Introduction

If you want to live and thrive, let the spider run alive.
An old proverb I learned as a child

I was never going to get the pony I wanted, so I settled for an ant farm at an early age.

I have no idea where this interest in bugs and nature came from. Maybe it was my grandparents, who had a beautiful garden and looked out for the birds. But, despite being featured in our local paper at the age of eleven as a birdwatcher with a pair of binoculars around my neck, I was never as keen on birds as bugs. My eyes were downwards focused. Ants featured frequently in my garden wanderings, to the frustration of my mother, who poured boiling water on the nests near the house. But the ants kept coming and their social behaviour was deeply fascinating. Where were they all going and why did they carry the dead bodies of fellow ants around? I collected them from the garden and kept them in an old ice cream tub in my room to more easily observe them. However, I was untrained in the art of ant care and they failed to thrive, died or made their escape from the inhospitable world of a girl's bedroom.

My first literary introductions to bugs were the Collins insect guides and *The Country Diary of an Edwardian Lady* by Edith Holden, which I was given for my birthday. This was a posthumous publication of Holden's observations and poetry,

alongside charming drawings of birds, plants and insects. While I had no gift for drawing, I found the book captivating and my interest with invertebrates has never left. With inspiring teachers I was encouraged to study biology. One teacher secured me a post-exam summer job at a local research institute, which was a dreamy alternative to shelf stacking. I spent many hours with one of the world's leading bee experts, counting bees in and out of hives, with or without pollen sacks. We were testing which pheromones (the chemical signals bees use to communicate) encouraged foraging and which triggered fight or flight behaviours. At that point, my insect love was probably fixed forever – as anyone who has studied bees cannot fail to fall in love with them.

In later years, I investigated many pest species including rats, aphids, leaf miner flies and cockroaches, the last of which I developed a deep respect for. These unfairly maligned insects are remarkably sleek, and fast, too, as I found when I tried to catch escapees in the laboratory. They are highly adaptable, able to live in a huge variety of habitats and feed on many different foods. Some even produce milk for their babies. I was investigating ways to control them but, really, it is us whom we need to control better.

I have spent around thirty years as an environmental campaigner, researcher and lobbyist, and through all that time, invertebrates have been such a strong motivator for carrying on when despair could easily have set in. Having children reinforced for me the need to protect the planet they would inherit. The additional joy in seeing your child's complete fascination for a worm was a major bonus. We bred stick insects as pets for my young boys, which I know they will always remember. And my insect passion remains very much alive – I had a giraffe-necked weevil (unique to Madagascar) tattooed on my shoulder for my fiftieth birthday.

But the past decades of overuse of the world's resources have been hugely damaging, despite the work of campaigners, scientists and communities to protect the environment and the natural beauty of this world. There is growing evidence of a major crisis in invertebrate populations and it's clear that we can't carry on with business as usual.

Less scientifically, but potentially driving new public interest, those of a certain age (including myself) have noticed the strange absence of bug-splattered windscreens. When I was young and went on family trips through England, the windscreen and headlights of our car would be thick with dead bodies when we arrived at our destination. We also see far fewer butterflies or wasps around when we picnic or stroll in the countryside – the iconic stars of a huge cast of species that underpin life on earth have seemingly vanished.

This may seem overdramatic, and invertebrates as a whole are unlikely to go extinct, yet many studies at a national, and even global, scale are showing crashes in both the number and diversity of insects and other bugs. One recent study in 2019 drew from 73 reports of insect declines from around the world, echoing many other studies showing a disturbing trend. Their review suggested that over 40 per cent of insect species are in decline and so at risk of extinction over the next decades, more than twice that of vertebrate species.[1] There were strong critiques of the study methods, but previous analyses have shown similar declines but received less attention. We also don't really know what we are losing. In addition to the one million identified types of insect, there may be over four million yet undiscovered species. And that is just the insects. Millions of other invertebrates, on land and sea, are also undiscovered. We have not yet catalogued far more species than those we have recorded, and they may be lost through deforestation and other actions before we get chance to do so.

So most global analyses are beginning to indicate that we are seeing a major loss of numbers and diversity of species worldwide as well as locally – and even global extinctions.[2] In the UK alone, twenty-three bee and wasp species have become extinct since 1850, while the number of pesticide applications, a key factor in wildlife harm, has almost doubled in the twenty-five years from 1995.[3] According to Buglife, an organisation formed in 2000 to champion the invertebrate cause, in the UK: 'butterflies, moths, bees, wasps, and dung beetles are amongst the most at risk, along with freshwater insects such as stoneflies, caddisflies and mayflies.' It is a depleted world, which we are creating. And, as I finish this book in 2020, the world has been turned upside down by the Covid-19 pandemic. Scientists are warning that this pandemic has revealed how far we have disrupted the natural systems through forest destruction, industrial-scale farming and the pushing of small-scale farmers further out to the margins.

We should learn the lessons from this, and also from invertebrates, how to fit into and live with nature, rather that assume we are above it and can fix any threats through science and technology.

So, what do I mean by 'rebugging'? My crucial proposition is that we can all rewild by rebugging, and that there is far more to rebugging than site-based actions – we need to rebug our lives, too. Rewilding is mainly defined as the reintroduction of almost-natural systems, and often missing species, into areas and then leaving nature largely to take care of itself. It has become an extremely popular and often controversial issue, given the huge pressure on land use, but there are inspiring examples of rewilding which I explore more in chapter 3.

But for me rebugging means this and more. We also need to join with others and act as citizens, to make the bigger

policy changes. It matters how we live, how we buy stuff and how we engage in society.

This book also aims to gladden hearts with great tales and learnings of the invertebrate world, bring awareness of their demise and, finally, give readers the tools to act. It does not pull punches when it comes to the difficult, political, social

What do I mean by 'bugs' and 'rebugging'?

Let me take a moment to explain. The word 'bug' is often used to refer to tiny creatures that crawl along, such as insects and even small animals that are not insects: spiders, millipedes, worms and water-dwelling creatures. Scientists use the word bug in a more specific way to mean insects that have mouthparts adapted for piercing and sucking; these are known as 'true bugs' and include aphids, cicadas, spittle bugs (they sit in that spit you find on plant stems) and shield bugs.

For this book, I use a broader biological definition, which may seem more familiar: bugs are small creatures that do not have a vertebral or spinal column – called 'invertebrates' – and which are in the arthropod (insects, arachnids, crustaceans and myriapods) and annelid (earthworms and leeches) families. I occasionally stray into other taxonomic groups, such as slugs, for reasons you will discover.