiness to grab any passing prey, for this is a species that, rather than constructing a web, actively hunts on the ground, and that rushes out from its discreet hiding place the moment an unsuspecting victim passes by.



FLOWER SPIDER

Thomisus spectabilis

The flower spider, which is found throughout Australia and that's particularly common in eastern regions of the continent, is also known as a 'crab spider', a name it owes to the fact that its front legs, with which it grabs its prey, are usually held in a position similar to that of a crab.

Females, which can vary in colour from white to yellow, are far larger and more conspicuous than males, which are usually brown, and although they often rely on camouflage to catch their prey, it's their almost limitless patience that ultimately brings results, but they don't spend their days and nights waiting for their prey to fly into a sticky web.

White spiders may conceal

Right: This flat rock spider was hiding among a pile of bricks in the author's garden.







A female flower spider in the author's garden.



This female flower spider, well camouflaged on the petals of a flower, captured a bee that was going about its business of collecting pollen. And as a bonus, the spider could feast on the unsuspecting insects that had hitched a ride on the bee's furry body.

themselves on the petals of a white flower, and yellow spiders often choose a yellow bloom as their hunting ground, but on many occasions the idea of camouflage, at least as seen by the eyes of a human, seems to have been thrown out of the window, for vivid pink or red flowers are among the flower spider's favoured haunts.

Bees, butterflies, and other insects that visit flowers to feed on their nectar and pollen are the flower spider's primary prey, and with a spider spending several days on the same flower, its patience ultimately pays off as an unsuspecting victim eventually wanders within reach.

The female of the species creates a silken egg sac, usually on the underside of a leaf, and guards it until the minute spiderlings eventually hatch and make their way onto nearby flowers to begin their lives as stealthy and patient hunters.

The bite of a flower spider signals instant death for its insect victim, and although the bite of one of these attractive little spiders has no serious consequences for any human that feels its wrath, it can cause considerable short term pain. Fortunately, the spider's instinctive reaction when a human comes within its field of vision is to scurry away, and that means that there's almost as much chance of being bitten by one of these diminutive predators as there is of being whisked away to foreign lands on a magical flying carpet.



BOLAS SPIDER

Ordgarius magnificus

These small and usually unobtrusive spiders are found in Queensland and New South Wales where they hide in secluded retreats, made of leaves bound together with silken thread, which are concealed among foliage and sometimes hidden in dark corners beneath the roofs of buildings.

The bolas spider, which has a distinctive cream to white body with two yellow conical areas and light red

swirls on its abdomen, is not easy to spot however, for females are merely 14mm across, and males, being only around 2mm, are little larger than a fat full stop.

The bolas spider belongs to the family of orb weavers, but it doesn't make a web to snare its prey, for it has a far more cunning trick up its sleeve. It takes its common name from the bolas, a simple device that stockmen in some South American countries use to catch cattle, and that consists of a rope with a weight attached to its end that, when thrown with great skill, wraps itself around the legs of an animal. And the bolas spider uses a similar technique to bring wild creatures to their knees.

It drops a silken thread, with a sticky blob attached to the end, down from its lair when its prey is hovering below, and as the spider twirls its unique weapon of choice through the air, its victim has little hope of escape. But that's not the only amazing feat that this spider can perform.

Moths are its main prey, and in order to attract them bolas spiders release an odour that's identical to that emitted by female moths when they want to attract a mate. The sensitive hairs on the spider's legs can detect the vibrations caused by the beating wings of an approaching moth, and when that happens it swings the bolas through the air, and moths that have been attracted by the spider's deception become glued to the sticky blob and their fate is inevitably sealed.

The bolas spider, like the moths it captures, is a creature of the night. During the day, it hides in its secluded haven of leaves and silk, and that makes it even harder for human eyes to see, and it's usually only the presence of its egg sacs that indicate that a female bolas spider is somewhere nearby.

The long and distinctive cream coloured egg sacs, which hold hundreds of minute eggs in their silken embrace, are unique sculptural works of art that are usually suspended from leaves, and somewhere nearby, the spider patiently guards the egg sacs and waits for her brood of spiderlings to hatch.

The amazing bolas spider cannot lay claim to being among the most beautiful of arachnids, but neither is it one that should be feared, for although its bite might cause some pain, it doesn't pose any danger to those who might be fortunate enough to discover that this secretive creature is living right on their doorstep.



Opposite page: A tiny bolas spider hides in her silken retreat above her unique egg sacs that are suspended from the leaves of a ginger plant. And while it might have been a coincidence, the egg sacs are an almost identical shape and colour to the dead flowers of the plant from which they are hanging, and are thus well camouflaged.





A male northern green jumping spider on the leaf of a rose bush in the author's garden.



A female northern green jumping spider on a bromeliad leaf in the author's garden.



A female northern green jumping spider on a leaf with her prey, another spider, in the author's garden.



NORTHERN GREEN JUMPING SPIDER

Mopsus mormon

Beauty, someone once insisted, is all in the eye of the beholder, and with this spider's species name '*mormon*' being a derivative of an ancient Greek word describing a she-monster or hobgoblin, the taxonomist who gave this wild creature its scientific name obviously didn't see it as a beautiful creature. The origins of the name of its genus are far less clear however, for *Mopsus* was a mythological Greek hero who was the son of Apollo and a revered seer who could understand the speech of birds, a talent that, as yet, is not known to be one shared by the northern green jumping spider.

This highly distinctive spider is among the largest of Australia's many species of jumping spiders, but being merely 15mm long, it's certainly not a beast of gargantuan proportions. It's found in Queensland, northern New South Wales, the Northern Territory, and Western Australia, and although it inhabits woodlands and forests, it's equally at home in urban parks and gardens.

Like many spiders, it's a master of camouflage, and with its vivid green colouring the northern green jumping spider is often hard to see when it's hunting for its prey among verdant foliage. The most conspicuous physical characteristics of the female of this species are its variable but generally leaf-green colour, the distinctive brown and white pattern on its face, and the two black lines along its tear-drop shaped abdomen. And the male, which is slightly smaller than the female, has a prominent moustache of white hairs on each side of its face.

The northern green jumping spider, rather than build a web to catch its



prey, simply leaps, with incredible agility, onto its victim and kills it with a bite that injects it with venom. And although the doomed creature, which is usually an insect or another species of spider, rapidly succumbs to the affects of the poison, humans who are unfortunate enough to be bitten by this strangely attractive little spider will suffer no more than a brief period of localised pain.



LYNX SPIDER

Oxyopes species

Lynx spiders, which are found throughout eastern Australia, thrive in a wide range of habitats, including forests and woodlands, heathlands, and gardens where they're discreetly camouflaged among flowers, grasses, and the foliage of low shrubs.

They're small but very distinctive spiders that are merely 4-10mm in

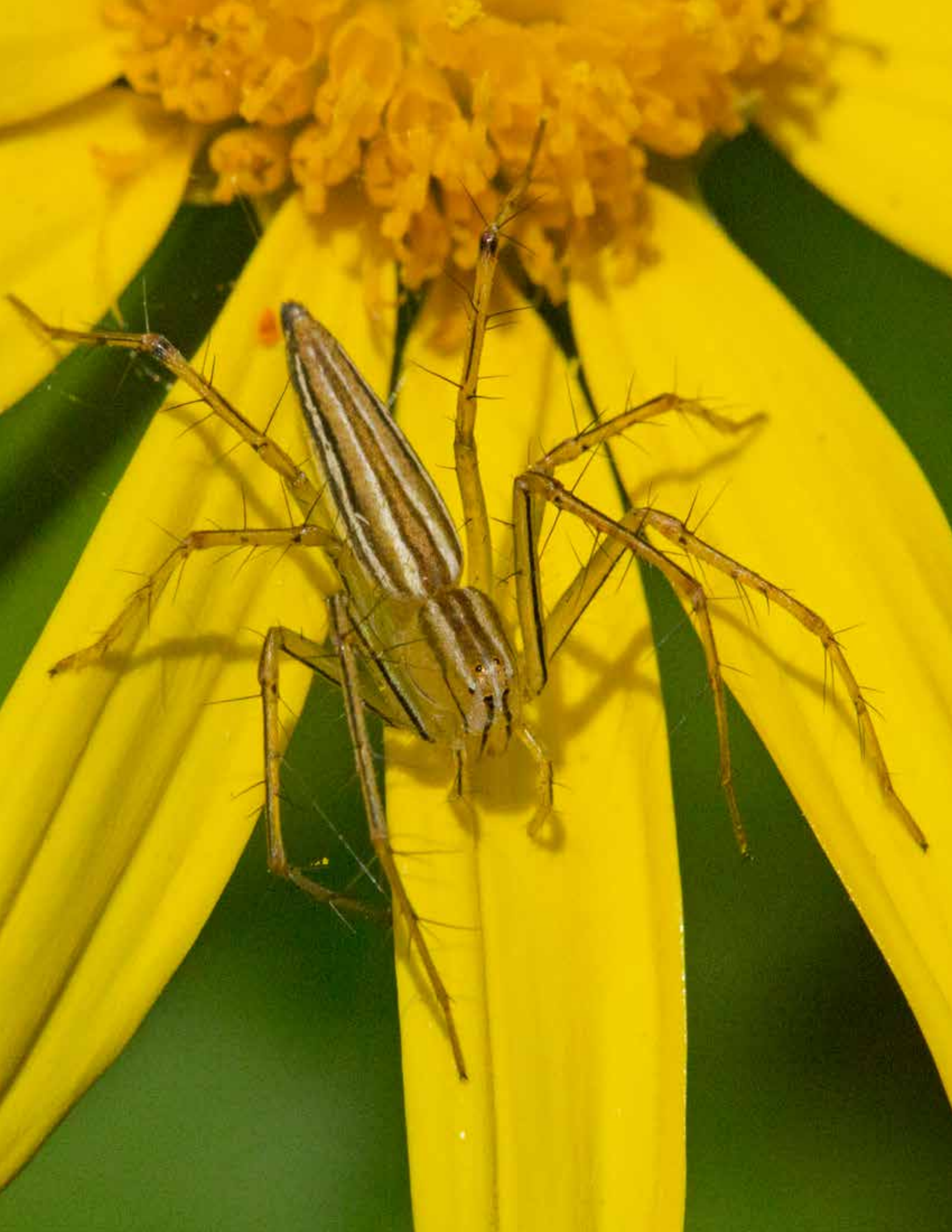
length and that have an armoury of long and savage spines on their legs, and long, slender, tear-drop shaped abdomens with distinctive stripes in varying shades of brown.

Lynx spiders don't require a web or other trap in which to catch their prey, for with eight eyes that give them an almost 360 degree view of their surroundings, and the ability to run and jump with astounding speed, these attractive little creatures are extremely efficient and ferocious hunters. They're on the prowl primarily during daylight hours, and hunt like the wild cats to which they owe their common name, for they slowly, stealthily, and silently stalk their prey, then pounce onto it with lightning speed. And like a rodent in the paws of its feline captor, there's no escape for any minute creature that's destined to provide a meal for this skilful and prickly predator.

Above: A female lynx spider with her egg sac.

Opposite page: A spiny lynx spider hunting on a flower.







NET CASTING SPIDER

Deinopis ravidus

The name of the genus to which this spider belongs has been derived from the Greek words '*deinos*' meaning 'fearful' and '*opis*' meaning 'appearance', and that's a highly accurate description of the net casting spider. Its alternative colloquial name of 'ogre-faced spider' is also quite appropriate, but although it would win no prize in any arachnid beauty contest, this is a creature that's a real winner in the field of ingenuity, for this well camouflaged brown spider, which can be found in eastern Australia and in Tasmania, has a unique trick up its sleeve when it comes to snaring its prey.

The net casting spider, which has a slender body that's about 30mm in length, usually takes life easy during the day, and with its long legs stretched out in pairs to form a cross, and its head usually held downwards, it settles down to rest on a few strands of cobweb that it's spun among vegetation or on the wall of a house or other shaded building.

When Mother Nature begins to pull the blanket of night across the sky, the net casting spider awakens, and with food on its mind, it gets to work on the construction of a trap. It doesn't build a conventional web however, but uses similar skills and strands of silk to create a rectangular net that, with the agility that only a spider can demonstrate, it holds at each corner with its four front legs. It then hangs upside down, in a location frequented by insects, holding the net beneath it, and simply waits.

Research has shown that net casting spiders, which have eight eyes, including two large ones that face forward, have excellent eyesight and can see in the dark even better than cats and owls, and the moment an insect comes within its reach, the spider leaps down and drops the net over its unsuspecting prey.

Unlike most other species of arachnids, female net casting spiders are slightly smaller than their male counterparts, but it's the female who

comes off best after mating. The male, once he's had his way with his partner, dies, and the female busily creates a small brown globular egg sac that's suspended from dry leaves that camouflage it and that offer the eggs and the spiderlings that will eventually hatch, an improved chance of survival so that they too will eventually be out and about casting their nets for a meal.



WOLF SPIDER

Lycosidae family

Early naturalists were convinced that spiders of the *Lycosidae* family hunted in packs, like wolves, and it was this erroneous assumption that gave them their common name, but wolf spiders, at most times of their lives, are solitary creatures.

More than 130 species of wolf spiders have been identified in Australia, but it's far from easy to distinguish one from another as many are of similar colouring and there's considerable variation between the hues and patterns displayed by spiders of the same species. The majority, which are dull grey, brown, or black, could never be described as beautiful, but all have one outstanding feature - their eyes.

Every wolf spider has eight eyes, including four small ones, one pair of large eyes that face forwards, and another pair of large eyes that face upwards, and this astounding optical array enables these ferocious predators to see in every direction simultaneously.

Australian wolf spiders thrive in a wide range of habitats, from rainforests, open grasslands, and suburban gardens, to arid inland areas of the continent. And while many live on the ground where they hunt among leaf litter and low vegetation for their prey, the species illustrated on the following page has a far different lifestyle to that of its many relatives, for it spends much of its life in a burrow in the ground. It may occasionally emerge from the burrow that provides it with shelter

from the heat of summer and from the biting cold of winter nights, and hunt for prey, but it prefers the patient approach, and merely waits at the entrance to its burrow and snatches any insect that wanders within its reach, or takes pot luck and dines on any hapless creature that stumbles into its lair.

A wolf spider can sense the slightest of movements on the soil surrounding its burrow, and if a predator, such as a reptile, comes too close for comfort, the spider, which is often referred to as a trapdoor spider, simply grabs the lid that it has created from grass and soil held together with silk, and pulls it down to seal itself inside its sanctuary until the danger has passed.

Female wolf spiders that live in burrows raise their young underground in silken webs, but other species, with dedication that rivals the maternal instinct of any human mother, never let their offspring out of their sight. Each carries her egg sac with her, fixed to her spinnerets, and when the horde of tiny spiderlings hatch they instinctively clamber onto their mother's back and hold on tightly while she goes about her day to day life, but if she's threatened by another wolf spider, the spiderlings temporarily abandon her. She'll fight to the death to save herself and her young, but spiderlings have no parental loyalties, and when the battle comes to its conclusion, they scramble onto the back of the victor who carries them into their future.

Wolf spiders may demonstrate aggression towards each other, but although they pose no serious threat to humans, their bite can be extremely painful, with victims suffering from a range of unpleasant symptoms that ensure that their close encounters with these wild creatures are memorable ones for all the wrong reasons.



Opposite page: A net casting spider in the author's garden.

A wolf spider closing the lid of its burrow
in south-western Queensland.



