Introduction

This is a book about an often misunderstood, sometimes feared group of animals, illustrated with beautiful images and informed by good science. Its simple aim is to inspire interest in the natural world and its invertebrate wonders.

As a child, you might have been lucky enough to play in local creeks, scooping up shrimps and water beetles in a jar with rainbow fish, tadpoles, skaters and dragonfly nymphs. The aim of this book is to inspire a similar wonder, delight and interest in tiny jewel-like spiders glinting from their hiding places under leaves, or large spiders of ancient lineages, spending their lives underground. To be able to identify and understand these creatures will surely make the time you spend in natural places more vibrant and meaningful.

Popular nature guides are well-trodden ground, if not for spiders, then for many other groups of animals. Most of all, birds and butterflies are the clear winners in the field-guide genre. But why stop there? Birds and butterflies might be just the beginning. There is so much more out there.

If you are already a backyard naturalist, you may have ventured into the world of

Who doesn't like a good mystery? These spiders have a pebble-encrusted retreat suspended above a horizontal orb web pulled up at the centre. You don't see that every day. Strangely, they seem to resemble spiders from Brazil, notably the Twelve-spotted Spilasma. Laurence Sanders discovered this unusual critter about 15 km west of Emerald in a strip of land between the highway and the railway line. Researchers at the George Washington University in Washington D.C. are on the case. DNA analysis so far has suggested this is a quite independent case of pebble-encrusted retreats and this spider is related to *Arachnura*, not at all related to *Spilasma*. Such mysteries are an almost everyday occurrence in arachnology and it is discoveries like this that make spidering so much fun. PHOTOS: LAURENCE SANDERS ♀ 4 mm

insects, bugs, beetles and moths. There are guides to help you identify Blue-banded Bees, Harlequin Bugs, Jewel Beetles, Damselflies, Katydids, Lacewings and Mantids.

And then you come to spiders. A few are dangerous, most are bright and beautiful, while some are cheeky and disarming.

They belong to the world of the small, the world of invertebrates, a world which has irrevocably changed with the advent of modern digital cameras, magnifying lenses and super-macro settings. New vistas have opened up, the colours stunning, the structures complex and fascinating, the variety endless.

You now have the guide book in your hands and you are ready to absorb spider knowledge.

But the very first thing one learns about Australian spiders is that our knowledge is embarrassingly incomplete. Amazingly there are still many more unknown spiders than known ones.

The current explorers of this field know all too well how much there is still to learn. If you join them you are very likely, within a few days, to discover an undescribed species yourself, a species new to science. That's exciting and pretty rare in biological studies. There are not many groups of animals visible to the naked eye which have so many new species to discover in your own backyard or in nearby bush. The adventure of discovering and naming new species is just the beginning. How do these species function? How do they fit into food webs? What are their ecological roles, their life cycles, behaviours, strengths and weaknesses?

In answering these questions, not only can you satisfy your own curiosity, you can also contribute to the world's knowledge of nature. Let's face it, there couldn't be a better time to discover new nature – before it disappears.

Before going any further, here's a question. What's your level of spider knowledge? How much do you know? Very little, quite a bit, or lots?

If you answered lots, you are one of very few Australians.

Apart from the Sydney Funnelweb, St Andrews Cross, the Redback, the Huntsman, Daddy Long-legs and Garden Orb-weaver, most Australian spiders are virtually unknown to the general public, even to many naturalists.

This is rather odd, in a world that explores distant galaxies and the depths of the oceans, because spiders are everywhere and often close by. They occupy virtually every possible habitat niche and every continent. There is even a small jumping spider known to live at an altitude of 6,700 metres on Mount Everest, making it one of the highest-altitude creatures on Earth.

Spiders are also early colonisers. When the remains of the 1883 volcanic explosion of Krakatau were explored in 1884, the only living thing on the island was a tiny spider, found in a crevice.

Has anyone tried to calculate how many spiders there might be, in total?

Yes, actually. In 1939 British arachnologist W. S. Bristowe calculated that in one Sussex field there were at certain seasons more than 2,000,000 spiders to the acre. This translates to an amazing 500 per square metre, which admittedly stretches credulity. In 1999 Martin Nyffeler of the University of Bern reworked the calculations (using

Opposite *Sphecotheres vieilloti* Australasian Figbird ♂ Brisbane QLD PHOTO: ANNE JONES. Will spiders ever become as popular as birds? Probably not. But surely they deserve more love and affection than they presently get.

data available since Bristowe's original 1939 estimates) finding a much more reasonable average of 200 per square metre.

Whether there are 500 or 200 spiders per square metre in optimal conditions, the simple fact is there are lots of spiders out there, and more than the ones you normally see. There are spiders in the forest canopy, under leaves, under bark, in leaf litter and underground. There are also spiders so small they are simply overlooked, and others so well camouflaged you miss them even in plain sight.

In Australia, most of them are undescribed. Elsewhere this is not the case. Occasionally previously-undescribed British species are found but they are a rarity rather than an everyday occurrence. In Japan and Germany previously-undescribed species are so rare, if you discovered one you would probably be carried through the streets on the shoulders of Ministers of the Environment.

The total number of Australian spider species is probably around 15,000 to 20,000. So far only 4,000 of them have been described, a small percentage.

Euryattus ventralis Creeping Jumping Spider ♀ Cape York QLD PHOTO: ROBERT WHYTE. This is not a new species but it is the first recorded Australian specimen of this species normally found in PNG (and its neighbours). Thanks to its describer Jerzy Prószyński for identification. ♀ 8 mm ♂ 7 mm

Why are so many spiders unknown?

Australia is a vast, old continent and it has been on its own, separated from other land masses, for a long, long time. Around 80 million years ago Australia and its most recent companion, Antarctica, began slowly separating. Africa and South America were far distant, even though they were still attached to Antarctica.

Around 46 million years ago Australia began moving rapidly north towards the Equator, finally completing its separation from Antarctica, becoming a true island continent. Drying began in the north, eventually reaching the Nullarbor, while the far north drifted into the tropics where it came under the influence of a monsoon climate.

The result of all this has been plenty of time for separate evolution. This is why more than 90 per cent of Australia's invertebrate species are known nowhere else.

Western science has been operating in Australia for not much over 200 years, nowhere near enough time to explore every nook and cranny; secondly much of Australia is harsh, making exploration is difficult.

Austracantha minax Australian Christmas Jewel Spider ♀ Glenmorgan QLD PHOTO: ROBERT WHYTE. A common and much-loved spider throughout Australia, sometimes found in large groups (with overlapping webs) in a range of habitats. ♀ 8 mm ♂ 4 mm

Is the challenge too big? Not really. It is certainly a big challenge, but citizen science is helping. Will all Australia's spiders be known one day? Unlikely. Their diversity is mind-boggling. The closer you look, the more you find. One simply has to accept this world of the small, the engine room of ecosystems everywhere, is something that may never completely mapped, defined or written down. But this shouldn't stop us trying.

For many groups of Australian invertebrates, progress is being made. Lavishly illustrated field guides cover more species of moths, beetles, dragonflies, butterflies, stick insects, even cockroaches, than ever before.

This guide to the spiders of Australia is designed to be a welcome addition to the libraries of naturalists, scientists, students, farmers, gardeners and the general public.

Everyone has a story about spiders and most people have an opinion about them. More and more the opinions are becoming favourable as people learn spiders are fascinating and wonderful to photograph.

The vast majority of spiders are harmless and all of them, in fact, are beneficial.

Australomisidia pilula Lozenge-shaped Crab Spider ♂ Central Highlands TAS PHOTO: ROBERT WHYTE. This spider was previously in the genus *Diaea*. A modern revision by Pawel Szymkowiak has found there are no genuine *Diaea* spp. in Australia. They have all been moved to new genera, see page 352.
♀ 6 mm ♂ 4 mm

Argiope keyserlingi St Andrews Cross Spider ♀ Brisbane QLD PHOTO: ROBERT WHYTE. This is one of the more recognizable and easily-identified Australian spiders. ♀ 20 mm ♂ 5 mm

From arachnophobia to arachnophilia

Fear of spiders is learned. It is not innate. It is one of those fears switched on or not in early childhood. It is learned from people around the child who make the 'disgust-and-horror' face when they see a spider. In other cultures where eating spiders is routine, this fear is not expressed and therefore it is not switched on.

While fear of spiders is an acquired fear, it is still very real. Some arachnophobes have lived severely limited lives because of their phobia. The good news is – arachnophobia can be unlearned. With careful desensitisation and a positive outlook, fear can be overcome, even reversed.

Spiders: learning to love them by Lynne Kelly tells the story of how Lynne overcame her night terrors by studying spiders in her garden.

It took Lynne six months of close observations of the spiders around her house before the fear went completely. After the fear, came the fascination. Lynne still studies spiders and has got to know many of the world's leading arachnologists.

Undescribed *Jotus* sp. ♂ Barron Gorge QLD PHOTO: ROBERT WHYTE. When beginning to cure your arachnophobia and desensitising yourself to reduce fear of spiders, it's probably best not to start with a big, hairy Huntsman. Why not try this adorable jumping spider, only 3 mm long, completely harmless to humans and extraordinarily cute. You can get to know it and maybe even give it a name. ♀ 4.5 mm ♂ 3 mm

How to use this book

After an initial skim through, it's likely most people will take this book off the shelf when they have a spider they want to identify.

After a while, you may know which part of the book to go to, whether it be to identify a mostly ground-dwelling mygalomorph spider or a daytime hunter on foliage. The pages of your favourite groups might become dog-eared, tea-stained or coffee-splattered. If so the book is proving its worth.

The information with each photograph will tell you where in Australia the spider specimen was found and in what type of habitat, one or two significant facts and the approximate maximum size of females and males.

In many cases spiders encountered in the main sections of this book will be fairly easy to find, commonly noticed, reasonably large and often attractive. There is a separate section for spiders in little-known families which might be hard to find, remote, rare or extremely small.

Argiope ocyaloides Bark-hugging St Andrews Cross Spider ♀ Collinsville QLD PHOTO: ED NIEUWENHUYS. This is a spider in the family Araneidae, subfamily Argiopinae, known for its interesting web patterns. ♀ 14 mm ♂ 4 mm.

Oxyopes sp. A lynx spider JUV Henbury Station NT PHOTO: ROBERT WHYTE. This species cannot be identified with certainty because it is juvenile. Only adults have all the features necessary for confident identification.

Information on biology

Biology, as a broad term, refers to lifestyle, behaviour, reproductive and mating habits, prey capture, and so on. It usually involves observations in the field. To say very little is known about the biology of a species would apply to so many spiders in this book it would become tediously repetitive. The reason so little is known is because many were described in the 19th century from preserved specimens sent back to Switzerland, Holland, Germany, France, Britain or Italy. The author in many cases did not see a living specimen, let alone one in the wild. The knowledge gaps are only now beginning to be filled, as scientists and citizen scientists make more observations in the field.

What if I find a spider outside its range?

Ranges for Australian spiders are extremely difficult to specify, as so little is known. Surprises pop up all the time. A few spiders are presently known from small ranges, but even this may change over time when more information is gathered.

Coverage

Images from all states and territories have been included. The east and particularly the north east of Australia are well represented as this is a region of extremely high species diversity.

Special trips to other states and participation in the Federal Government's Australian Biological Resources Study program Bush Blitz have added many remote locations including the deserts of Western Australia,

Maratus purcellae Purcell's Peacock Spider ♂ Brisbane QLD PHOTO: IAIN R. MACAULAY. Don't let the size of the image on the page fool you. This spider is extremely small (total body length of only 1.8 mm) even though a full-grown male. ♀ 3 mm ♂ 2 mm

mist forests of Tasmania, rocky gorges of the Kimberley, snowy peaks, swift rivers, the arid centre, the far northern coastlines and the tip of Cape York.

A generous arachnological community has provided photographs from even more locations. As a result this book is the most comprehensive popular account of Australian spiders ever published.

But as comprehensive as this book might be, there are always more spiders. There are spiders known but elusive and others no one has seen for decades, possibly extinct. Range extensions, new species, new genera and even new families are being added to the Australian lists all the time. The website *arachne.org.au*, a companion to this book, will be updated whenever possible.

Can I tell how big by the photo?

The scale of each photograph differs.

In other words the photos are not to scale relative to each other. A small spider can look big in a photo and a big spider can look small. But each photo caption has the body length for the spider, for example, the spider on the facing page is accompanied by the symbols and measurements ♀ 3 mm ♂ 2 mm meaning the female has a body length of 3 mm and the male a body length of 2 mm. If the body length of either sex is not included it is because it is not known. Juveniles are signified JUV.

Measurements, for example ♀ 24 mm ♂ 12 mm, refer to the average upper limit of body length, from the front of the cephalothorax (front segment) to the rear of the abdomen (rear segment).

Neosparassus sp. Badge Huntsman Spider ♀ Fish River Station NT PHOTO: ROBERT WHYTE. Bigger than it looks. This spider and the one on the previous page could hardly be more different. This Huntsman Spider, by no means the largest Australian spider, is around 20 times the size of the one to the left. It hunts by night, the other hunts by day. ♀ 35 mm